

Network Strategy Plan 2020-2029



Foreword by the Director Network Management EUROCONTROL and Chairman of the Network Management Board

The **Network Strategy Plan 2020-2029** has been developed cooperatively between the EUROCONTROL Network Manager and Network Operational Stakeholders – the Air Navigation Service Providers, Airspace Users, Airports and the Military.

The Network Strategy Plan illustrates the long-term perspective of the Network and aims to define the main steps to achieve the Network Performance Targets for RP3 and the further evolutions beyond. The Network Strategy Plan has been endorsed by the Network Management Board on 27 June 2019, (subject to any regulatory changes that will require new consultation), and has been formally adopted through a decision of the European Commission on [xxx].

In the next 10 years, it is expected that air traffic will continue to rapidly grow with volatility in demand. ATM network capacity and scalability should evolve accordingly in order to limit the expected increase in ATFM delay. In this context, **the Network Strategy Plan defines the strategic directions** to be followed to enable the **implementation of the Network Vision**, promoting the **need of a network-centric approach**, meaning that all ATM Stakeholders in the Network will be able to acknowledge that the Network improvements are beneficial for all, at both the network and local level.

The Network Strategy Plan defines the vision for the evolution of the Network over the next decade, translating its implementation in **10 Strategic Objectives to be achieved through an extensive Collaborative Decision-Making process (CDM)** involving NM and all operational stakeholders (ANSPs, Airspace Users, Airports and Military).

The European Network is experiencing a **capacity crunch** affecting the overall Network capacity through RP3 and the **Network Strategy Plan defines several initiatives to be implemented in the first five years**, addressing both capacity and flight efficiency improvements. **Concrete actions** related to **airspace re-configuration, operational excellence and full integration of airports in the Network** are included in the Network Strategy Plan, with the aim at ensuring a well-managed recovery of network performance over RP3. This is in addition to the overall strategic vision for the next decade.

Environmental sustainability will be further enhanced, and it will be given the necessary priority, in line with the SES performance ambitions. All partners of the ATM Network will **cooperate to enable better trajectories and accelerate the implementation of innovations supporting greener aviation**.

In parallel, **new operational concepts** supporting interoperable and secure information management systems and tools, will be key to helping solve the capacity challenge and deliver the required operational performance. This includes both systems and tools at a local level, as well as the Network Manager systems and tools that will go through a vast modernisation process. The Network Strategy Plan supports a **more focused SESAR R&D** on innovative concepts like **4D trajectory management, target times, integration of airports within the Network and SWIM**, whilst simultaneously ensuring that new operational concepts are **validated** and implemented in a coordinated manner across all network stakeholders.

A continuous **monitoring** of the availability of the **CNS infrastructure** of the European ATM Network is established. The Network Strategy Plan supports the **move towards an optimised ATM/CNS infrastructure and services**, in order to allow further increased performance (through the transition towards an agile and scalable ATM Network) and to reach more efficient Network operations and services.

All actors of the ATM Network will contribute to **improving safety** in line with the SES performance targets, through **identifying and assessing Network operational safety hazards and risks**. Where necessary, they will be adopting **higher security standards** to cope with any potential increase in international security risks, including terrorism and cyber-attacks and will be acting cooperatively to share any information on risks under a **strengthened crisis management process**.

The **Network Optimisation approach** will foster initiatives for **more flexible working arrangements**. This may include a variety of measures, to be applied according to the local context. Some examples to be considered are:

- improved night/weekend rostering;
- ATCO functional mobility;
- staff mobility (if financially and operationally viable);
- cross-unit provision of Air Traffic Services (ATS).

In the longer-term, the operational implementation of the most disruptive SESAR technologies will require **appropriate addressing of the human factor dimension**.

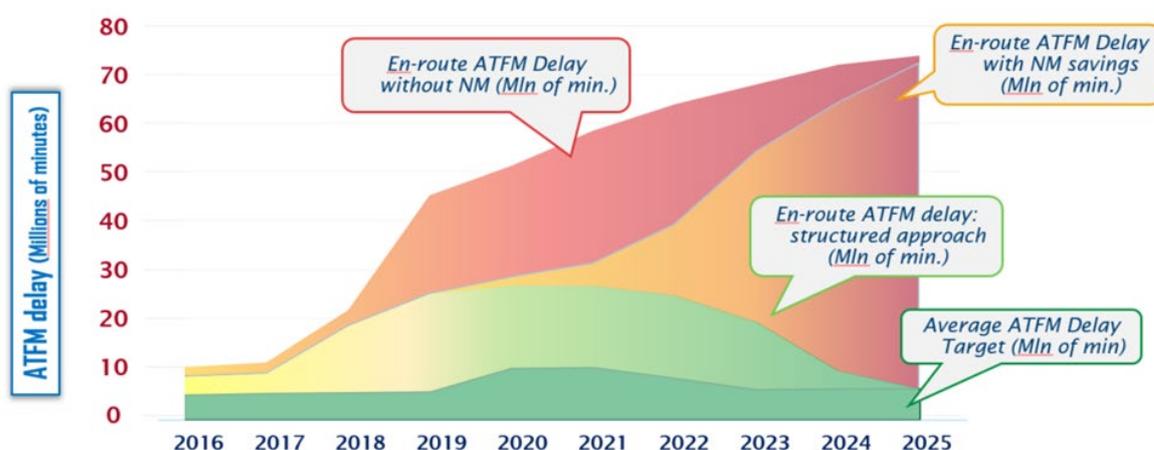
The Network operational stakeholders will cooperate on developing excellence in all ATM technological and operational areas, acting jointly through partnerships to grow at a global level. **The Network Manager will support the European aviation industry** by promoting the concept of 'Global Network of Networks' worldwide and by helping develop operational arrangements beyond Europe.

One of the most relevant aspects of the Network Strategy Plan is the **balance between the Network perspective and the local operational and business needs**. The pace of adoption of a Network-centric culture shall be enhanced as much as possible to encourage faster benefit realisation for the benefit of the network, through greater convergence on actions by all stakeholders.

The **commitment to the Network is paramount** to achieve both Network and local targets, as any lack of commitment can severely affect the Network performance. A **much more robust Collaborative Decision-Making (CDM) process** will be needed, allowing NM, together with the operational stakeholders, to deliver the Network-centric actions.

The Network operational stakeholders and the Network Manager will work together to drive the transformation of the Network and to deliver Network Functions, as well as other operational/technical services for highly-performing ATM. Delivering the **Network Strategy will become everyone's job**.

Make Strategy everyone's job



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Table of Contents

1	Introduction	5
1.1	Purpose and scope of the Network Strategy Plan	5
1.2	Preparation of the Plan and validation process	6
1.3	Progress from NSP implementation in RP2	6
2	Overall context and requirements	11
2.1	Trends, challenges and opportunities	11
2.1.1	Traffic forecast	11
2.1.2	Single European Sky implementation	14
2.1.3	Global ATM modernisation	14
2.2	Current and planned network situation	15
2.2.1	ATFM function	15
2.2.2	Network design (ERND) function	15
2.2.3	Scarce resources functions	16
2.2.4	Airports	16
2.2.5	Crisis Management	17
2.2.6	Other NM tasks	17
2.2.7	Summarised Network Situation	17
2.3	Network performance objectives & business requirements	18
2.3.1	Safety	18
2.3.2	Capacity	18
2.3.3	Environment (flight efficiency)	19
2.3.4	Cost efficiency	20
2.3.5	Operational Stakeholders' business requirements	20
3.	Strategic Vision	22
3.1	Why: Serving the Aviation Strategy for Europe	22
3.2	What: Network Vision 2030	24
3.3	When: Steps of the journey towards 2029 and beyond	25
3.4	Deriving strategic objectives from the Network Vision	26
3.5	Compliance with the Performance Scheme	27
3.6	Consistency with the European ATM Master Plan	29
3.7	Consistency with the common projects set up in accordance with Commission Implementing Regulation (EU) No 409/2013	31
4.	Strategic objectives	32
4.1.	Detailing the Strategic Objectives	32
4.1.1.	SO 1: Manage network performance through 'Network-minded' decision-making	32
4.1.2.	SO 2: Deploy and integrate interoperable and secure information management systems	33
4.1.3.	SO 3: Optimise Network design	33
4.1.4.	SO 4: Optimise Network operations	34
4.1.5.	SO 5: Develop European connectivity and airport services	35
4.1.6.	SO 6: Ensure network safety and security and reinforce crisis management	35
4.1.7.	SO 7: Optimise ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services	36
4.1.8.	SO 8: Develop the network human capital and improve its flexibility through excellence	37
4.1.9.	SO 9: Improve environmental sustainability	37
4.1.10.	SO 10: Support European aviation at global level	38
4.2.	Cooperative aspects of the participating operational stakeholders in terms of roles and responsibilities	38
4.3.	Strategic Objectives and Performance and Regulatory Requirements	38
4.4.	Measuring NSP progress towards the objectives	38
4.5.	Impact on industry and other concerned areas	39
5.	Strategic Planning	40
5.1.	Short and Medium Term Planning	40
5.2.	Long Term Planning	52
5.3.	Cost, benefits and business case	55
6	Risk Assessment and Mitigation	56
6.1	Risk associated with the plan	56
6.2	Description of the monitoring process/Risk management	58
7	Recommendations	59
8	Annexes	60
	Annex A- List of Acronyms	60

1 Introduction

1.1 Purpose and scope of the Network Strategy Plan

The Network Strategy Plan (NSP) framework is defined by Commission Implementing Regulation (EU) 2019/123 of 24 January 2019, laying down detailed rules for the implementation of air traffic management (ATM) network functions and repealing Commission Regulation (EU) No 677/2011 and Commission Implementing Regulation (EU) 2019/317 of 11 February 2019, laying down a performance and charging scheme in the single European sky and repealing Implementing Regulations (EU) No 390/2013 and (EU) No 391/2013.

The NSP guides the network long-term development with the ultimate objective of achieving the performance targets for the network functions in all EU Member States and in third countries contributing to the pan-European dimension of the SES. This Network Strategy Plan makes a distinction, where necessary, between the overall network developments and the more specific Network Manager related evolutions.

The geographical scope of the Network Strategy Plan addresses the EU 28 Member States, Switzerland, Norway, associated countries and third countries that participate in the work of the Network Manager in accordance with Union law, subject to and in accordance with agreements with the Union as defined by Commission Implementing Regulation (EU) 2019/123. It also addresses the required interfaces with the wider world. This ensures close coupling of the SES Performance Scheme and the network-level optimisation. This scope is shown on Figure 1.



Fig 1: Scope

The period of application of this NSP is the 3rd and 4th reference period of the performance scheme addressing a timeline up to 2029 and directions of development beyond these reference periods.

The scope of the Network Strategy Plan addresses the network and its components, including: airports, the airspace and the interfaces that connect them, the infrastructure, resources and capabilities of the EATMN that together serve the civil and military airspace users. This will allow operational stakeholders and the Network Manager to plan, design operate and monitor the network components with a view to support network optimisation, interoperability, interconnectivity and the achievement of the agreed local and network-wide performance targets.

The Network Manager (NM) is responsible for developing and maintaining the NSP.

The document aims to provide an executive view (vision, strategic objectives, high-level plan) identifying the main actions required to implement the NSP. This third NSP has been derived from the NSP agreed in 2014 and from the requirements for RP3 and RP4. It also takes account of the prospects for the SESAR deployment phase and is fully consistent with the European ATM Master Plan and all relevant ICAO Regional and Global Air Navigation Plans.

The NSP is a rolling plan and will be updated in the medium term as appropriate.

The detailed description of the actions deriving from the NSP, as well as their evolutions, are reflected and updated through the Network Operations Plan (NOP).

1.2 Preparation of the Plan and validation process

The overall network planning process comprises the coordinated preparation of the Network Strategy Plan, the Network Operations Plan and the Network/Local Performance Plans – as summarised below.

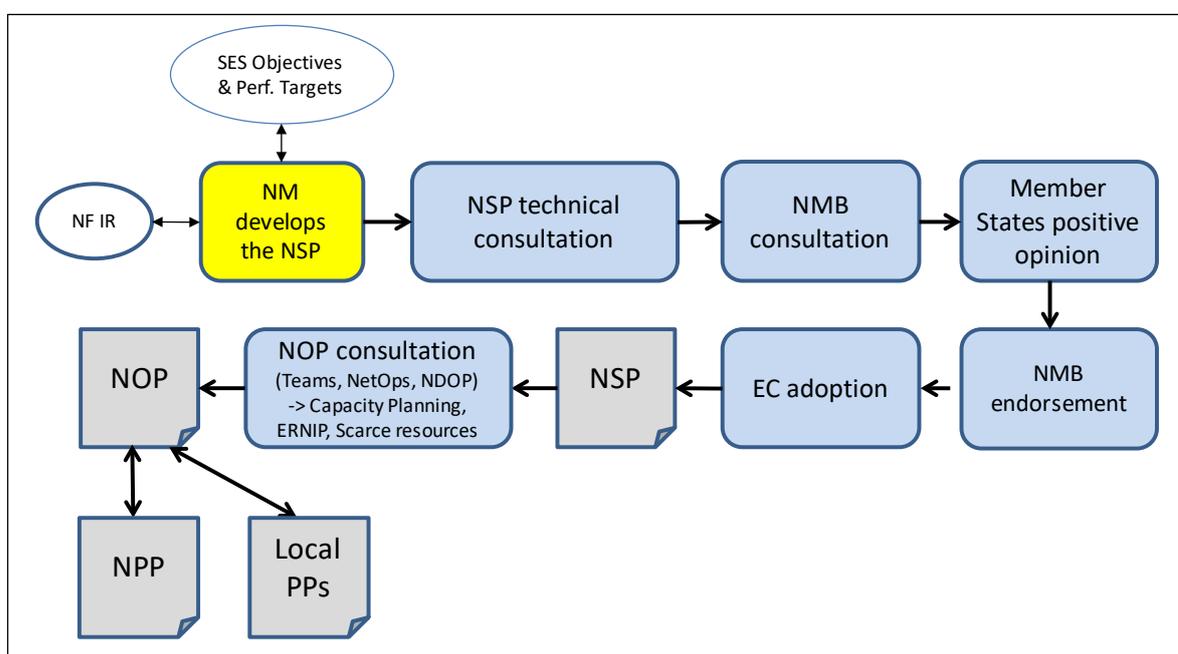


Fig 2: NSP and NOP processes

This NSP document was prepared on the basis of the feedback received from the EC, the Member States, the NDOP, and the NMB members. This NSP will be updated as necessary to take into account of the technological, institutional and economic developments which may have an impact on network performance.

1.3 Progress from NSP implementation in RP2

The performance targets and objectives are captured in the Network Performance Plan (NPP). The main performance evolutions and activities to-date are shown on Figure 3. As a result of the previous Network Strategy Plan, throughout RP2, NM addressed network operational performance issues in safety, capacity, and flight efficiency.

The Network Strategy Plan 2015-2019 defined a number of strategic objectives. The results achieved provided a fundamental contribution in maintaining a reasonable operational performance. The progress on the implementation of the Strategic Objectives included in the previous Network Strategy Plan is described in the Annual Reports of the Network Manager.



Fig 3: NM main activities

Network Capacity

The high increase in traffic (12.6% between 2015-2018), put additional pressure on the network. In this context, NM worked with its partners to enhance and optimise network capacity. En-route ATFM delay was 1.73 min/ft in 2018 double that of 2017. Weather impact, ATC capacity, ATC staffing issues, ATC industrial actions as well as external factors such as airspace volatile geo-political situations continued to create disruptions in the network.

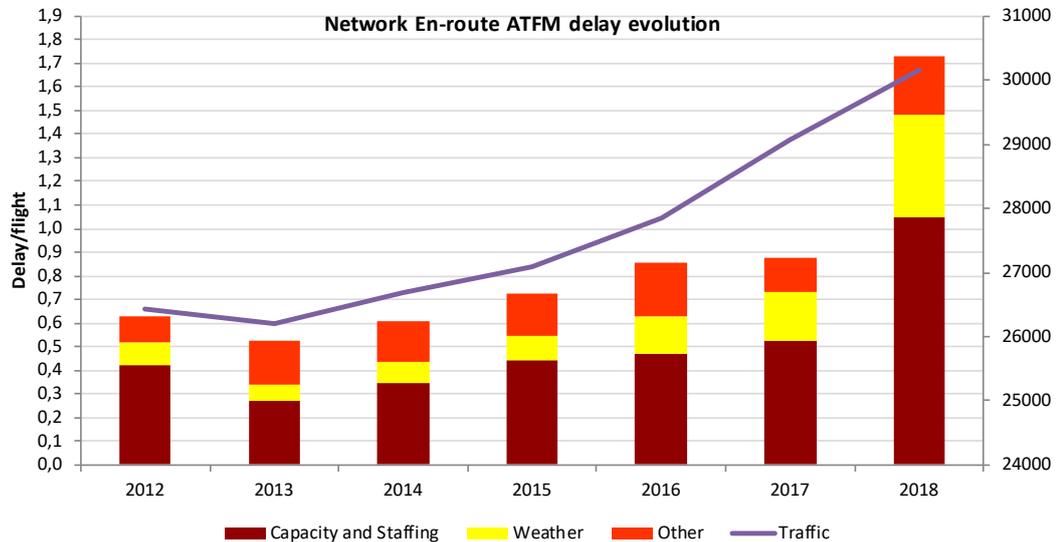


Fig 4: Network delays evolution

Almost three quarters of the European ATM network en-route ATFM delays were generated by only four ANSPs. These bottlenecks will need to be addressed with high priority in RP3.

NM's contribution to delay mitigations

The NPP defines a range of indicators so that stakeholders understand NM's added value for ATM network performance. The main objective for NM is to reduce the total en-route ATFM delays by 10%. In 2018, en-route delay mitigations exceeded 2,700,000 minutes from direct actions in NMOC (21,500,000 min) and RRP's proposed and followed by airlines (200,000 min), equivalent to 0.25 min/ft – without this, the delay in 2018 would have been 1.98 min/ft. This equates to 12.5% of the annual network en-route delay, meeting the 10% objective.

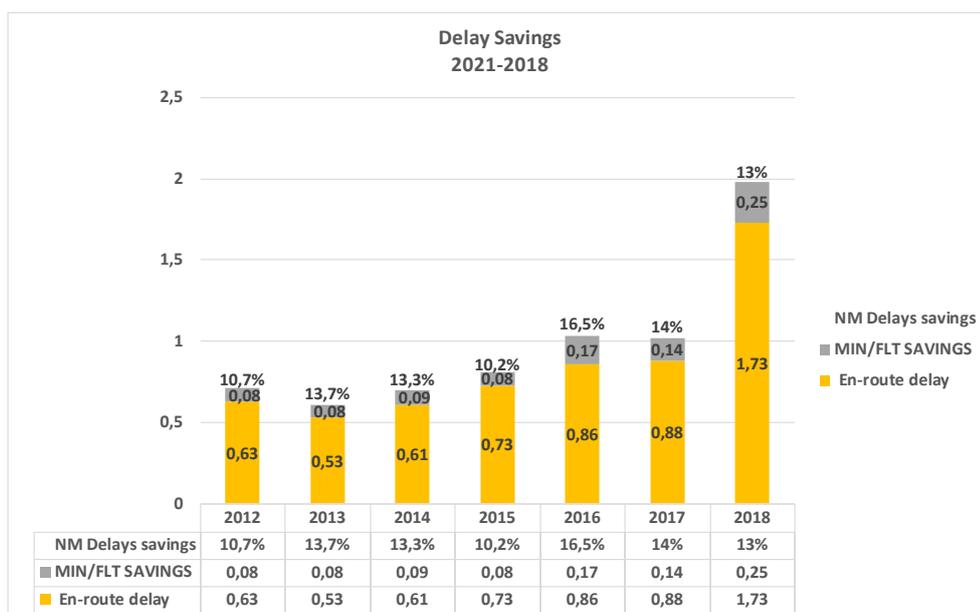


Fig 5: NM's contribution to en-route delay savings

In addition to the above, the NM pro-actively worked with the operational stakeholders in the preparation of the Network Operations Plan and subsequent capacity enhancement measures, in the preparation of detailed transition plans and mitigation measures for the implementation of major ATM projects at local and network level. While there is no quantification of those actions, they have a significant contribution in delivering additional capacity and/or mitigating short-term effects of the transition plans.

Environment - Flight Efficiency

The NPP has two environment targets.

The flight plan indicator KEP improved again in 2018, reaching 4.72%, a reduction of 0.02pp over 2017. It is however still above the target of 4.27%. The KEP for NM area showed similar improvement, reaching 4.59% in 2018.

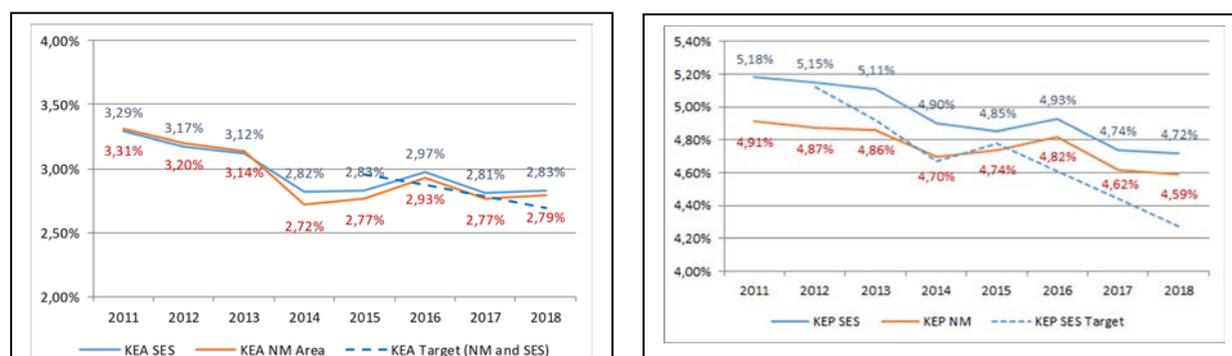


Fig 6: Flight efficiency indicators KEP & KEA

The actual trajectory indicator KEA on the other hand deteriorated slightly over 2017. The SES value of 2.83% was above the target of 2.69% while the KEA for the entire NM area was 2.79% for the same target. This 2018 performance is explained by the interaction of various factors.

On one hand are the inefficiencies caused by the on-going crises in Ukraine, the Middle East, and south Mediterranean, as well as capacity shortfalls, industrial actions and weather.

On the other hand, flight efficiency registered significant improvement brought by the implementation of Free Route Airspace (FRA) projects, which now covers the majority of European airspace. When compared to the start of RP2, the potential benefits of the airspace changes until 2024 represent approximately 160 million NMs, i.e. the equivalent of 960 000 tons of fuel saved, or reduced emissions of 3 200 000 tons, or 800 million Euros.

The differences between KEA and KEP and the trends identified for a number of flows in Europe clearly demonstrate that the airspace structure and the procedures implemented allow an efficient use of the airspace. At the same time, they indicate that there is a shift in traffic due to differences in user charges that impact both flight efficiency and traffic predictability.

NM's contributions to Flight Efficiency

The NM supported the airlines to optimise their flights from a flight efficiency perspective. The group re-routing tool (GRRT) provided better opportunities not only for refiling shorter and more efficient routes but also to allow airlines to identify possible inefficiencies in their flight planning. Re-routing proposals (RRPs) for flight efficiency were provided to the airlines that opt-in for this service. The NM Guidance Material for Computer Flight Plan Service Providers (CFSPs) supports an improvement of the flight plans filed on behalf of the air operators.

The NM combined GRRT and RRP mechanism delivered savings of more than 59,000 nautical miles in 2018. While the combined proposals made exceeded the 5% objective of the NM flight efficiency savings, due to low acceptance rate the confirmed route changes matching the proposals were much lower than the objective, as only less than 10% of the re-routed proposals were immediately accepted.

NM's contribution to operational safety

NM has a safety approach to network operations built around a harmonised ATM network safety management system (SMS) and ensuring a 'just culture' within the ATM network. NM and stakeholders had developed and deployed SMS best practices, operational safety improvement tools and methods, and learning and sharing of safety knowledge across the network. They have also promoted 'just culture' as a key enabler for improving European aviation safety.

One of the main activities of the NM network safety domain was the identification of the operational safety hazards at Network Level and the assessment of the associated safety risk. The top 5 process identifies those operational hazards that have network-wide commonality and require network-wide consolidation of knowledge by all actors because of the low probabilities of occurrence, spread of the knowledge and sensitivity of the detailed information needed.

2 Overall context and requirements

2.1 Trends, challenges and opportunities

2.1.1 Traffic forecast

Preamble

The NSP makes the assumption that all planning shall be done on the basis of the most demanding traffic scenarios (traffic levels and/or complexity) to ensure that any fluctuations of the demand in the network will be appropriately covered and that a reserve of performance is created and anticipated.

Traffic assumptions in the NSP

The NSP has been drafted taking into account the EUROCONTROL Seven-Year- Forecast1 2019-2025 issued in February 2019. This foresees an average annual growth in traffic movements of between 0.7% (low), 2,0% (baseline), and 3.1% (high) for the period 2019-2025 in Europe (ECAC). This forecast comes after a significant traffic growth in the first part of RP2 of approximately 12.6% over the period 2014-2018. This creates significant challenges for all operational stakeholders in responding to the overall performance requirements.

Economic context and network forecast

Air transport has long seen cycles of growth driven by world-wide economic expansion. Historically, this generated an average annual flight growth of 3-4 percent. There were also periods of economic crisis that lead to a traffic decline. To ensure predictability of the overall network performance, it is important that planning assumptions still consider the most demanding scenarios, depending on geographical areas, to accommodate all possible volatility in the traffic demand arising from economic evolutions or political impacts. For the period 2019-2025, the forecast is driven by the sustained, although fragile, positive outlook of the economy in Europe despite the appreciation of the euro, the rise in oil prices, uncertainties such as the Brexit negotiations, etc. In 2025, this forecast is for 12.7 million IFR flight movements in Europe (± 1 million flights), which will represent an average annual growth of 2.0%.

Worldwide evolution and long-term trends

When considering a longer-term perspective – as described in the EUROCONTROL Long-Term Forecast 'Challenges of Growth' - by 2040, the Middle-East and Asia/Pacific regions are expected to provide the strongest growth, with respective average growth of 3.5% and 3% per year.



Figure 7: Average annual growth rates from ECAC to world

Faster growth from outside Europe means that there will be a gradual shift in the composition of European traffic, with an increasing proportion of flights to and from Russia, the Middle East and Asia as compared to intra-European and NAT traffic. In view of the current geographical distribution of traffic in Europe, this factor is not expected to have a major impact on European traffic patterns, bearing in mind that intra-European flights will continue to represent 3/4 of the total traffic, at Network level.

Addressing the challenges of traffic volatility

European air traffic has become increasingly volatile due in particular to the current political crises and variations in the economic evolutions that are both difficult to forecast. Therefore, when addressing volatility, while considering the requirements of the Performance and Charging Regulation (EU) 2019/317, the most demanding traffic scenarios (depending on routings, complexity, operational experience, etc.), depending on geographical areas, might need to be used when building performance and operational plans.

Multiple scenarios – The figure below illustrates how the economic forecast for EU countries has changed since 2018. Growth in Europe (EU28) eased from a 10-year high of 2.5% in 2017 to 1.9% in 2018. The forecast includes a further moderation to 1.7% in 2019, 2020 and 2021. The trade tensions with the United States and the impact of rising oil prices on inflation explain the slight downward revision of the forecast (0.1 pp) for 2020 and 2021.

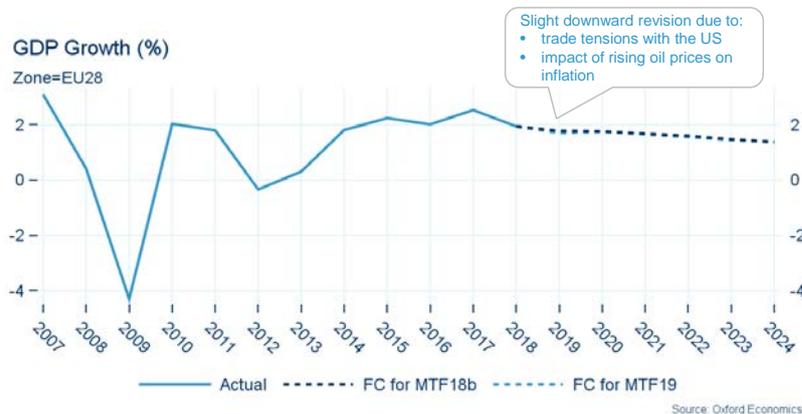


Figure 8: EU28 GDP growth

Crude oil and fuel prices determine a large share of total aviation transport cost and the sector is particularly sensitive to it, including for its overall competitiveness. The volatility of oil prices, as shown on figure 9, is a driver for air traffic volatility.

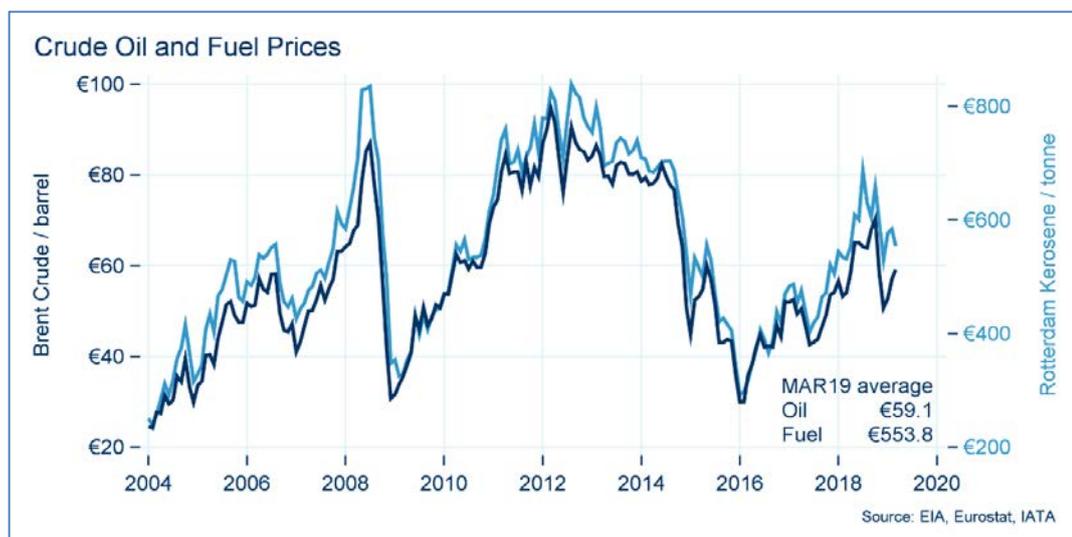


Fig 9: Crude oil and fuel volatility

Recent variability in traffic has re-emphasised the need to consider a range of possible scenarios, in order to manage risks. The EUROCONTROL Long-Term Forecast 'Challenges of Growth', looking at traffic evolution until 2040, considers four scenarios, each describing a different future:

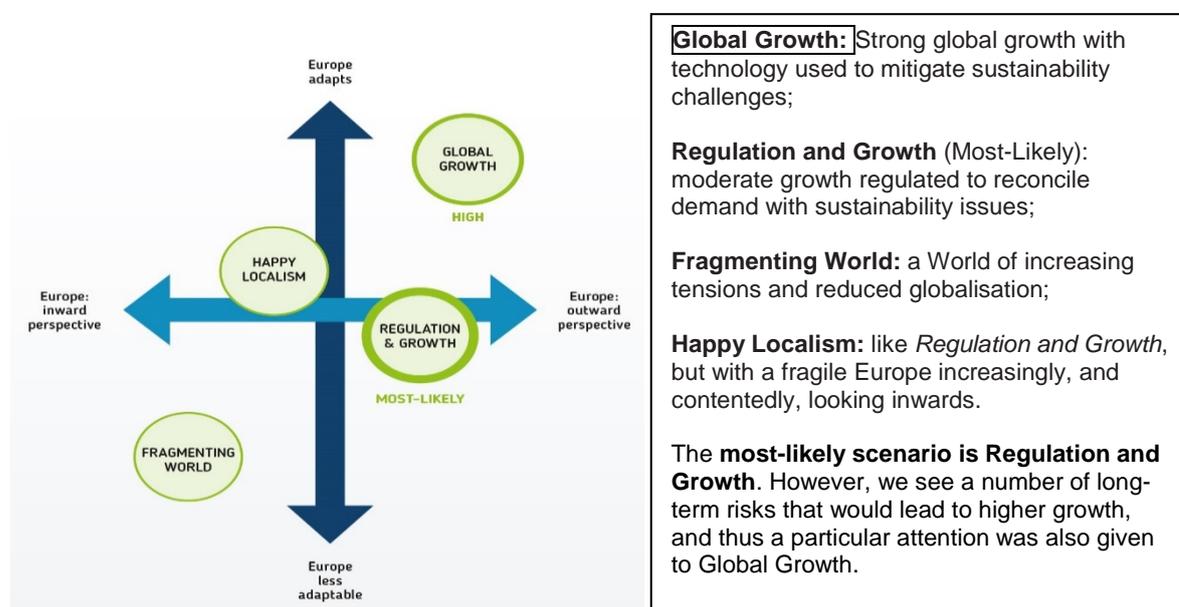


Fig 10: Growth scenarios

By 2040, traffic in Europe is expected to grow to just over 16 million flights in Regulation and Growth, and close to 20 million in Global Growth. This is a total growth of 53% (Regulation and Growth) and 84% (Global Growth) compared to 2017.

ATM agility – Airlines have been always able to adapt quickly to market evolutions and this requires more flexibility on ATM as well. Current load factors have reached historically high levels in Europe and this could also generate a steep increase in flights over the next years. ATM must therefore develop its agility as a priority to adapt to traffic evolutions at good overall performance levels.

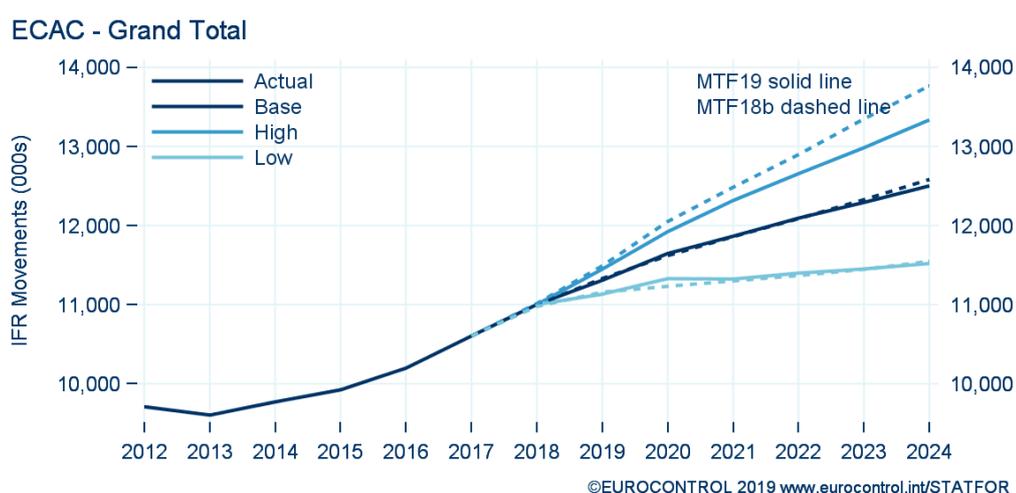


Figure 11: IFR movements forecast

Local impact - Individual States are more subject to traffic variations than the network as a whole. This is particularly the case for overflights - which represent the majority of flights for most States,

and the variability is even stronger when it comes to revenue, due to the average longer distance and higher weight of overflights.

It should be noted that the network would adapt more easily to downside risks (which occur more progressively and may alleviate some operational issues), while upside risks may generate immediate increases in traffic delays, due to the current small margins in capacity and high load factors.

However, downside risks should not be underestimated as they hit ANSPs on their bottom line, and because sudden downside shocks tend to be larger than unexpected growth (it is actually easier to cut capacity quickly than to add to it).

As a result, while considering the requirements of the Performance and Charging Regulation (EU) 2019/317, the recommendation endeavour to plan on the most demanding traffic scenarios (depending on routings, complexity, operational experience, etc.), depending on geographical areas, might need to be considered when building performance and operational plans, **to close current capacity gaps..**

2.1.2 Single European Sky implementation

The Single European Sky (SES) initiative launched in 2000 in the context of the European Union aims to improve the overall efficiency of the way in which the European airspace is organised and managed.

The major components of the second package of legislation approved in 2009 have already been implemented:

- ❑ A first Performance Scheme for the period 2012-2014 was adopted and implemented;
- ❑ A second Performance Scheme for the period 2015-2019 was adopted and ongoing;
- ❑ The Functional Airspace Blocks (FABs) were established; however, their contributions in RP2 were not sufficient to support significant network improvements;
- ❑ Eurocontrol has been appointed as Network Manager in 2011 by the European Commission in order to manage the network functions in close collaboration with operational stakeholders until 2019; this appointment has been renewed in 2019 until the end of 2029;
- ❑ The SESAR Joint Undertaking was established in 2008 to develop a common research programme aimed at modernising the European ATM system;
- ❑ The Pilot Common Project (PCP) aimed at supporting the deployment phase of the SESAR initial functionalities was adopted in 2014, under the coordination of the SESAR Deployment Manager (SDM) function. The SESAR Deployment Alliance (SDA) has been appointed as SESAR Deployment Manager in 2015;
- ❑ The Network Manager has worked closely with all the Single European Sky bodies to ensure added value and the delivery of the SES objectives.

2.1.3 Global ATM modernisation

The ICAO Global Air Navigation Plan (GANP) addresses the need for more integrated aviation planning at both the regional and State level by introducing Aviation System Block Upgrades (ASBU) modules. The performance improvement areas and the ASBU Modules associated have been organized into a series of four Blocks (Block 0, 1, 2 and 3) based on timelines for the various capabilities they contain.

States, operational stakeholder and NM participated in the development of ASBU Modules and blocks, in order to ensure a high degree of consistency between ASBUs elements and PCP requirements /SESAR solutions and enablers/NSP Strategic Objectives. Consequently, the NSP is fully aligned with ASBU blocks 0, 1 and 2 and high-level alignment with less mature elements of ASBUs block 3 is addressed within NSP.

2.2 Current and planned network situation

2.2.1 ATFM function

The record increase in traffic, notably in already congested areas, put additional pressure on the network. In this context NM worked with its partners to further develop and optimise network capacity so that the increase in traffic does not translate in a jump in ATFM delays. External factors such as airspace restrictions, volatile geo-political situations and severe weather continued to create disruptions in the network. Staffing issues and industrial actions have been added to the complex situation of the European ATM network. As a result, the ATFM performance target for en-route ATFM delays has not been achieved in any year of the RP2.

NM's efforts to reduce delays in cooperation with the operational stakeholders lead to positive results through the development and implementation of capacity enhancement measures through the Network Operations Plan, the direct actions of the NM Operations Centre in coordination with the ANSPs, to reduce delays, actions to mitigate crisis, weather and staffing issues impact. At the same time, NM has maintained continuous evolution of its own systems and procedures to adapt them to the new operational concepts, SESAR evolutions and critical network needs. However, further investment in NM systems is still required to continue this evolution.

The outlook from the most recent edition of the Network Operations Plan, as well as longer term evaluation made by NM to investigate future capacity needs, indicate that, if there is no significant change in the way in which the European ATM network is planned and operated and there is no a more "network-minded" attitude, serious disruptions could be faced until 2030-2035. The graphs below indicate the possible evolution of capacity performance if the current approach is maintained.

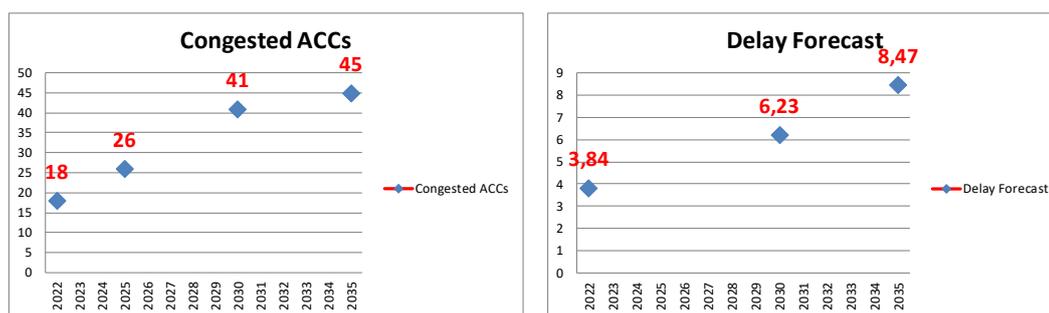


Figure 12: Future Outlook of Significantly Congested ACCs and Delay Forecast

2.2.2 Network design (ERND) function

The European Network Improvement Plan (ERNIP) will have enabled the implementation of approximately 1000 packages of airspace improvements by the end of RP2. The ERND function was instrumental in RP2 in achieving the target for the route extension indicator due to airspace design changes.

The improvement in the flight efficiency of the last filed flight plan accelerated, but it was still impacted by crisis situations, industrial actions and, in some cases, the insufficient utilisation of the available airspace structures due to flight planning systems limitations. The actual trajectory indicator progressed considerably as a result of the airspace structures and procedures enabled by the implementation of Free Route Airspace.

In RP3 and 4, the ERNIP will enable the full implementation of Free Route Airspace and PBN, of a network-minded approach to airspace availability and utilisation in order to meet the required operational performance targets. As required by the NF IR, airspace structures irrespective of national or functional airspace block borders or Flight Information Region (FIR) boundaries, not constrained by the division level between upper and lower airspace, will be required to enable progress with the overall operational performance while addressing civil and military airspace users requirements. This calls for a strategic commitments to enable a fully coordinated airspace design at network level, that

includes also the established ANSP RP3 airspace plans. This will be achieved through the already established network CDM processes addressing ERND to ensure coordinated developments and implementation.

The achievement of the performance target in the last filed flight plan requires cooperation between the users and the computer flight plan service providers. Airspace users need the appropriate tools and assistance to enable achievement of this objective.

2.2.3 Scarce resources functions

The Radio Frequency and Transponder Code Functions responded to the need to optimise the use of these scarce resources through a central allocation process, thereby preventing the risk of local under-utilisation which might impact on network performance. During RP2 a comprehensive exercise was undertaken by NM and most of the European States to improve the quality of the VHF frequency assignment. The resulting benefit was significant in terms of number of frequencies gained, also decreasing the number of frequency shifts required to accommodate new frequency requests. Nevertheless, urgent progress needs to be made with 8.33 kHz implementation below FL195 to allow comprehensive frequency conversions and satisfying future needs in already congested airspace.

Concerning the Transponder Code Function (TCF), the Aircraft Identification (ACID) strategy considers the application of 3 methods: ORCAM, CCAMS and downlink of aircraft identification. The Centralised Code Assignment and Management System (CCAMS) has been expanded and prevails over the other methods (with approximately 60% of the transponder code assignments being generated through CCAMS), starting with the CCAMS implementation as a back-up solution. CCAMS is already used by 19 States and other States plan to implement it over the next period. It should be noted that CCAMS also benefits non-CCAMS States as it reduces the number of code changes due to crossing different participating areas. The long term vision is to use the mode S downlink capability as the primary means of identification, with CCAMS as a complementary solution when feasible for ANSPs in the NM area, by 2020.

In RP3 the focus will again be to ensure that scarce resources do not have a negative impact on network operations. To achieve this objective, close monitoring of the revised Radar Transponder Code and Radio Frequencies functions will be required. NM will support the EU Member States and third countries participating in its work in meeting their ICAO and SES obligations concerning Frequency and Radar Transponder Code Function.

2.2.4 Airports

The continuous focus of NM airport activities in RP2 was to assist airport stakeholders in enhancing airport performance and to ensure the further integration of airport operations into the Network. By the end of 2018, 26 airports were connected to the Network as CDM airports representing almost 34% of departures in the NM area. NM expects that a further 6 - 8 airports will be connected to the network in 2019. Currently 23 airports are connected to the Network as an Advanced ATC Tower airport representing 9.75% of departures in the NMOC area. In 2019, other 10 - 17 airports may be connected to the Network. In close collaboration with its operational stakeholders, NM initiated activities to develop address the establishment of an Airport Operational Plan (AOP) and of operational procedures and interfaces between APOCs and the NMOC

Continuous efforts and political support will be required to build physical additional capacity at major airports. The 'Challenges of Growth 2018' report showed that airports had sharply cut their expansion plans, to just a 16% increase over the next 18 years (2017-2035). There was only one major airport opening during RP2 - new Istanbul airport. Long-term forecasts indicate that by 2035, unconstrained demand at European airports could exceed available capacity by 1M flights annually (arrivals and departures). 16 airports will be highly congested by 2040. Without significant physical additional capacity, major delays can be expected at many airports during peak periods.

Figure 11 / Demand exceeds capacity by 1.5M flights in 2040, climbing to 3.7M in *Global Growth*.

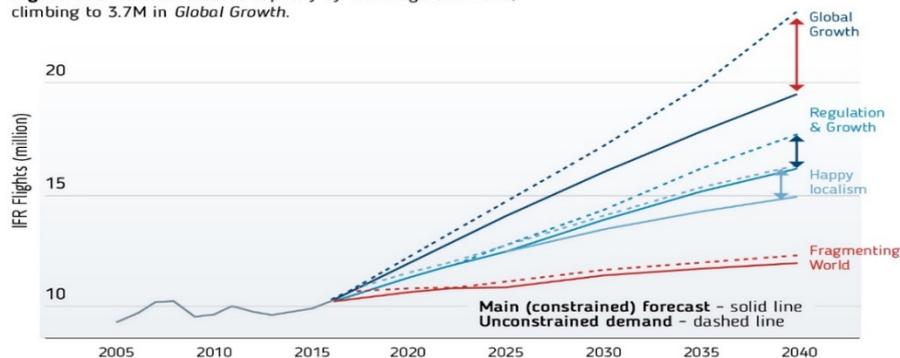


Figure 13: Demand-capacity scenarios

A number of important actions concerning airports are therefore required in RP3 and RP4:

- ❑ Maximise coherent development between the airside and groundside airport capacity;
- ❑ Improve the airports' efficiency by minimising airport arrival delays, taxi times, impact of weather and vertical flight efficiency in TMAs;
- ❑ Continue to better integrate airports with network operations – in particular by implementing A-CDM projects and accelerating the DPI deployment as well as by increasing communication between airports and the Network Manager to facilitate the network view;
- ❑ Arrival and departure management to maximise runway throughput,
- ❑ When possible, develop regional plans to accommodate traffic from congested airports to regional airports in vicinity.

2.2.5 Crisis Management

Within the crisis management framework, NM has successfully managed several crises with major impact on aviation, e.g. Eyjafjallajökull, MH17 and Brussels airport terrorist attacks. In addition there are a number of significant disruptions impacting the European network where NM has been in close contact with the operational stakeholders directly concerned to ensure the appropriate mitigations.

2.2.6 Other NM tasks

NM has been mandated by EC and NMB to carry out the tasks of Data Link and 8.33 performance monitoring. NM has successfully managed these tasks in 2017/2018/2019. New NF IR adds additional tasks related to the development and provision of monitoring of the ATM/CNS infrastructure and of common network support services related to the execution of network functions. These new NM functions will be carried out from 2020 onwards.

2.2.7 Summarised Network Situation

Despite the progress achieved in RP1 and RP2, a number of systemic issues of the European ATM system are still remaining:

- ❑ Planning and operations still do not fully consider the most demanding traffic growth scenarios to allow anticipated resolution of network operational performance issues, as in RP1 and RP2 the recommendation was to plan on the low growth scenario;

- ❑ European airspace is still fragmented. Significant efforts will be required to fulfil airspace users requirements for a seamless and pan-European ATM, designed and managed irrespective of current borders;
- ❑ The efficiency and flexibility of the European ATM network are still impacted by structural weaknesses which need to be addressed at political and executive level (e.g. lack of ATCOs, lack of flexibility in allocating ATCO resources, lack of seamless solutions for airspace structures, sub optimum airspace design and utilisation, impact of industrial actions, etc.);
- ❑ Provision of additional capacity and ATCO shortages require investment which increases the cost of ATM service provision;
- ❑ Without prejudice to safe operations, flight and cost efficiency remain major priorities for the aircraft operators and this needs to be addressed through de-fragmentation of the European ATM network, irrespective of current borders.
- ❑ The environmental impact of aviation is increasing although at a lower rate than expected considering the growth in the number of flights over the second reference period. Nevertheless, there is a perception that aviation is one of the major polluters.

2.3 Network performance objectives & business requirements

The network and local performance targets are established through the Performance Scheme process. This Chapter provides an executive summary of the performance objectives and corresponding stakeholder requirements for each performance area.

2.3.1 Safety

The performance targets in the key performance area of safety will be measured as the minimum levels of the effectiveness of safety management to be achieved by air navigation service providers certified to provide air traffic services:

- ❑ at least Level C in the safety management objectives 'safety culture', 'safety policy and objectives', 'safety assurance', and 'safety promotion';
- ❑ at least Level D in the safety management objective 'safety risk management'.

These performance targets will take account of actual and targeted performance in the second reference period and go beyond minimum compliance with the requirements for the elements of the safety management system.

The framework used to measure the levels of the effectiveness of safety management is more stringent than in the second reference period, which is reflected in the approach taken to set performance targets in the key performance area of safety for RP3. These targets also take into account the safety management implications of ATM changes promoted by the implementation of SESAR projects, by focusing on the safety assurance and safety risk management objectives.

ANSPs and NM can expect to benefit from the best practices of their peers and so to accelerate progress. The expertise acquired by the NM through the years and the safety management tools and methodologies developed are being re-used by the ANSPs. NM will continue to focus its efforts on safety in order to help the ANSPs achieve their safety KPIs and implement state of the art safety methods and tools, in addition to complying with its own safety obligations.

2.3.2 Capacity

In RP3, the performance targets for the key performance area of capacity relate to the average en route ATFM delay attributable to air navigation services and are defined as follows: 0,9 minute per flight in 2020, 0,9 minute per flight in 2021, 0,7 minute per flight in 2022, 0,5 minute per flight in 2023 and 0,5 minute per flight in 2024.

Despite the progress achieved in RP1 and RP2, capacity shortfalls remain concentrated in some critical areas due to systemic problems mainly concerning airspace saturation and staffing and in some cases recurrent sector capacity gaps. These issues have a detrimental effect on overall network performance and need to be addressed as a priority through the solutions proposed in the

Airspace Architecture Study, subject to the establishment of an agreed transition plan with the full involvement of all stakeholders, promoting network-minded solutions supported by reinforced CDM processes.

In RP3 and RP4, NM will continue to contribute to capacity through the management of the Network Functions, and by developing appropriate network solutions through effective CDM processes for both planning and operations.

In RP3 and RP4, operational stakeholders together with NM will continue to provide and contribute to capacity based on the requirements expressed in the NF IR. Appropriate network solutions will be brought forward for both planning and operations.

Concerning airport capacity, it is becoming increasingly difficult to build new runways and a few European airports around major cities are close to congestion. This may result, towards the end of RP3 and 4, in major delays during peak periods. Attention should be paid to build political support for additional physical capacity in conjunction with improving the efficiency of airport operations at these most congested airports in order to make best possible use of existing capacity. Additionally, as observed over the past years, regional airports are being more extensively used, requiring further developments for the terminal areas and closer coordination between the ground and air-side developments.

The relevant capacity indicator might need to further evolve to indicate the capacity required to be delivered instead of the delay indicator.

2.3.3 Environment (flight efficiency)

Performance targets for the key performance area of environment are expressed as an average horizontal en route flight efficiency of the actual trajectory and measured as average additional distance flown compared to the great circle distance and shall not exceed the following values: 2,53% in 2020, 2,47% in 2021, 2,40% in 2022, 2,40% in 2023 and 2,40% in 2024.

The targets proposed for RP3 take into account the natural physical limitations on further evolutions of this performance area. Nevertheless, meeting these targets will require continuing the progress made in RP1 and RP2.

Airspace users have expressed an urgent need for flight efficiency improvements, starting at operational level with better horizontal and vertical flight profiles and ultimately by considering solutions at structural level to mitigate the negative impact of heterogeneous route charges. Airspace users have also asked for the development of improved metrics to assess flight efficiency.

The focus for the Network in RP3 will be on:

- placing a high priority on European cross-border Free Route Airspace with optimised connectivity to TMAs;
- providing sufficient capacity flexibly where required (available airspace is actually a prerequisite for enabling alternative flight options);
- improving airspace management through advanced FUA;
- better handling at network level of the airspace utilisation rules;
- enhancing vertical flight efficiency performance;
- and improving airspace utilisation – through the provision by NM of flight efficiency tools and support to airspace users, and the commitment and engagement of airspace users on better airspace utilisation and utilisation of better flight planning tools adapted to the dynamicity of the European airspace.
- Development of better suited flight efficiency indicator(s), involving operational stakeholders in that activity

Support to flight efficiency will continue to be one of the main priorities of the Network Manager in RP3.

There is an absolute need to reduce the impact of aviation on the climate change as this might become one of the major challenges for the next ten years. This might necessitate in the longer term a strategic initiative to look into managing the Network based also on implications related to environmental impacts.

2.3.4 Cost efficiency

Performance targets for the key performance area of cost-efficiency, is a year-on-year change of the average determined unit cost for en route air navigation services of -1,9% for 2020, -1,9% for 2021, -1,9% for 2022, -1,9% for 2023 and -1,9% for 2024.

In RP3, NM will continue to cost-effectively manage its activities in accordance with the Network Performance Plan.

It will also contribute to improving overall Network Cost Efficiency by delivering efficient and cost-effective services through the Network Functions.

2.3.5 Operational Stakeholders' business requirements

This Network vision and the resulting NSP strategic objectives aim to address the following operational stakeholders' requirements.

Airspace Users

Airlines need to reduce their operational costs whilst providing enhanced and punctual services to customers. Improvements in airspace design and airspace management, the full implementation of Free Route Airspace, more predictable network information and reinforced flight planning support will be required so that airlines are able to optimally tune flight trajectories with the available ATM resources. At the same time, progress will be made towards the first steps of trajectory management.

Airlines also need to abide more readily by the State/European rules on the environment and the reduction of noise/emissions. Airlines expect to reap the benefits of their investments in new aircraft with enhanced navigation capabilities (PBN), by using flight-efficient TMA trajectories respecting environmental constraints.

Airlines also expect to derive further benefits from efficient Network functions.

Airports

Operational stakeholders at airports have already improved their operational performance in many ways. The integration of operations of the different stakeholders is advanced as well as the exchange of data between the different actors that have operations at airports. Still, moving towards integrated operations of all actors on the airport platform as well as integrated ATC provision will allow a more intensive use of their infrastructure. Other requirements include improved resilience and risk management, including the response to difficult weather conditions, a better ATM predictability, including the anticipation of ATM congestion/disruptions and a better consistency of ATM and airport slots and airport operations within environmental constraints.

Operations at airports should be fully integrated into network operations through CDM coordination and exchange of information via system-to-system connections. Together with horizontal data exchange between airports, this will allow continuous and dynamic airport operation optimisation, resulting in improved predictability, punctuality, optimised rotation times and reduced delays.

Air Navigation Services

From a business perspective, ANSPs might face the challenge of combining competitive strategies for market development and cooperation with their peers to share costs and improve the overall network performance. From a financial perspective, ANSPs have to reconcile cost-efficiency objectives with the need to meet their other obligations stemming from the Single European Sky. This requires investments to redesign or modernise their ATM, CNS and IT infrastructures (e.g. controller working position, FDP systems, air/ground Datalink, PBN, SWIM-enabled systems); and reorganisation efforts to address structural capacity issues.

On the operational side, ANSPs need to strive to improve their daily performance. – including service costs – without compromising on safety. This can be achieved through a combination of structural measures and operational changes, in particular by de-fragmenting the airspace; and organising ATCs on a mixed regional and local basis to enable more flexibility.

ANSPs will also need to address collectively the management of their resources and technical infrastructures. Appropriate processes will be required in that respect. This will be done through

reinforced cooperation amongst ANSPs and with with NM. Further elaboration of processes will be required in that respect. ANSPs expect to derive further benefits from efficient Network functions.

To achieve the overall objectives to further improve operational performance, further investments will be required that in turn may increase costs in the short and medium term.

Military

The Military consider the ATM system as an enabler for defense and security missions. Whatever are the evolutions of the ATM system, ensuring that military aviation will continue to provide, and further improve, effective security and defence in Europe without prejudice to the safety of civil air traffic remains paramount. Therefore, the airspace design and utilisation processes shall take into account the requirement to conduct military trainings and operations, including exercises. In addition, in order to protect operational security and mission requirements, any ATM changes must take into account rapid airspace access and air movement across national and ECAC airspace and must accept that military assets may not provide the electronic conspicuity expected. To optimise training mission effectiveness by reducing transit time while minimizing impact on environments and traffic flows, any reserved airspace should ideally be located close to airbases. Such airspaces should also be suitable for military training in size, shape and location, notably to accommodate Fifth (and future) Generation Fighter Aircraft and new weapon systems.

In order to meet military requirements in a congested ATM environment, a specific balanced CDM process able to accommodate military needs at network level should be developed. That CDM process at national and network level should ensure the satisfaction of military requirements, specifically:

- Freedom to operate both manned and unmanned aircraft in all areas of the European airspace;
- activation of ATM system capabilities, including civil ones, to support military deployment, in particular for priority flights and for time-critical missions, but also for military aircraft not fully equipped to the civil standard;
- The establishment of Temporary airspace reservations (TRA/TSA), situated as close as practicable to the appropriate operating areas, including airspace restrictions for non-flight-related activities

Integrating new users

New business models and users are emerging and expected to be developed very fast (e.g. several business models for drones, air taxis, light airframes, higher airspace operations above FL660.). Their airspace use requirements need to be accommodated taking into account ATM safety and security requirements for different types of airspaces.

Enhancing Connectivity

The Commission's 2015 Aviation Strategy identifies the provision of connectivity as a key function of air transport. NM has been working with the European Commission to develop a set of public indicators of regional air transport connectivity. For example, the figure shows the 'flight choice', one of the connectivity indicators, from one European city to the rest of the EU28, with darker colours indicating more choice. The methods take airport accessibility into account, and are being extended to global connectivity, and to allow for driving and high-speed rail.

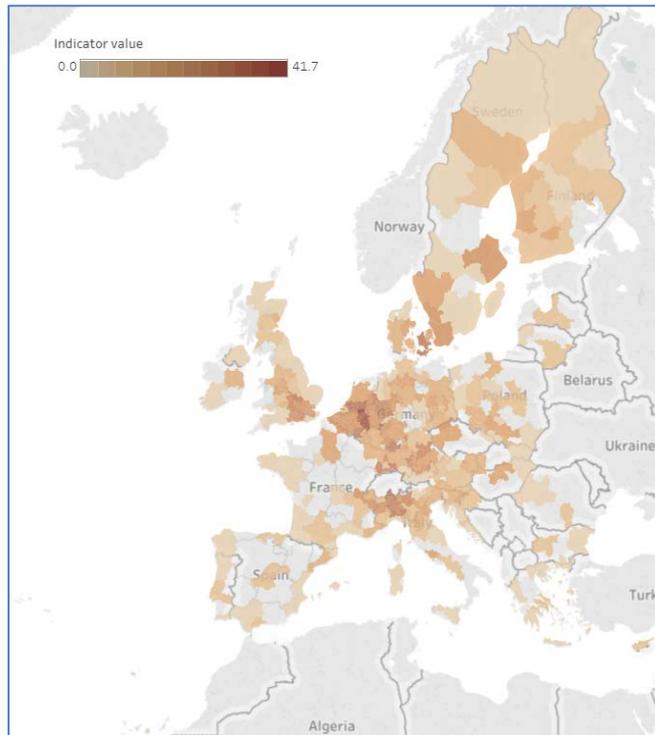


Fig 14: Towards measuring connectivity

3. Strategic Vision

3.1 Why: Serving the Aviation Strategy for Europe

After two decades of booming development in the European aviation sector, following the liberalisation of the EU's market for air services, the Single European Sky initiative of the European Commission has set the pace for the 2010/2020 decades, striving to reshape the European aviation into a highly competitive and innovative industry, capable to capture a fair share of global growth.

A longer term European Aviation strategy was elaborated in the **"Flightpath 2050, Europe's Vision for Aviation"** and the **"Aviation Strategy for Europe"** documents published respectively in 2011 and in 2015. **The goal of the European Aviation Strategy is to strengthen the competitiveness and sustainability of the entire EU air transport value network.** The EU Aviation Strategy sets **three key priorities:**

1. **'Tapping into growth markets'** – by improving services, market access and investment opportunities with third countries, whilst guaranteeing a level playing field;
2. **'Tackling limits to growth in the air and on the ground'** – by reducing capacity constraints and improving efficiency and connectivity;
3. **'Maintaining high EU safety and security standards'** – by shifting to a risk and performance based mind-set;

Ultimately, the Aviation Strategy for Europe addresses the need for a better service to the passengers.

The operational stakeholders in the European ATM Network and the Network Manager will contribute to the implementation of the European Aviation Strategy through:

1. **'Tapping into growth markets'** – by improving services, market access and investment opportunities with third countries, whilst guaranteeing a level playing field;
 - Support European Aviation at global level;
 - The Network partners will cooperate on developing excellence in all ATM technological and operational areas and acting jointly through partnerships to grow on global markets
2. **'Tackling limits to growth in the air and on the ground' – by reducing capacity constraints and improving efficiency and connectivity;**
 - Stronger and more efficient ATM Network Management.
 - Matching Capacity and Demand through more active and collaborative Network Management and Network Optimisation that will provide additional benefits by improving airspace design and cross border operations.
 - Business Trajectories planned and flown in significant portions of the Network, by 2030.
 - A pro-active role for the Network Manager to secure optimum Network performance by constantly assessing the cumulative Network effect of individual preferences and reconcile individual preferences of operational stakeholders via CDM when incompatible, or if not possible, then via proposed remedial measures in accordance with established rules where necessary.
 - The implementation of the essential operational and technology changes related to the execution of the Network Functions, foreseen to deliver the SESAR contributions to the achievement of the Single European Sky performance targets.
 - The implementation of the Airspace Architecture Transition Plan to the extent required for the execution of the Network Functions, subject to the establishment of an agreed transition plan by, and with the full involvement of, all stakeholders.
 - The deployment of transformational digital technologies to enable significant improvement of the network decision making capability based on data driven approaches and to support business process automation;
 - Facilitating accommodation of military requirements and crisis management responses within the European ATM Network.
3. **'Maintaining high EU safety and security standards' – by shifting to a risk and performance based mind-set;**
 - All actors of the ATM Network will contribute to improve safety in line with the SES performance targets; They will adopt higher security standards to cope with a potential increase in international security risks, including terrorism and cyber-attacks and will be act cooperatively under a strengthened crisis management process

3.2 What: Network Vision 2030

Vision statement: Achieving an European ATM network serving European civil and military aviation and passengers in a safe, secure, predictable, operationally efficient, environmentally friendly and cost-efficient manner through close cooperation with all operational stakeholders.

The ultimate ambition is for the **European ATM Network** to become an essential instrument for the implementation of the **Aviation Strategy for Europe**. It will transform into a more “**customer driven ATM network**”, putting passengers’ needs and societal benefits first by reinforcing a public service orientation by all operational stakeholders, and taking due account of all customer requirements.

When addressing crisis management and the Global Network of Networks, the scope of the Network Functions will be gradually extended for this purpose, from ATM to “Aviation Network Management”, building on an enhanced Single European Sky regulatory framework.

The Network Manager, supported by appropriate governance mechanisms, will drive operations in partnership, through Cooperative Decision Making and common network information and data. It will be the driver of **Network Optimisation and Rationalisation**, in full cooperation and transparency with all concerned stakeholders.

It will translate the Aviation Strategy for Europe and the ATM Master Plan into operational directions and coordinate their execution in close cooperation with all Network partners, refocusing the ATM Network on **common priorities**:

Addressing European ATM Network Capacity Challenges

- ❑ **Becoming best-in-class in operational efficiency:** *The SES performance targets will be achieved through a stronger ‘Network minded attitude’ to be demonstrated by all partners, the systematic use of transparent CDM processes supported by a common ‘Network performance cockpit’ that will consolidate existing data, tools and processes to enable improved data collection and analysis. Special attention will be put on serving airspace users’ needs, fully integrating airports and Terminal Airspace Systems into the network; preparing timely availability of airspace and airport capacity, improving operations predictability through intensive information exchanges; and accelerating the integration of SESAR solutions in operations - with the ultimate ambition to set new world-wide standards for ATM customer service and address passenger and civil and military users needs.*
- ❑ **Achieving Network optimisation:** *To make the best use of all Network resources, a more proactive approach towards the ‘Optimum Network’ will be adopted. This will be achieved in a collaborative, coordinated and expeditious manner, taking due account of human potentials, network services and resources availability and flexibility amongst users as well as operational stakeholders’ interests. The implementation of the Airspace Architecture Transition Plan will be a main driver in this direction.*

Building a competitive aviation value chain

- ❑ *The Network partners will maintain their continuous commitment on developing cost efficient ATM/CNS services, further fostering a strong technical and operational coordination and integration at network level.*
- ❑ *Ensure the necessary evolutions towards an optimum and efficient Network infrastructure ;*
- ❑ *The ‘Network Interoperability Strategy’ will be fully implemented, enabling the creation of an open and collaborative digital ATM.*

Supporting European aviation leadership at global level

- ❑ *The Network partners will cooperate on developing excellence in all technological and operational areas and acting jointly through partnerships to grow at global level. The Network Manager will support the European aviation industry by promoting our concept of ‘Global Network*

of Networks' worldwide and by developing operational arrangements beyond Europe, in line with the requirements set for the Network Manager in the Aviation Strategy.

Developing environmental sustainability

- ❑ *The Network partners will commit on minimising the air transport environmental footprint through innovative technologies and concepts of operations, reducing fuel consumption, aiming to become carbon neutral, and supporting forward-looking climate change policies. The Network Manager will ensure appropriate operational arrangements, building on its flight efficiency initiatives.*

Enhancing connectivity and airport services

- ❑ *To support mobility and local/continental economic development, therefore extending the SES benefits to passengers and society, connectivity between en-route, Terminal Airspace Systems and airport services, as defined in the EU Aviation Strategy, will be better addressed, also integrating a multimodal dimension.*

Adopting and implementing high network safety and security standards

- ❑ *The SES targets for safety improvement will continue to be actively pursued, focusing on network operational safety risks, and taking a cautious and phased approach to ATM evolution. Operations continuity and crisis management will be reinforced with a risk and performance based Network approach, using high safety and security standards and stronger operational coordination, involving civil-military cooperation and relevant international institutions to address threats and risks of global nature.*

To shape the transformation of European ATM, this more ambitious Network Vision builds on the dynamics created by the Vision 2020 developed in the previous NSP and on the Airspace Architecture Study. It fully supports the implementation of the ATM Master Plan and takes into consideration the latest SESAR developments.

3.3 When: Steps of the journey towards 2029 and beyond

The NSP approach builds on the alignment between operational and technical transformations for which the Network Manager will ensure appropriate coordination:

- ❑ From an operational perspective, a continuous effort towards Network Optimisation, to be collaboratively achieved with all operational actors, while addressing military requirements;
- ❑ To implement the operational perspective, a progressive integration of mature SESAR solutions including ATM/CNS infrastructure optimisation and rationalisation related to the execution of network functions, paving the way towards the new Flight and Flow centric operations, supported by trajectory data exchanges

The steps of this journey are summarised in the chart below:

Step 1 (2019-2025/2029):

- ❑ Ensuring Network optimisation in the areas required for the execution of the network functions and tasks, enabled by the joint implementation with all operational stakeholders of major airspace reconfiguration and operational excellence projects, aligned to the outcome of the Airspace Architecture Study; and a better integration of airports and Terminal Airspace Systems into the Network, supported by a new NM system based on innovative digital technologies and on ground-ground and air-ground connectivity.

Step 2 (2025-2035/40):

- ❑ Initiating and achieving the implementation of future Network Operational Concept, based on “network-minded” flow and flight centric operations.

A detailed description of the two steps is provided in the Strategic Planning section.

3.4 Deriving strategic objectives from the Network Vision

The NSP Strategic Objectives define the **common goals** to be achieved by all **Network operational partners** with a view to meeting the network performance targets.

The **strong priorities of the Network Vision** described in the NSP state the directions to be followed to achieve the NSP Strategic Objectives.

Overview of the NSP Strategic Objectives

In order to facilitate the strategic alignment of all actors, and ensure the continuity of the joint actions engaged in the previous NSP, the previous NSP Strategic Objectives have been updated to better encompass the new Network Vision

The NSP Strategic Objectives accelerate the transformation of **Network Operations** while adapting the related ATM services to maximise their **societal benefits**. They address all network Components including resources and capabilities that together serve the civil and military airspace users to meet their needs and requirements as well as the defined level of performance.

Strategic Objectives of more transversal nature are introduced:

- ❑ An Objective ‘**Optimise Network Design**’ is added regrouping and extending two objectives from the previous NSP (i.e. “Implement a seamless and flexible airspace”; “Plan optimum capacity and flight efficiency”),
- ❑ An Objective ‘**Optimise Network Operations**’ towards challenging targets defined at Network level, combined with the progressive implementation of the SESAR concepts,
- ❑ Objectives involving **air transport at large**, to address societal matters such as **extended European connectivity**, passenger service (including the inter-modality dimension) freedom for re-creative and general aviation; the generation of economic growth through **better presence on global markets**; and additional issues with global implications, such as **environmental sustainability**.

These ten strategic objectives have been grouped in two categories: (1) **Optimised network and** (2) **Improved societal impact**.

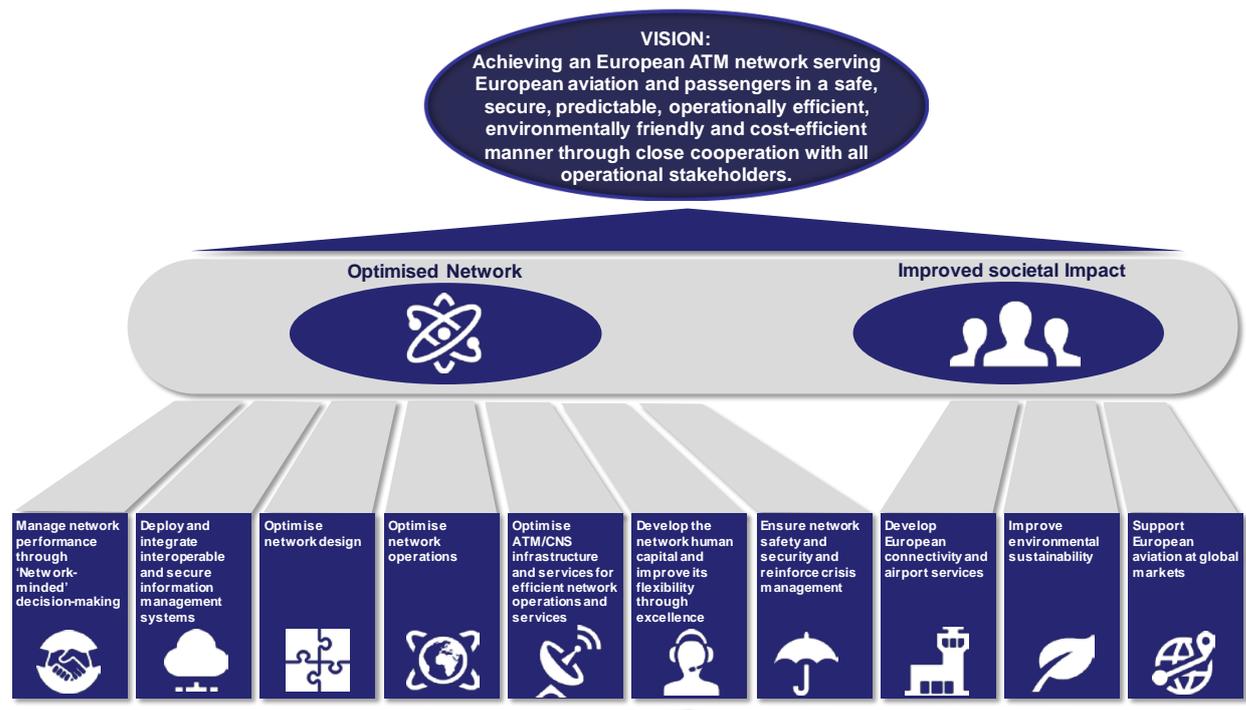


Figure 14: NSP map

3.5 Compliance with the Performance Scheme

The following correspondence has been established between the Network Strategic Objectives and their contribution to the Key Performance Areas, as defined in the Performance Scheme Implementing Rule.

	Capacity	Environment	Safety	Cost-efficiency
SO 1: Manage network performance through 'Network-minded' decision-making	X	X	X	X
SO 2: Deploy and integrate interoperable and secure information management systems	X	X	X	XX
SO 3: Optimise Network design	XX	XX	X	XX
SO 4: Optimise Network operations	XX	XX	X	X
SO 5: Develop European connectivity and airport services	X	X		X
SO 6: Ensure network safety and security and reinforce crisis management	XX		XX	X
SO 7: Optimise ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services	X	X	X	XX
SO 8: Develop the network human capital and improve its flexibility through excellence	XX	X	X	XX
SO 9: Improve environmental sustainability	X	XX		X
SO 10: Support European aviation at global markets	X	X	X	X

The contribution of Network Strategic Objectives to the Key Performance Areas is illustrated as follows: 'X' is used to show a contribution and 'XX' is used to show a significant contribution.

3.6 Consistency with the European ATM Master Plan

The European ATM Master Plan addresses the high-level operational and technological evolutions of the ATM system, clustered as "Essential Operational Changes" and detailed by deployment scenarios.

The Network Strategy Plan is an integral part of this change process. It targets concrete operational issues that can be solved over the period 2019-2029 and beyond via any operational and technical means. It ensures that the planned SESAR deployments necessary to the execution of the Network Functions and tasks are synchronised and have maximum Network benefit.

The ATM Master Plan "Essential Operational Changes" are addressed by the NSP strategic objectives as illustrated in the table below:

ATM Master Plan Essential Operational Changes	NSP Strategic Objectives
CNS infrastructure and services	SO 7/4 addresses the optimisation of CNS infrastructure and support services. However, the CNS performance based approach is not addressed by any elements of SO 7. In addition, the SESAR solutions approach maturity related to ACAS Xa and A-PNT are not addressed by NSP, as the implementation of these system enhancements are considered local.
ATM interconnected network	The system components of this EOC are fully covered by SO 2/1, SO 2/3 ,SO 2/4 and SO 2/5 The ATFCM and DCB components of this EOC are fully covered by are covered SO 4/2, SO 4/3 ,SO 4/5, SO 4/6 and SO 4/7.
Digital AIM and MET Services	The Digital AIM is covered by SO 2/6. The Digital MET service is covered for the NM systems by SO2/3.
U-space Services	SO 3/7 addresses the integration of new entrants in the overall Network Planning. This is included in the long term planning part of the NSP.
Virtualisation of Service Provision	SO 4/1 addressed by some extend the aim of service provision modernisation and virtualisation. More specifically, this EOC is referred for step 2 planning in the context of flight and flow centric operations.
Airport and TMA performance	The airport aspects that required Network synchronisation are fully covered by SO 4/4 and SO 5/2. The airport local components are not included in NSP. TMA optimisation is addressed by SO 3/1 and SO3/3, as well as by SO 9/1 concerning the implementation of CCO/CDO.

ATM Master Plan Essential Operational Changes	NSP Strategic Objectives
Fully dynamic and optimised airspace	The planning part of this EOC is fully covered by elements of SO 3, while some elements concerning the execution part of this EOC are covered by SO 4/1 and SO 4/2
Trajectory based operations	The components that substantially contribute to this EOC are covered by SO 4/1, SO 4/3 and SO 4/5.
Multimodal mobility and integration of all aerial vehicles	NSP addresses some long-term components of this EOC by SO 5/5, while the solutions linked with this EOC are not specifically addressed.
Note	
Some Operational Improvement (OI) steps linked with EOC reference to HUM enablers	SO 8: Develop the network human capital and improve its flexibility through excellence

However, some Strategic Objectives are not part of the ATM Master Plan. This can be explained as follows:

- ❑ The NSP should also address network SO 1 related objectives and processes, which are not necessarily enabled by technological changes;
- ❑ The ATM Master Plan also covers some operational and technical aspects that do not have a Network dimension as they are considered as local without substantial impact on Network performance.

3.7 Consistency with the common projects set up in accordance with Commission Implementing Regulation (EU) No 409/2013

The table below illustrates the consistency of NSP strategic objectives and PCP ATM functionalities.

	PCP AF1	PCP AF2	PCP AF3	PCP AF4	PCP AF5	PCP AF6
SO2/1			√	√	√	
SO2/2				√	√	
SO2/3	√	√	√	√	√	√
SO2/4				√	√	
SO2/5			√	√	√	
SO2/6				√	√	
SO3/1	√		√			
SO3/2	√		√			
SO3/3			√			
SO3/4			√	√	√	
SO3/5				√	√	
SO3/6			√			
SO4/1	√		√	√		√
SO4/2				√	√	
SO4/3				√	√	
SO4/4		√		√	√	
SO4/5	√	√	√	√	√	√
SO4/6				√	√	
SO4/7			√	√		
SO5/2				√	√	
SO5/3				√	√	
SO 6/4					√	
SO 6/5				√	√	
SO7/1						√
SO7/3						√
SO7/4	√	√				√
SO10/3				√	√	
SO10/4				√	√	

4. Strategic objectives

The NSP strategic objectives define the common goals to be achieved by all the network operational partners, with a view to delivering concrete outcomes which are required to achieve the target network performance. Each Strategic Objective is translated into actions (see Chapter 5 - Strategic Planning). The execution of these actions is monitored by the NMB through the NM annual report, NSP periodic reports as required and through the NOP execution and monitoring process.

4.1. Detailing the Strategic Objectives

4.1.1. SO 1: Manage network performance through 'Network-minded' decision-making



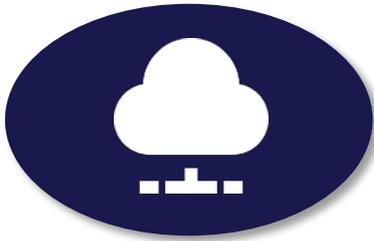
The SES Network performance targets will be reached in all aspects of operational efficiency, aiming to deliver world-class service to airspace users.

This Strategic Objective is strengthened by converging performance measurement to address end-to-end airspace user service; by extensively using CDM processes – supported by a common 'network performance cockpit', and by encouraging performance driven operational behaviours.

The **commitment of all Network actors** to the SES targets and to excellence in airspace user service will be reinforced through a systematic application of **collaborative decision making** processes, including:

- ❑ **A priority on addressing end-users needs** - passengers, goods and regions;
- ❑ **A priority on addressing civil and military airspace users' needs**, through operationally performant ATM/CNS services, established locally and/or network-wide. This will include clear accountabilities and consistent performance-based plans at network and local level. Deviations from the plans will be addressed through the management of the ATM measures and will need to be fully addressed by empowered and accountable entities. It will ensure a coordinated and consolidate approach from planning into operations by aligning operational plans/concepts/manuals with the Network Concept of Operations and the coordination of the NSP and ATM Master Plan. The execution of the overall process will be monitored and reported by NM through the defined CDM processes, including capabilities for customising reports to airspace users' requirements at individual level. This will be also supported by reinforced CDM processes.
- ❑ **Improved performance data exchange**: Network Operations will make optimised decisions, enabled by a more accurate network view, and considering the trade-off between network performance and airspace users' needs. The predictability of Network operations will improve through reinforced flight data exchanges between all actors, including neighbouring countries. **Predictability indicators will be required** at network level, addressing both traffic and ATM operations predictability.
- ❑ A shared view of the operational performance achieved through a common **Network 'performance cockpit'** that will consolidate existing data, tools and processes to enable improved data collection and analysis; the design of this cockpit shall be evolutionary, to facilitate possible future extensions of the data sets to additional areas of network performance (e.g. connectivity, vertical flight efficiency, environmental sustainability);
- ❑ Operational behaviours will be encouraged to contribute to an **improved network performance** (e.g. linked to 'fair' delay allocation, adherence to plans, cross-border initiatives for airspace improvements and delegations of service, re-allocation of over-capacities, re-use of best practices across service providers, etc.) and to encourage airspace users to make the best use of available network resources.

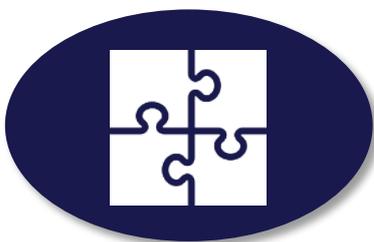
4.1.2. SO 2: Deploy and integrate interoperable and secure information management systems



The capabilities and world-wide competitiveness of the European Aviation value chain will require the end-to-end integration of standardised and performant ANS and Airport services, building on the timely implementation of the SESAR developments.

- ❑ A common **target ATM architecture**, based on the Airspace Architecture Study, will be defined in close cooperation between all Network actors together with a common roadmap applicable to all actors;
- ❑ The European ATM Network will be supported by **system wide information sharing** of dynamic ATM information, serving all operational users' needs, inter alia building on the NM capabilities;
- ❑ The European ATM Network will be supported by a **secure system wide information sharing** of dynamic ATM information and connecting military ATM systems where possible, serving all operational users' needs, inter alia building on the NM capabilities
- ❑ The Network Manager will undertake a vast modernisation of its own system to support all new emerging operational concepts, making extensive use of transformational technologies, such as big data and machine learning and supporting business process optimisation across the ATM network, as described in the NM Future System Architecture Study;
- ❑ The **Network Manager interoperability strategy will be further updated** to address current gaps and to accelerate operational implementation, strongly integrating NM systems and procedures with its operational partners';
- ❑ The **current standards for interoperability** will be extended and their adoption will be coordinated at ICAO level through the applicable EU processes; the fast deployment of these interoperability standards will be encouraged;
- ❑ NM will provide indications on **opportunities, information, analysis support** to the relevant parties identified in the NF IR, including liaising with operators of other modes of transport, to address specifically crisis situations.

4.1.3. SO 3: Optimise Network design



This objective relates to the organisation and management of European airspace to be used as a continuum, in a flexible and dynamic way (“one single European Airspace System”) enabling optimum operations for airspace users. It will remain a cornerstone for meeting the SES performance targets, building on the progress achieved to date and will include security and defence requirements.

The Network improvements will be driven more proactively through a Network Optimisation approach coordinated by the Network Manager, based on the approach described in the Airspace Architecture Study and taking into account users needs. **Optimum airspace structures responding to the SES performance targets will be defined between all Network actors at Network level** – to deliver the most efficient services to traffic flows irrespective of geographic boundaries – towards which all actors will progressively converge their pre-existing airspace evolution plans, as recorded in the ERNIP. The strength of this approach is to combine the Network capacity modelling processes of the NOP with the techniques enabling the optimisation of all necessary Network resources. It encompasses the design of the optimum

airspace structures, irrespective of State boundaries and appropriate links to Terminal Airspace Systems; it will take due account of airspace requirements for national security and defence purposes; the setting up of optimum sector opening schemes with flexible rostering (addressed in SO8); the Network need to optimise the supporting infrastructure including ATM, CNS, AIS (addressed in SO7); and the optimisation of network operations (addressed in SO4).

The operational concepts enabling this objective include the implementation of Free Route Airspace down to TMA boundaries, the Advanced Flexible Use of Airspace, the development and progressive implementation of a target/ideal sector structure and the optimisation of TMA structures based on PBN, as agreed through the Network CDM Process.

This Strategic Objective will also consider the network integration of new entrants into European network operations, including drones and European Higher Altitude Operations.

4.1.4. SO 4: Optimise Network operations



Optimisation of network operations is a key objective. Building on the well-established NOP process, the Network Manager will cooperatively work with air navigation service providers, as well as civil and military airspace users, in achieving higher performance levels in capacity and flight efficiency, with due regard to military operational requirements thanks to a new approach, progressively driving all actors towards 'Network Optimum Operations'.

The optimisation of network operations will tackle the following axes:

- ❑ improved demand capacity balancing, with due regard to military mission effectiveness;
- ❑ enhanced operational predictability;
- ❑ collaborative trajectory management based on 4D trajectories; and
- ❑ full integration of airports and Terminal Airspace Systems into the Network;
- ❑ facilitation of military operations, training and exercises.

The following steps will be taken:

- ❑ ATS units with structural capacity problems will consider **more cross-border arrangements**, including arrangements with adjacent units to delegate service, implement functional mobility or any other relevant means;
- ❑ **More commitment** will be ensured for the delivery of the **operational actions defined in the NOP based** on the predicted traffic demand. ANSPs will plan sector openings accordingly to optimize demand capacity balancing avoiding both the lack of capacity as well as the surplus of capacity as much as possible.
- ❑ Joint projects for improving both **traffic predictability** from an Airport and ANSP perspective, as well as **ATM service predictability** from an AO perspective will be taken, to unleash capacity buffers caused by low predictability. NM will also drive relevant initiatives, (e.g. the development of data exchanges including at pan-European level) to accelerate the implementation and achieve consistent results across the network.
- ❑ The transformation of ATFM into **Collaborative Traffic Management** in support of time based operations and eventually the path towards the **management of Business Trajectories**, which is expected to be operational in substantial parts of the Network by 2030.
- ❑ The Network Manager, through the defined Network CDM processes, will have a key role to play, coordinating the adaptation of the Network operational processes to support the **technical evolutions to be delivered by SESAR complemented by an adaptation of the current ATS/ASM/ATFM procedures and implementation of best practices**. It will also lead the strategy enabling a smooth and harmonised European implementation of the ICAO concepts supporting flight plan evolutions (e.g. FF-ICE, FIXM) and the SESAR enablers of the Business Trajectory. It will also be part of the initiatives concerning the implementation of the Flight Object.
- ❑ By 2030, it is expected that **the integration of all major European airports into Network Operations** will be finalised, with these airports being fully part of the CDM processes and an integral part of ATM, enabling a gate to gate management of the Business Trajectory. This

operational convergence will be guided by the ultimate objective of preventing any airports capacity crunch.

- ❑ At the end of the transformation process, the Network Manager's role will evolve to become the **coordinator of the 4D Business/Mission Trajectory** vis-à-vis the airspace users and the management of an **enhanced Demand Capacity Balancing process**.

4.1.5. SO 5: Develop European connectivity and airport services



To extend the positive societal impact of the SES and improve the passenger experience, connectivity and airport services will be enhanced and monitored.

European connectivity will develop to support economic growth both at local and European level.

- ❑ The **Network functions will support the setting up of the connectivity model and to monitor the progress** of the related indicators. The NOP planning function will include the identification of required improvement measures at airport/network level. It will evolve towards the integration of airport and network operations, addressing the links AOP - NOP and the connectivity between APOC and NMOC. For crisis situations, inter-modal connectivity will be addressed as required by the NF IR.
- ❑ The actors of the **ATM Network will evolve their services to improve European connectivity**, enabling:
 - **Internal connectivity** to develop as required to support the European ambitions set at political level, optimising economic growth and reducing regional imbalances.
 - **External connectivity** to progress faster than the average global connectivity, supported by operational agreements to be set up by NM to implement the Aviation Strategy for Europe;
 - The Network Functions will support the **quality of service to passengers** and to monitor the progress accomplished in this area.

4.1.6. SO 6: Ensure network safety and security and reinforce crisis management



All actors of the ATM Network will contribute to improve safety in line with the SES performance targets, through identifying and assessing network operational safety hazards and risks. They will adopt higher security standards to cope with a potential increase in international security risks, including terrorism and cyber-attacks and will be acting cooperatively to share any information on risks under a strengthened crisis management process.

All actors will evolve to address **safety** primarily from an operational risk perspective:

- ❑ The measurement of **safety** will be transparent and **expressed in terms of actual operational risks** (e.g. separation minima infringements, runway incursions, etc.). It will specifically target areas where prevention is required. Common methods and tools should be used across the network to enable the aggregation of operational safety risks.

- ❑ **All actors will cooperate** – encouraged by the extension of **Just Culture** across all Member States. Network partners will perform collaborative safety knowledge management addressing all network functions and tasks-related safety events which will be used then to enhance safety, security, airspace design and operational procedures network-wide.
- ❑ The Network Functions will focus on the **identification of major safety risks from a Network perspective**. This includes the sharing of lessons learned from all serious incidents, the safety knowledge management, the facilitation of best practices implementation, the monitoring and reporting of the progress achieved end-to-end and the preparation of mitigation measures at network level to ensure operations continuity and coordinate their implementation through NM.

With respect to security:

- ❑ NM will be at the fore-front for implementing the **standard security services, in accordance with the required security standards, for their own systems;**
- ❑ NM will implement the security requirements arising from the recent legal designation as critical infrastructure of NM sites in its host states.

Crisis Management will be risk and performance based, reinforced at network level, the Network Functions will be extended to include specific **operational coordination at network level in times of crisis**, and mitigate the occurrence of major risks quickly and efficiently, such as political crises, cyber-attacks and terrorism, **including the facilitation of Defence & Security crisis response**. This will be enabled by a strengthened framework for international pan-European cooperation including civil-military coordination and the creation of an interface with the EU Emergency Response Centre.

- ❑ **Appropriate tools will be developed** (e.g. maps for managing nuclear emergency events) in support of managing crisis events.
- ❑ **Crisis management expertise** will be strengthened at local level (e.g. in States, ANSPs, AOs, etc.) and at the network level
- ❑ NM will promote the **harmonisation of best practices** in service management aimed at ensuring maximum security and developing resilience; this will include the development and coordinated implementation of **scenarios for crisis and recovery measures at network level**.
- ❑ NM will also coordinate the **operational/technical cooperation** with relevant international expert/scientific organisations to address specific risks (e.g. cybersecurity, pandemics, exceptional natural phenomena...).

4.1.7. SO 7: Optimise ATM/CNS infrastructure and services to support evolutions towards more efficient network operations and services



The European aviation value chain will become more performant and cost effective, a prerequisite for extending the presence of the European industry on global markets.

This Strategic Objective will drive evolution towards the 'Network Infrastructure Performance and Cost Optimum'.

A continuous monitoring of the availability of the CNS infrastructure of the European ATM Network is established and will also actively promote the technical integration, when required and if applicable. It will monitor and report on the performances of the CNS infrastructure required at network level. This should operate in full cooperation and transparency with the concerned infrastructure operators, and have the capability to propose improvements and mitigation measures when network performance is at stake. This should include proposals for the rationalisation of infrastructures.

Special attention will be put on the aviation spectrum defence (cf. ITU/CEPT) and monitoring to ensure that the spectrum aviation asset is available, protected for safety of live applications, well used and equally shared between the different systems and the stakeholders. It will also cover the definition/operations of common services, as identified in the applicable legislation or as requested by and on behalf of, the Network operational stakeholders' community, when relevant, based on cost benefit analyses.

4.1.8. SO 8: Develop the network human capital and improve its flexibility through excellence



In the 2025-2030 timeframe, the operational implementation of the most disruptive SESAR technologies are or will be initiated, which will result in significant changes for the day-to-day work of the ATM personnel. In parallel, the Network Optimisation approach will foster initiatives for more flexible working arrangements. This may include a variety of measures, to be applied according to the local context. Some examples to be considered are improved night/weekend rostering, ATCO functional mobility, staff mobility if financially and operationally viable, or cross-unit provision of air traffic services.

Staff competencies are – and will remain - paramount in achieving operational efficiency without compromising on safety. All evolutions shall in any case pay due regard to the Human Factor and licensing requirements of the Single European Sky. All these evolutions will require an important **training** effort and a more systematic exchange of **best practices**. More focus shall be put on **involving staff in the SES evolution** with a win-win spirit.

This will require a twofold approach:

- collectively through **new initiatives for social dialogue** involving all actors concerned at Network level and promoting the harmonisation of skills and working conditions;
- at individual level, through Network wide initiatives for developing **excellence of the ATM operational and technical personnel**, including a more proactive recognition/promotion of staff expertise at Network level, as agents of change and support to their peers;
- addressing **legal and regulatory constraints** in support of ATCO mobility.

4.1.9. SO 9: Improve environmental sustainability



Environment sustainability will be improved in line with the SES performance ambitions for 2030: all partners of the ATM Network will cooperate to enable more direct trajectories, and accelerate the implementation of innovations supporting greener aviation.

The definition of an 'ideal/target airspace structure' will drive the coordinated improvements by all actors towards the progressive **optimisation of flown trajectories** end to end, including Continuous Climb and Descent Operations and optimised TMA design using PBN. Further actions, including **adaptations of the current route charging policy**, might be required to further encourage network actors in this direction.

The Network Functions will **help the Network operational partners to achieve the SES targets for Environment**. This will involve expertise at Network level in the areas of fuel consumption, gaseous emissions, noise reduction. It will include the provision of Network operational and technical support to innovative concepts of operations and experimentation of new air transport vehicles that

will contribute to environmental sustainability (e.g. supporting new applications for RPAS and electric and hybrid electric aircraft, protecting 'Solar Impulse'-like experimental flights). This may also include a technical support and advice to the political bodies in charge, for instance for applying environment related **incentives** and implementing the 'climate change policy'.

The Network Manager will further develop its capabilities to support the EC's environment policy, extending its capabilities for collecting and analysing environmental and aircraft performance data (e.g. addressing TMA operations, taxi times, vertical flight efficiency, etc.).

4.1.10. SO 10: Support European aviation at global level



The Network partners will cooperate on developing excellence in all ATM technological and operational areas and acting jointly through partnerships to grow at global level. The Network Manager will support the European aviation industry by promoting our concept of 'Global Network of Networks' worldwide and by developing operational arrangements beyond Europe.

Implementation of common standards enabling **ATM systems interoperability in Europe and their integration with NM systems** will positively contribute to the European aviation industry's competitiveness on global markets.

The Network partners will engage in **collaborative partnerships** at European level to address jointly new markets beyond Europe.

To support the **global development** of the European industry according to the Aviation policy, NM will set up **agreements organising operational cooperation beyond Europe** – with the support and involvement of all Network partners. This will also enable the generalisation of the European network management concept to the global "Network of Networks" concept, based on the interconnection of regional Network Operations nodes.

This strategic objective will contribute to the enhancement of the European and external connectivity (SO5).

4.2. Cooperative aspects of the participating operational stakeholders in terms of roles and responsibilities

The participation of the operational stakeholders in the implementation of the Network Strategy Plan Strategic Objectives will be further detailed through the revision of the Network Cooperative Decision Making Processes that will be finalised by the end of 2019.

Further details on the involvement of individual operational stakeholders are also provided in the section 5.2 of the Network Strategy Plan.

4.3. Strategic Objectives and Performance and Regulatory Requirements

The contribution of the Strategic Objectives to the performance and regulatory requirements is described in the sections 2.3, 3.5, 3.6 and 3.7 of the Network Strategy Plan.

4.4. Measuring NSP progress towards the objectives

The actions of the NSP are intended to frame and drive the work and deliverables of the various consultation groups, in the framework of the Network CDM process as agreed by the NMB.

In order to manage the progress of the actions, indicative milestones will be defined in the roadmaps in NOP. The progress in achieving the 10 strategic objectives will be assessed annually by the NMB on the basis of the Network Annual Report to be produced by the Network Manager at the end of each year.

Reports on the progress of the NSP implementation will be periodically provided by the Network Manager to the NMB and the Commission as necessary.

4.5. Impact on industry and other concerned areas

The evolutions foreseen in the Network Strategy Plan will improve cooperative decision making processes, the planning and management of Network Operations, the evolutions of the air traffic management or air navigation services systems and procedures and the overall improvement of network performance.

The Network Strategy Plan provides all ATM stakeholders, including the Network Manager, with the timely information required to strategically plan and prepare for the operational performance needed to meet expected demand and to develop permanent solutions to further improve network performance.

The information included in the Network Strategy Plan and, more specifically, the sub-objectives of each of the Strategic Objectives will facilitate the required evolutions of ATM stakeholders and industry systems, procedures, operational practices and an enhanced management of the ATM network, through the early identification of solutions and the development and implementation of appropriate operational and technical capabilities. These will be further evolved, as required, taking into account the gradual evolution towards the implementation of the mature SESAR solutions in strong coordination with all network partners to ensure their timely and synchronised implementation.

The impact on the industry and other concerned areas will be progressively evaluated through the Network CDM Process and the Network Operations Plan. In addition, for SESAR solutions impacting industry, the Network Manager will work closely with the SJU to address the necessary operational and technical evolutions that might impact other stakeholders, in particular for those solutions having reached the V3-V5 stages. It is expected that the impact assessment will be done collaboratively between SJU, all concerned partners and NM.

The table below includes a high level assessment of the impact on industry and other concerned areas for each Strategic Objective.

Strategic Objectives	Impact
SO/1	Low
SO/2	Medium to High
SO/3	Low for the short/medium term Medium to high for the long term
SO/4	Low for the short/medium term Medium to high for the long term
SO/5	Low
SO/6	Low
SO/7	Low
SO/8	Low
SO/9	Low for the short/medium term Medium to high for the long term
SO/10	Low

5. Strategic Planning

The 10 strategic objectives are enabled by a set of actions to be implemented over the period 2019-2029 and beyond by the operational stakeholders together with the Network Manager. They encompass the network-wide deployment of technological developments and operational procedures and evolutions in the allocation and sharing of resources.

Section 5.1 summarises what is proposed to be addressed in the short medium term timeframe to achieve the strategic objectives and enumerates, in more detail, the main actions which will contribute to achieving each strategic objective in the short and medium term. The description of these actions includes the required operational stakeholder(s) in terms of roles and responsibilities. The progress towards achieving those objectives will be included in the NOP and Annual Report mechanisms.

Section 5.2. summarises what is proposed to be addressed in long term timeframe to achieve the strategic objectives and highlights the main actions to be taken to achieve the long term part of the Strategic Objectives.

Section 5.3 provides a high level summary of the costs and benefits that is aligned with the conclusions of the Airspace Architecture Study.

The governance and cooperative aspects of the participating operational stakeholders in terms of roles and responsibilities are described in the appropriate legislation and in the Network Cooperative Decision Making Processes. Nevertheless, these will need to appropriately evolve to reinforce expeditious, fair, and strengthened cooperation and CDM of all the operational stakeholders involved in operation of the European ATM Network.

The general description of the short/medium term planning and of the long term planning is summarised as follows:

Step 1: 2019-2025/2029 - Driving Network optimisation through the implementation of airspace restructuring and operational excellence, as described in the Airspace Architecture Study and a better integration of airports and Terminal Airspace Systems into the Network

Step 2: 2025-2035/2040 - - Initiating the implementations of Flight and Flow centric operations

5.1. Short and Medium Term Planning

To address the challenges to network performance over the period 2019-2029 and beyond , the network actors need to build on the instruments established under the Single European Sky and align their action plans accordingly, namely:

- Network strategic objectives and actions** (main operational and technical evolutions led by NM)
- SESAR implementation** (Common Projects, ATM/CNS developments)
- Network Management optimisation** (e.g. Network Functions, CDM)

Step 1: 2019-2025/2029 - Driving Network optimisation through the implementation of airspace restructuring and operational excellence, as described in the Airspace Architecture Study and a better integration of airports and Terminal Airspace Systems into the Network

This aims primarily at achieving a common Network view, **optimising operational performance** at network level and making the best use of the available human resources, by:

- Setting up an optimum airspace structure that responds to SES performance targets and adaptation of capacity to demand network-wide;
- Optimising sectorisation and airspace structures, in particular at cross-border level;
- Optimised connectivity to Terminal Airspace Systems;
- Improving the flexibility of service provision with flexible staff arrangements;

- ❑ Improving the capacity planning of week-weekend/nights;
- ❑ Implementation of “Operational Excellence” initiatives together with the ANSPs and Airports to further foster operational and technical harmonisation and interoperability. This new initiative would aim at identifying best practices and capture quick wins (through changes in operational procedures, rostering, smaller adaptations to systems, etc.) among all stakeholders and effectively support their implementation to reduce delays;
- ❑ Capacity commitment through the NOP will be established between NM and ANSPs consolidating demand capacity balancing optimisation addressing both lack and surplus of capacities considering network and local conditions.
- ❑ Improving vertical flight efficiency for reducing gas emissions and fuel consumption;
- ❑ Optimising flight planning, airports operations and flow management through the integration of data and constraints. This includes
 - Sharing the main enablers that ensure a common network view (e.g capacities, trajectories, configurations, activations);
 - Improving traffic predictability and the assessment of traffic complexity;
 - Consolidating an efficient ATFM set of solutions based on improved traffic predictability and network impact assessment;
- ❑ The Network Manager undertaking a vast modernisation of its own system to support all new emerging operational concepts based on the implementation of its Future System Architecture (FUTARS) study

A specific attention will be put on the **performance of - and access to – the most congested airports/TMAs**, a sensitive component of the Network. This will involve:

- ❑ Improve the efficient use of airport infrastructures through advanced collaborative operations;
- ❑ integration of airport and network operations, addressing the links AOP - NOP and the connectivity between APOC and NMOC;
- ❑ Advanced airport capacity planning with end-to-end optimisation at network level.

In parallel, **all actors will implement the Common Projects components of SESAR**. From a Network strategy perspective, **the Network Manager will ensure full coordination of AF3 and AF4 Families where most network benefits are expected** and where synchronisation will have to be carefully managed.

The first steps required for **the Network Functions to support the new ambitions stemming from the Aviation Strategy for Europe** will be initiated **while responding to the requirements of the NF IR..** Additional dimensions of Network performance will be analysed, in terms of connectivity, passenger service, and pace of implementation of environmental friendly technologies and procedures. The Network Manager will enlarge its operational intelligence capabilities to become an observatory in support of the political bodies concerned: collecting the operational data, taking part in the analyses, identifying areas for improvement **in coordination with all Network actors** and facilitating the analysis and coordination of air transport with other modes of transport for crisis situations. A return from experience will be deduced from these initial steps to further refine, if necessary, the scope of the Network Functions to address those new aspects.

Another cornerstone of this transformation will be to address **Infrastructure Evolutions** in close cooperation with all actors. It will in particular:

- ❑ Monitor the day to day network operational and technical performances to the extent required for the execution of the Network Functions and tasks and the fair sharing of the scarce resources.
- ❑ Develop, organise and provide common network support services related to the network functions that are required by operational stakeholders, as stipulated in the NF IR or as otherwise decided through the Network CDM processes.
- ❑ Ensure that infrastructure services will meet network performance objectives and address the aviation requirements and spectrum constraints as they evolve (e.g. to support future RPAS operations).

Several additional functionalities for Network operational performance with direct benefits for airspace users will be gradually implemented:

- ❑ The generalisation of the User-Driven Prioritisation Process (UDPP).
- ❑ The deployment of information sharing in support of the business and mission trajectories.
- ❑ Digital integrated briefing.
- ❑ Full deployment of Extended Projected Profile (EPP).
- ❑ Progressive implementation of Enhanced Collaborative Airports Performance Management, and
- ❑ The gate to gate optimisation with airside-landside integration.

This will require to be facilitated by an extensive dialogue amongst operational stakeholders with regard to potential improvements in the regulatory framework as well as by the implementation of those **more structural/institutional changes** in the areas of:

- ❑ Harmonised ATCO licensing and conditions of employment.
- ❑ Refinement of the route charging model.
- ❑ Enhanced coordination between all actors to simplify and further integrate Network Functions and tasks from R&D, industrialisation, implementation into operations.
- ❑ Optimised integration of civil-military activity and requirements.

For each strategic objective, the list of the most significant actions to be implemented between 2019-2029 and beyond has been established, indicating:

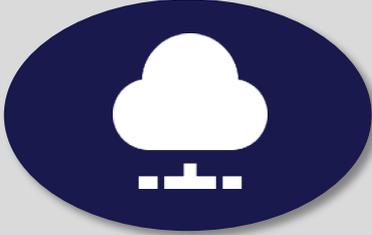
- In the first column the priorities for each of the sub-objectives’;
- In the second column, and as relevant, the deployment of technology, architectural impact, human aspects;
- In the third column required operational stakeholders participation and NM involvement.

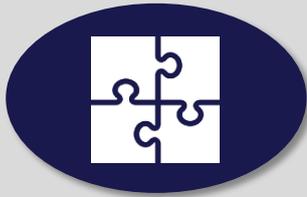
The detail of these actions is provided and regularly updated in the NOP.

The sections below provide the lower level planning for each individual Strategic Objective:

 <p>SO 1: Manage performance through ‘Network-minded’ decision-making <i>High Priority</i></p>		
 <p>SO 1/1 <i>High Priority</i></p>	<p>Addressing operational stakeholders needs, through operationally performant network and ATM/CNS services, established locally and/or network-wide. . This will include clear accountabilities and consistent performance-based plans at network and local level. It will address also the responsibilities of NM vis-à-vis its operational stakeholders. Deviations from the plans will be addressed through the management of the ATM measures and will need to be fully addressed by empowered and accountable entities. It will ensure a coordinated and consolidate approach from planning into operations by aligning operational plans/concepts/manuals with the Network Concept of Operations and the coordination of the NSP and ATM Master Plan. The execution of the overall process will be monitored and reported by NM, including capabilities for customising reports to airspace users’ requirements at individual level. This will be also supported by reinforced CDM processes</p>	<p>NM, ANSP End 2020</p>

 <p>SO 1/2</p> <p><i>High Priority</i></p>	<p>Improved predictability based on a more accurate network view and trade-off analysis between network performance and airspace users' needs. Predictability indicators will be developed at network level, addressing both traffic and ATM operations predictability.</p>	<p>NM End 2020</p>
 <p>SO 1/3</p> <p><i>High Priority</i></p>	<p>Extension of network performance cockpit to support performance analysis and improvements on other areas including connectivity, inter-modality and access to airports, passenger information and satisfaction, vertical flight efficiency, safety risks, security risks, human factors (e.g. change management, crises management, working conditions), environment sustainability (e.g. fuel consumption, biofuels, gas emissions, noise reduction).</p>	<p>NM 2020-2022</p>
 <p>SO 1/4</p> <p><i>Medium Priority</i></p>	<p>Fostering operational behaviours towards network performance</p> <ul style="list-style-type: none"> <input type="checkbox"/> Delay attribution process - 2020 <input type="checkbox"/> Best practice implementations (including flexible rostering and dynamic sectorisation, airport throughputs) – as from 2022 <input type="checkbox"/> Cross border initiatives – as from 2021 <input type="checkbox"/> Adherence to performance plans - continuous <input type="checkbox"/> Encourage preliminary flight intentions provision (ICAO FF_ICE) to support efficient collaborative network management and earlier coordination with airspace users – as from 2022 	<p>all</p>
 <p>SO 1/5</p> <p><i>High Priority</i></p>	<p>Strengthen operational stakeholders' performance planning through the NSP and NOP CDM process.</p>	<p>all 2020</p>
 <p>SO 1/6</p> <p><i>Medium Priority</i></p>	<p>Stronger coordination of the whole cycle of technological modernisation for the execution of network functions will be put in place at network level in order to achieve full interoperability between ATM systems and NM systems. This will include a strengthened cooperation between all relevant partners.</p>	<p>All As from 2020</p>

 SO 2: Deploy and integrate interoperable and secure information management systems <i>High Priority</i>		
 SO 2/1 <i>High Priority</i>	Implement the Network Interoperability Strategy to ensure full alignment with the Airspace Architecture Study, European Aviation Strategy and with the Digital Agenda, by making the ATM data widely available and by promoting interoperability based on open standards	All 2025
 SO 2/2 <i>High Priority</i>	Develop technical infrastructure and tools to support network performance cockpit (business intelligence) capabilities.	NM 2022
 SO 2/3 <i>High Priority</i>	Modernise the NM systems architecture to cope with upcoming business evolutions and to address current limitations. This action will lead to the implementation of the NM System Future Architecture Study until the end of RP4.	NM 2022-2029
 SO 2/4 <i>High Priority</i>	Participate to the evolution of interoperability standards and their coordination at ICAO level (e.g. SWIM profiles, FIXM, AIXM/WWXM as enablers of the 4D Trajectory, FF-ICE (Flight & Flow Information for a Collaborative Environment), Flight Object).	All 2022-2029
 SO 2/5 <i>High Priority</i>	Build a shared ATM Network Information Reference that allows planning of all stakeholders to be based on the same data and assumptions and enables an efficient CDM, that is the reference for any measure with network impact, and that supports any network-wide activity.	All 2025
 SO 2/6 <i>High Priority</i>	Implement European data management systems and aeronautical information relevant to the execution of network functions as well as an electronic integrated briefing portal as a common reference for aeronautical and airspace data for use in ATM systems and operations.	NM, ANSP 2025

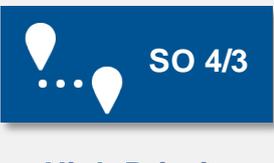


SO 3: Optimise Network design

High Priority

<p>SO 3/1 <i>High Priority</i></p>	<p>Implement optimum network, responding to SES performance targets irrespective of national boundaries and establish reasonably achievable objectives for all actors taking into account current capabilities and limitations. This will include implementation of full FRA, advanced FUA, dynamic sectorisation, cross border sectorisation, consolidation of sectors for upper airspace, full gate to gate optimisation taking into account airside and land side operations at major airports. Appropriate connectivity ensured with Terminal Airspace Systems.</p>	<p>All 2020-2027</p>
<p>SO 3/2 <i>High Priority</i></p>	<p>Extend NOP planning process to include network optimisation actions. The actions should address what is reasonably achievable taking into account the current situation and constraints towards the optimum identified.</p>	<p>All 2022</p>
<p>SO 3/3 <i>High Priority</i></p>	<p>Free route airspace implementation for the whole NM area supported by coordinated evolutions to ATM / NM systems to deliver flight efficiency benefits to airspace users in a cross border environment</p> <p>TMA optimisation, better connections between TMA and en-route sectors to ensure smooth and efficient transition in the FRA context</p>	<p>All 2022</p> <p>2022-2025</p>
<p>SO 3/4 <i>High Priority</i></p>	<p>Advanced FUA (with implementation of rolling AUP/UUP, dynamic airspace configuration, real-time ASM data exchanges, enhanced Network impact assessment & ASM performance reporting to facilitate efficient and harmonised FUA coordination between all ATM actors (local / regional) and deliver the flight efficiency benefits to airspace users</p>	<p>All 2020-2025</p>
<p>SO 3/5 <i>High Priority</i></p>	<p>Define optimum opening schemes to ensure the matching of future demand patterns and document them in the NOP.</p>	<p>NM, ANSPs 2022</p>
<p>SO 3/6 <i>High Priority</i></p>	<p>Implementation of “Operational Excellence” initiatives, which would aim at identifying best practices and capture quick wins among all stakeholders and effectively support their implementation.</p>	<p>NM, ANSPs Airports 2022-2025</p>

	<p>Network integration of new entrants into European network operations, including drones and European Higher Altitude Operations</p>	<p>All Continuous</p>
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 <p>SO 4: Optimise Network operations <i>High Priority</i></p>		
	<p>Modernise local/network ATM system capabilities including ATC planning and controller tools</p>	<p>NM, ANSP Continuous</p>
	<p>Improve the quality of the ATM Network Planning Processes by sharing accurate and timely, flight, flow and capacity data. Improve coordination of ATM transition projects.</p>	<p>All Continuous</p>
	<p>Transformation of ATFM into Collaborative Traffic & Network Management in the Trajectory based operations (TBO) context, including UDPP. Implementation and coordination of end to end 4D Business/Mission Trajectories at network level - 2029 Transformation of DCB into a collaborative constraint management process involving all ATM actors including airspace users and airports</p>	<p>All 2025 2020-2029 2025</p>
	<p>Integration of all major European airports into Network Operations supporting a gate to gate management of the 4D Business/Mission Trajectories. The NOP planning function will evolve towards the integration of airport and network operations, addressing the links AOP - NOP and the connectivity between APOC and NMOC.</p>	<p>NM, APT, ANSP 2020-2028</p>
	<p>Improved network situational awareness further integrating airports and to support the evolutions from SESAR (e.g. STAM, XMAN, traffic complexity management, EPP management and Target Time management, rolling & dynamic AOP/NOP integration, APOC/NMOC processes, continued implementation of Airport-CDM and Advance Tower concepts).</p>	<p>All 2020-2029</p>

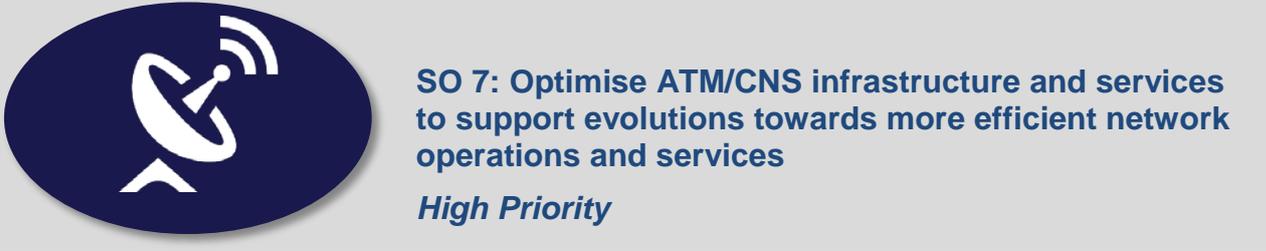
 <p>SO 4/6</p> <p><i>Medium Priority</i></p>	<p>Monitor airspace user service improvements in terms of flight punctuality predictability and efficiency; Assess impact of ATM constraints and ATFM regulations on operations.</p>	<p>All 2025</p>
 <p>SO 4/7</p> <p><i>High Priority</i></p>	<p>Evolve Network Manager's role to become the coordinator of the 4D Business/Mission Trajectory vis-à-vis the airspace users and to ensure the management of an enhanced Demand Capacity Balancing process.</p>	<p>All 2020-2029</p>

 <p>SO 5: Develop European connectivity and airport services</p> <p><i>High Priority</i></p>		
 <p>SO 5/1</p> <p><i>Medium Priority</i></p>	<p>Development of connectivity index and indicators to benchmark and monitor European connectivity with other regions.</p> <p>Analyse the impact of connectivity to the European economy at both European and local level.</p>	<p>All 2022</p>
 <p>SO 5/2</p> <p><i>High Priority</i></p>	<p>Extend NOP planning function to include the monitoring and identification of improvement measures for better connectivity at airport/network level. The NOP planning function will be extended to integrate of airport/network operations, addressing the links AOP-NOP and the connectivity APOC/NMOC.</p>	<p>NM Airports 2020-2028</p>
 <p>SO 5/3</p> <p><i>Medium Priority</i></p>	<p>Support with appropriate data the quality of service to passengers and monitor the progress accomplished in this area.</p>	<p>All 2025</p>
 <p>SO 5/4</p> <p><i>Medium Priority</i></p>	<p>Identify needs for enhanced airport services (e.g. faster connections and access to airports, reduced connection times, better passenger information supported by big data, inter-modality to address local congestions, etc.).</p>	<p>APT, NM 2025</p>

 <p>SO 5/5</p> <p><i>Medium Priority</i></p>	<p>Contribute to the development of inter-modal connectivity mainly for contingency and crisis situations</p>	<p>All 2025</p>
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 <p>SO 6: Ensure network safety and security and reinforce crisis management</p> <p><i>High Priority</i></p>		
 <p>SO 6/1</p> <p><i>High Priority</i></p>	<p>The Network Functions will focus on the identification of major safety risks from a Network perspective, the sharing of lessons learned from all serious incidents, the facilitation of best practices implementation, and the monitoring and reporting of the progress achieved end-to-end. NM will consolidate the deployment of common safety management methods and tools and the preparation of mitigation measures at network level to ensure operations continuity and will coordinate implementation.</p>	<p>All continuous</p>
 <p>SO 6/2</p> <p><i>High Priority</i></p>	<p>The measurement of safety will be transparent and expressed in terms of actual operational risks (e.g. separation minima infringements, runway incursions, etc.).</p>	<p>All continuous</p>
 <p>SO 6/3</p> <p><i>High Priority</i></p>	<p>NM will address cybersecurity by:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Implementing a security management system. <input type="checkbox"/> Setting-up a security operations center. 	<p>NM continuous</p>
 <p>SO 6/4</p> <p><i>High Priority</i></p>	<p>Implement security standards to support Network operations.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Security requirements from applicable legislation. <input type="checkbox"/> Security requirements arising from the recent legal designation as critical infrastructure of NM sites. <input type="checkbox"/> Promote the harmonisation of best practices in security management aimed at ensuring maximum security and developing resilience. 	<p>All 2020-2022</p>
 <p>SO 6/5</p> <p><i>High Priority</i></p>	<p>Enhance crisis management to include specific operational coordination at network level in times of crisis, and mitigate the occurrence of major risks efficiently, such as political crises, cyber-attacks and terrorism.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Appropriate tools will be developed (e.g. maps for managing nuclear emergency events) in support of managing crisis events. <input type="checkbox"/> Crisis management expertise will be strengthened at local level (e.g. in States, ANSPs, AOs, etc.) and at the network level 	<p>All continuous</p>

	<ul style="list-style-type: none"> ❑ NM will promote the harmonisation of best practices in service management aimed at ensuring maximum security and developing resilience; this will include the coordinated development of scenarios for crisis and recovery measures at network level. ❑ NM will also coordinate the operational/technical cooperation with relevant international expert/scientific organisations to address specific risks (e.g. pandemics, exceptional natural phenomena...). 	
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 SO 7/1 <i>High Priority</i>	<p>Ensure an optimised and cost-efficient use of the aeronautical radio frequencies. This will include the protection of aviation spectrum defence.</p>	NM, ANSPs continuous
 SO 7/2 <i>High Priority</i>	<p>Maintain a robust and transparent Radar Transponder Code Function, including the SSR code allocation process and a coordinated Mode S interrogator code allocation enabling the overall network efficiency and contributing to the overall network efficiency while optimising the availability of resources.</p>	NM, ANSP continuous
 SO 7/3 <i>High Priority</i>	<p>Ensure a coordinated approach towards a monitoring and reporting cost efficiency, performances, real-time service status reporting of the key infrastructure necessary to the executions of the Network Functions and tasks . Identify and promote best practices in planning and management of the monitored infrastructure.</p>	All Continuous
 SO 7/4 <i>High Priority</i>	<p>Propose and facilitate modernisation of the ATM/CNS infrastructure; This should include the rationalisation of infrastructures, setting up common solutions in particular for support services, etc.</p>	All continuous

 <p>SO 8: Develop the network human capital and improve its flexibility through excellence <i>High Priority</i></p>		
 <p>SO 8/1 <i>High Priority</i></p>	<p>Implement flexible ATS provision arrangements meeting the airspace users needs. Promote best practices on flexible working arrangements based on sharing benefits between staff, ANSP and airspace users.</p>	<p>All continuous</p>
 <p>SO 8/2 <i>High Priority</i></p>	<p>Ensure functional mobility of Air Traffic Control staff across sectors and frontiers to provide optimized capacity. Harmonise ATCO employment requirements.</p>	<p>All 2025</p>
 <p>SO 8/3 <i>Medium Priority</i></p>	<p>Develop performance indicators to monitor human factors and their impact on network performance addressing key elements (e.g. change management, preparation for new technologies, crises management, working conditions, training).</p>	<p>All 2025</p>

 <p>SO 9: Develop environmental sustainability <i>High Priority</i></p>		
 <p>SO 9/1 <i>High Priority</i></p>	<p>Develop actions and investigate possible incentives for the progressive optimisation of flown trajectories end to end, including Continuous Climb and Descent Operations and optimised TMA design using PBN.</p>	<p>All 2024</p>
 <p>SO 9/2 <i>Medium Priority</i></p>	<p>Provide appropriate data to address greener aviation in the areas of fuel consumption, gas emissions, noise reduction. Analyse the current situation, including performance objectives and specific actions.</p>	<p>All 2024</p>

 <p><i>High Priority</i></p>	<p>The provision of operational and technical support to innovative concepts of operations and experimentation of new air transport vehicles that will contribute to environmental sustainability (e.g. supporting new applications for RPAS, protecting ‘Solar Impulse’-like experimental flights, higher airspace operations above FL660).</p>	<p>All continuous</p>
 <p><i>Medium Priority</i></p>	<p>Develop Network Manager capabilities to support the EC’s environment policy, extending its capabilities for collecting and analysing environmental and aircraft performance data (e.g. addressing TMA operations, taxi times, vertical flight efficiency, etc.)</p>	<p>NM 2021</p>

 <p>SO 10: Support European aviation at global level <i>Medium Priority</i></p>		
 <p><i>High Priority</i></p>	<p>Promote the adoption of the European network management concept in other regions thereby supporting the establishment of the “Network of Networks” concept.</p>	<p>All 2021</p>
 <p><i>Medium Priority</i></p>	<p>Encourage network partners to establish collaborative partnerships.</p>	<p>All 2021</p>
 <p><i>High Priority</i></p>	<p>NM to set up agreements organising operational cooperation beyond Europe – with the support of European Network operational and institutional stakeholders promoting the sustainable ATM approach in Europe.</p>	<p>NM continuous</p>
 <p><i>Medium Priority</i></p>	<p>Accelerate implementation of common ATM standards in Europe and promote their applicability to other regions</p>	<p>All continuous</p>

5.2. Long Term Planning

To address the challenges to network performance beyond RP3, the network actors need to build on the instruments established under the Single European Sky and align their actions plans towards the recommendations of the Airspace Architecture Study covering the longer term steps, where appropriate supported and established by approval processes.

The recommendations of the Airspace Architecture Study will need to be implemented with respect to governance and regulatory actions required. These are covered by the second step described below. Some of them represent evolutions of more aspirational nature that will require further decisions with respect to the evolution of the network functions:

Step 2: 2025-2035/2040 - Initiating the implementation of Flight and Flow centric operations

The first **implementation** in operations of **SESAR advanced Concepts – of which Flight & Flow centric Operations** - will take place through cooperation between all relevant Network actors, ideally at Network core-area level, where operational needs are more pressing, or alternatively at local/sub-regional/seasonal level. They will focus on addressing ATCO workload and be preceded by in-depth evaluations in areas such as:

- Flight/Flow centric ATC operations and integration to NM operations
- Virtual ACCs
- Wide-spread application of data-link and advanced ATC support tools
- Initial trials of delegated separation

Based on the experience acquired in previous step, **there should be an aspiration** to define related Network targets enabling proper monitoring of the progress achieved, and the fostering corresponding improvement initiatives at Network level - e.g.:

- In support to Optimised ATM/CNS Infrastructure (SO7): addressing the need to evolve towards a more integrated Infrastructure Management.
- In support to environmental sustainability (SO9): monitoring and supporting operational actions to reduce fuel consumption, gas emissions and noise, to improve vertical flight efficiency, and to use alternative fuels.
- In support to extended connectivity (SO5): monitoring the relevant indicators at city-pair and passenger traffic level, and providing Network support to airports and airlines in their projects for development.
- For improving operations continuity and crisis management (SO4, SO5, SO6) : supporting projects establishing cross-border and multi-modal contingency plans and related measures.

The Network Functions will evolve to support the new Flight and Flow centric concept of operations with reinforced roles, governance, and CDM process, in particular through:

- Collaborative planning and decisions ,
- Dynamic capacity/demand balancing process
- Close cooperation with the airspace users
- ATC/ATFM integration
- Enhanced arrival manager

The quality of the Network view will continue to improve during this second step with more systematic exchanges between partners and joint initiatives to improve predictability. The Network Manager will take the opportunity of the SESAR changes to further progress the **harmonisation of operational concepts and procedures**.

During the transition, the Network Manager will play a specific key role in securing a **paced implementation through the continuous planning/monitoring** of the Network impact of changes. It will ensure **network operations continuity**, by **bridging multiple technical environments** and **managing mixed operational modes**. The Network Manager will facilitate the stakeholder coordination and support during the decision making process depending on the impact of changes.

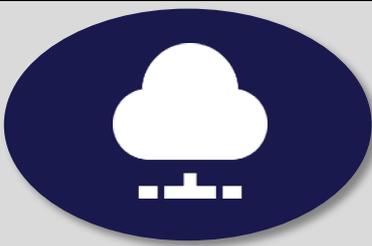
Ultimately, the **Network Manager will further strengthen the role of coordinating the air traffic flow and capacity management, with an encompassed reinforced governance and CDM process**. It will deal with airspace users to manage the evolutions of the capacity and demand, from

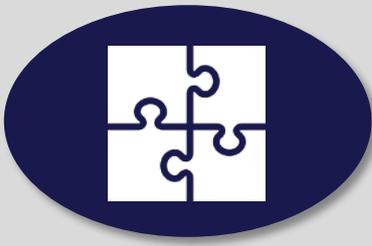
planning to execution. It will also advise during the CDM process on the optimum application of Target Times and Extended AMAN. It will need to ensure that the ATM Network will be able to integrate **new entrants operations**

More actors will engage in collaborative partnerships, building on interoperability gains. This will involve the following actions to be conducted at local level, through collaborative partnerships, when economically beneficial and operationally practical:

- Decoupling ATM services from infrastructure provision and services;
- Improving ANS operations productivity through automation.

The section below covers the Sub-Strategic Objectives concerned with the long term and those overlapping over short/medium and long term. Some repetition is unavoidable. **There are no long-term strategic aspirational sub-objectives in SO 1, SO 6, SO 7, SO 8, SO 9 and SO 10. Nevertheless, they include continuous elements that will be applicable also for the long-term.**

 <p>SO 2: Deploy and integrate interoperable and secure information management systems <i>High Priority</i></p>		
 <p><i>High Priority</i></p>	<p>Modernise the NM systems architecture to cope with upcoming business evolutions and to address current limitations. This action will lead to the implementation of the NM System Future Architecture Study until the end of RP4.</p>	<p>NM 2022-2029</p>
 <p><i>High Priority</i></p>	<p>Participate to the evolution of interoperability standards and their coordination at ICAO level (e.g. SWIM profiles, FIXM, AIXM/WWXM as enablers of the 4D Trajectory, FF-ICE (Flight & Flow Information for a Collaborative Environment), Flight Object).</p>	<p>All 2022-2029</p>

 <p>SO 3: Optimise Network design <i>High Priority</i></p>		
	<p>Implement optimum network, responding to SES performance targets irrespective of national boundaries and establish reasonably achievable objectives for all actors taking into account current capabilities and limitations. This will include implementation of full free route airspace, advanced FUA, dynamic sectorisation, cross border sectorisation, consolidation of sectors for</p>	<p>All 2020-2027</p>

High Priority	upper airspace, full gate to gate optimisation taking into account both airside and land side operations at major airports. Appropriate connectivity will be ensured to the Terminal Airspace Systems.	
 SO 3/7 Medium Priority	Network integration of new entrants into European network operations, including drones and European Higher Altitude Operations	All Continuous

 SO 4: Optimise Network operations High Priority		
 SO 4/1 High Priority	Modernise local/network ATM system capabilities including ATC planning and controller tools	NM, ANSP Continuous
 SO 4/3 High Priority	Implementation and coordination of end to end 4D Business/Mission Trajectories at network level - 2029	All 2020-2029
 SO 4/4 High Priority	Integration of all major European airports into Network Operations supporting a gate to gate management of the 4D Business/Mission Trajectories. The NOP planning function will evolve towards the integration of airport and network operations, addressing the links AOP - NOP and the connectivity between APOC and NMOC.	NM, APT, ANSP 2020-2028
 SO 4/5 High Priority	Improved network situational awareness further integrating airports and to support the evolutions from SESAR (e.g. STAM, XMAN, traffic complexity management, EPP management and Target Time management, rolling & dynamic AOP/NOP integration, APOC/NMOC coordination processes, continued implementation of Airport-CDM and Advance Tower concepts).	All 2020-2029
 SO 4/7 High Priority	Evolve Network Manager's role to become the coordinator of the 4D Business/Mission Trajectory vis-à-vis the airspace users and to ensure the management of an enhanced Demand Capacity Balancing process.	All 2020-2029

	<p>SO 5: Develop European connectivity and airport services <i>High Priority</i></p>	
 <p>SO 5/2 <i>High Priority</i></p>	<p>Extend NOP planning function to include the monitoring and identification of improvement measures for better connectivity at airport/network level. The NOP planning function will be extended to include integration of airport and network operations, addressing the links AOP - NOP and the connectivity between APOC and NMOC.</p>	<p>NM Airports 2020-2028</p>

5.3. Cost, benefits and business case

This section addresses the costs, benefits and business case for both the short/medium and long term phases.

The high-level impact assessment is based on a conservative top-down approach relying on simulation results covering mainly the capacity and environment areas. They are based on the current plans in the NOP and in the ERNIP and on the assumptions that:

- a major airspace restructuring project and operational excellence project will be implemented over the period covered by the NSP ;
- The full PCP will be implemented over the similar period;
- A number of promising SESAR solutions as identified in the NSP will be implemented until 2030.

With respect to capacity, it is estimated that between 250-300 million minutes of ATFM delays could be saved between 2020-2025 compared to a “business-as-usual” scenario. If one minute of delay is estimated at 70 EUROS, this would result in benefits estimated between 17.5-21 billion EUROS.

With respect to environment/flight efficiency, it has been estimated that the full cross-border FRA implementation would bring a reduction of 4 to 10 NM in 2029/2030. That would correspond to benefits resulting from fuel savings estimated to be at around 3 billion EUROS.

With respect to the investment costs, the source of the evaluations were the investment costs included in the Airspace Architecture Study that give, in their upper band, over the period 2020-2029 an amount of 4.7 billion EUROS. If the investment plan of NM ios also added to this amount, the total investments could be evaluated at approximately 5 billion EUROS.

As a result, the total benefits could be estimated to be between 20-24 billion EUROS for an investment cost evaluated at approximately 5 billion EUROS.

6 Risk Assessment and Mitigation

6.1 Risk associated with the plan

Risk 1 (low): Implementation commitment of Network stakeholders

The NSP implementation will require the full participation of all Network Stakeholders. Their commitment is primarily required in three areas:

- ❑ To ensure consistency between the strategic objectives of the NSP, the performance plans and the Network Operations Plan;
- ❑ To adopt “network minded” decision making when addressing operational issues.
- ❑ To have the financial resources to fulfil the obligations towards the KPA capacity, while still maintaining the cost-efficiency targets.

➤ **Risk mitigation strategy and action**

The risk for planning will be mitigated by close support from NM for the preparation of the local performance and operational plans as appropriate, and by monitoring the NOP actions. Effective monitoring and reporting will be required to ensure that deviations in performance are identified and resolved.

The risk of lack of commitment will be mitigated through either bi-lateral discussions or by strong involvement of NDOP and NMB in decisions impacting on the Network.

Risk 2 (medium): Incorrect assumptions and changes to the objectives

The NSP is based on a general context and scenario assumptions, and proposed objectives aim to achieve the corresponding required performance. The current times of uncertainty, in particular regarding economic and social issues, may result in the assumptions being inaccurate, which may affect priorities and have an unexpected impact on objectives. The risk is to follow a plan that will not achieve the anticipated objectives, without the necessary agility to reverse the situation.

➤ **Risk mitigation strategy and action**

This will be mitigated by supporting the NSP via a dynamic and rolling Network Operations Plan and regional and local performance and operations plans which are consistent, realistic and attainable. Major deviations from the assumptions in this document will require revision of the NSP.

Risk 3 (medium): Deviations in traffic forecasts and their accuracy

The NSP has been developed assuming an average annual growth in traffic movements of between 0.7% (low), 2.0% (baseline), and 3.1% (high) for the period 2019-2025 in Europe (ECAC).

The NOP identifies the need to plan on a high traffic growth scenario to enable an expeditious closure of the current capacity gap. There is considerable uncertainty as to the rate of growth and its geographic distribution. There are risks from the following perspectives:

- ❑ The RP3 performance targets have been established based on baseline growth forecast. There is a likelihood that this rate of growth could be different to the extent exceeding the performance scheme alert thresholds based on the following parameters: deviations of actual traffic from traffic forecast over a given calendar year expressed in percentage of IFR movements, deviations of actual traffic from traffic forecast over a given calendar year expressed as a percentage of service units and the variation of reference values as a result of seasonal updates of the NOP.
- ❑ Significant geographic variations in growth and traffic flow distribution can be expected.

➤ **Risk mitigation strategy and action**

Mitigation of these risks will require the early detection of any changes in expected traffic trends, volatility and their actual and potential effects and subsequent modulation of the indicative milestones for each strategic objective while maintaining the integrity of the actions themselves. A robust and flexible network operations plan (NOP) process can ensure that the performance objectives for RP3 are achieved. Major deviations from the assumptions in this document will require revision of the NSP.

Risk 4 (medium): Lack of implementation of structural and technological changes

The RP3 period assumes the timely deployment of a number of technology-driven operational improvements, and their actual implementation by all actors concerned. In addition, a modernisation of the NM system is required. These developments may lead to real benefits in capacity, flight efficiency and cost efficiency.

Failure to deliver on either will jeopardise achievement of the required performance during RP3.

➤ **Risk mitigation strategy and action**

To mitigate this risk, an early alerting and escalation process by NM will be established in accordance with the requirements of the NF IR if performance achievements are endangered and implementation plans do not progress as envisaged.

Risk 5 (medium): Postponement of Network-related strategic investments

In order to meet the RP3 Cost Efficiency target, when confronted with lower income, stakeholders and in particular ANSPs and NM may have to review their planned investments. This may delay their on-going modernisation plans and as a consequence the achievement of performance targets.

➤ **Risk mitigation strategy and action**

To mitigate this risk, the rolling Network Operations Plan will maintain a close link between the performance to be delivered and the reality of investments. Deviations from this planning with impact on operational performance will be subject of an early alerting and escalation process by NM, established in accordance with the requirements of the NF IR.

Risk 5 (high): Social tensions relating to Air Traffic Services provision

Social tensions have given rise to industrial action, which has had a negative impact on European ATM performance. This has generally been a localised phenomenon. There is a possibility that this risk will continue and indeed increase to some extent. Inability to overcome this problem will continue to jeopardise the achievement of the performance objectives.

➤ **Risk mitigation strategy and action**

The NM will monitor the evolving situation and mitigate as far as practicable and in a cooperative manner the impact of industrial action. A contingency plan with several scenarios will be developed with all operational stakeholders to address possible mitigation actions.

6.2 Description of the monitoring process/Risk management

The monitoring of the NSP and of the associated risks will be carried out through the Network CDM process, reporting to NMB. Any deviations from the plan must be fully addressed at an early stage.

Reporting and escalation processes are defined with the terms of reference of the consultations. The NMB will analyse the outcome, and actual or potential deviations from initial objectives, taking account of relevant decisions, including adaptations to the actions and goals of the NSP allowing achievement of the performance objectives. If needed, NMB will contact the EC, which may request an opinion from the SSC. The revision of the actions or goals of the NSP will be part of a process agreed with the EC.

This will be done through the Network Annual Report that will be further refined to address in a distinct manner the actions delivered through the collective efforts of the operational stakeholders and the NM in improving network performance and the performance of the NM in delivering services to the operational stakeholders.

7 Recommendations

Building on the guiding principles for the network operation and its long-term perspective as defined in this NSP, and focusing on the priorities for achieving the network performance targets, all European operational stakeholders are recommended to focus on the following points:

Drive Network optimisation through the implementation of the outcome of the Airspace Architecture Transition Plan.

Drive the progressive Network Optimisation by implementing network-minded solutions. Implement the initial SESAR solutions through Network actions and as part of a roadmap of coordinated operational improvements agreed with all operational partners.

Achieve a common Network view through optimising operational performance at network level and making the best use of the available human resources.

Support the Network Functions to achieve the new ambitions stemming from the Aviation Strategy for Europe and the Airspace Architecture Study, implement the strategic objectives of NSP and, in particular, address evolutions of infrastructure, by playing the role of performance monitoring to support efficient modernisation of such infrastructure at Network level, in close cooperation with all actors.

The NSP strategic objectives should be fully reflected in the Network Performance Plan and the local Performance Plans. Early detection of deviations from the plans is essential and must be reported to the corresponding governing bodies for corrective action.

Identify and initiate any possible further regulatory evolutions if, through the execution of the NSP this will be found essential.

Initiate and achieve the implementation of future Network Management and ATC concept, based on “network-minded” flow and flight centric operations

Initiate implementations in operations of SESAR advanced Concepts – of which Flight & Flow centric Operations - will take place through cooperation between all relevant Network actors, ideally at Network core-area level, where operational needs are more pressing, or alternatively at local/sub-regional/seasonal level.

The main focus shall be on: addressing solutions that alleviate ATCO workload; in-depth evaluations in areas such as Flight/Flow centric ATC operations and integration to NM operations; Virtual ACCs; Wide-spread application of data-link and advanced ATC support tools; Initial trials of delegated separation.

Evolve the Network Manager to support the new Flight and Flow centric concept of operations with reinforced role, governance, and CDM process, in particular through enhanced demand/capacity balancing processes and 4D business/mission trajectory coordination.

Identify and initiate any possible further regulatory evolutions if, through the execution of the NSP this will be found essential.

8 Annexes

Annex A- List of Acronyms

Acronym	Description
ACC	Air Traffic Control Centre
AIM	Aeronautical Information Management
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
AO	Aircraft Operator
AOP	Airport Operations Plan
APT	Airport Operator
ASBU	Aviation System Block Upgrade
ASM	Airspace Management
ASMA	Arrival Sequencing and Metering Area
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Services
A-CDM	Airport Collaborative Decision Making
B2B	Business to Business (<i>Application</i>)
CCAMS	Centralised SSR Code Assignment and Management System
CDM	Collaborative Decision Making
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CFSP	Computerised Flight Plan Service Provider
CNS	Communication Navigation Surveillance
CTM	Cooperative Traffic Management
DPI	Departure Planning Information
EAD	European Aeronautical Database
EASA	European Aviation Safety Agency
EC	European Commission
ERND	European Route Network Design
ERNIP	European Route Network Improvement Plan
ESRA	EUROCONTROL Statistical Reference Area
EU	European Union
FAB	Functional Airspace Block
FDP	Flight Data Processing
FF-ICE	Flight and Flow Information for a Collaborative Environment
FIR	Flight Information Region
FL	Flight Level
FPL	Flight Plan
FRA	Free Route Airspace
FUA	Flexible Use of Airspace
GDP	Gross Domestic Product
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IP	Internet Protocol
IR	Implementation Rule
IT	Information Technology
KEA	KPI on horizontal flight Efficiency of Actual trajectory
KEP	KPI on horizontal flight Efficiency of last filed flight Plan
KHz	Kilo Hertz
KPI	Key Performance Indicator
NAT	North Atlantic Region

NM	Network Manager
NMB	Network Management Board
NOP	Network Operations Plan
NPP	Network Performance Plan
NSA	National Supervisory Authority
NSP	Network Strategy Plan
PBN	Performance Based Navigation
PCP	Pilot Common Project
PENS	Pan-European Network Service
PI	Performance Indicator
RAD	Route Availability Document
RFF	Radio Frequency Function
RP	Performance Scheme Reference Period
SES	Single European Sky
SESAR	Single European Sky ATM Research
SMS	Safety Management System
SO	Strategic Objective
SOA	Service Oriented Architecture
SSC	Single Sky Committee
SSR	Secondary Surveillance Radar
STAM	Short Term ATFM Measure
STATFOR	EUROCONTROL Statistics and Forecasts Service
SWIM	System Wide Information Management
TCF	Transponder Code Function
TMA	Terminal Manoeuvring Area
TTA	Target Time to Arrival
VCS	Voice Communication System
VHF	Very High Frequency



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