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Single European Sky: the way forward

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Highlights

The Single European Sky (SES) is an initiative of the European Commission conceived in 1999, aimed at reducing delays, increasing safety, mitigating the environmental impact and reducing costs related to service provision in the aviation sector. It seeks to achieve this by promoting the de-fragmentation of the European airspace and by creating a more efficient Air Traffic Management (ATM) system. Although the policy is evolving and new features such as its technological pillar, SESAR, have been added to the original concept, the SES has failed in delivering the expected progress. As a result, the European airspace remains fragmented and capacity problems persist with rapidly growing air traffic.

There are various factors behind its late implementation, categorised in the Air Forum discussion as institutional, economic, legal and political. Identification of the problems but also of appropriate solutions is of crucial importance given continuously growing air traffic and its expected doubling in Europe by 2035. More concretely, the forum investigated the following questions: What are the impediments to the implementation of the SES? What are some of the ideas for a future architecture of the European Airspace? And, how will we get to the implementation of the vision for the future?

The emergence of new digital technologies is shifting the paradigm of European air traffic management similar to what is observed in other network industries. With this in mind, the 10th Florence Air Forum gathered relevant stakeholders in Budapest to discuss the reasons for the late implementation of the SES, the design options for the future, and ways to reach the vision.

Incentivising the Evolution Towards Interoperability

A Comment by Matthias Finger

The 10th Florence Air Forum produced a quite clear analysis of the situation in European ATM; at least it seems to me that the situation had rarely been as clearly analysed so far. This may also be due to the fact that we had, for the first time, an academically informed analysis of the situation prior to the Forum, which helped structure the discussion: there we had distinguished between institutional, economic, legal and political impediments to realising the SES, assuming that technology was a given, i.e., that technology was automatically driving this change. This assumption may have been somewhat naïve, though.

In his conclusion, Filip Cornelis, Director of Aviation in the Directorate General Mobility and transport of the European Commission, structured the challenges to the realisation of the SES along four issues, namely (1) the technological path towards the SES, (2) the conceptualisation of the airspace architecture, (3) the economics of ATM, and (4) actor relations. Let me elaborate on each of these. While the structure is Filip's, the responsibility for the content is solely mine.

The Technological Path Towards the SES

Technology is clearly driving, but is it driving into the right direction? Is at the end of this technological evolution a coherent ATM technology, that makes everything smoother, more efficient and more performing? What, if this is not the case? We did indeed see that there are different maturity stages, that there are different technologies, with huge interoperability issues, owing to the commercial interests of the suppliers involved.

So it is clear that technology will not automatically get us there. Technology is costly and therefore the ones who invest into particular technologies have interests to promote 'their', as opposed to their competitors' technologies. This leads to the issue of interoperability or even interconnection. Obviously we cannot let technology unfold its path and wait and see what comes out. The path needs to be managed and for that a clear vision of where we want to get to is needed. This vision can only come from the Commission, perhaps in concertation with Eurocontrol for its technical expertise and its different geographical coverage. But a clear vision is not enough: the Commission will also have to steer the different technological actors towards achieving this direction. Clearly, SESAR JU is doing the right things but the problem is, that the different industry players push for their own technologies to be included in the masterplan. Some of the technologies researched are actually already in use by some of the ANSPs, as could be seen in Florence. This leads to an increased fragmentation. Also, acquiring research financing has become a business in itself.

In other words, after having developed a clear vision, the Commission needs to steer the different technological actors into the right direction. This is best done by way of a carrots and sticks approach: rewarding these actors that collaborate in the right direction and not rewarding or even punishing the actors that don't. And the right direction is clearly the one that is increasing the interoperability among ATM technologies. The clarification of the status of intellectual property rights created through publicly funded research could also support this policy objective.

The Conceptualisation of the Airspace Architecture

We all know that the European airspace architecture is highly fragmented and that this is one of the main causes of all the problems. Earlier on, the Commission tried to create FABs along the idea that an intermediate step of collaboration would lead, sooner or later to a Single European Sky. It turned out that this was a wrong assumption and that FABs have created an additional layer of bureaucracy and actually an additional obstacle to realising the Single European Sky.

This was followed by a series of ideas about how to create centralised services, all somewhat based on the assumption that the various activities of the ANSPs

could be unbundled and that some of them could be centralised and tendered out to private services providers. And this approach has been fuelled more recently by technological developments, especially in the area of digitalisation, which, like in the case of many other network industries, has given rise to the possibility of creating a (centralised) data layer above the various (activities of) ANSPs. This is where the current airspace architecture study of SESAR JU comes in.

It is now clear that this data layer (and this new architecture) will sooner or later exist; if it is not created by the EU as an EU prerogative, as a PPP or by a joint effort of the industry – ANSPs and suppliers at a minimum – it will come from outside of the industry and probably disrupt the industry altogether. Some operational issues will have to be solved, such as the questions of capacity planning and real-time capacity management. But the main challenge will be to provide the network manager with the necessary 'powers' vis-à-vis ANSPs.

The Economics of ATM

The current economics of the ATM sector is clearly an impediment to the realisation of the Single European Sky, as ANSPs receive no market signals. Their signals come from the performance regime which is substituting for the absence of market signals like in every other monopolistic infrastructure. Ideally the pricing of airspace usage should reflect its costs much more directly and much more immediately and ultimately tend towards something like congestion pricing or nodal pricing to use the concepts from the electricity industry. Furthermore, pricing should increasingly reflect the externalities of aviation.

Clearly, this will not be achieved by way of a performance regime, no matter how sophisticated. Rather, it will be made possible thanks to the above-mentioned new airspace architecture, especially the new data layer as well as innovative forms of regulation. And so we are back to incentivising the evolution towards technological interoperability which ultimately will allow for the introduction of a more efficient pricing of more sustainable airspace usage. There is also the necessity to start to discuss the charging scheme, as the current scheme does not provide the right incentives to support the technological evolution and the emergence of infrastructure related services for the next decade.

Actors and Actor Relations

Everybody agreed at the 10th Florence Air Forum that there are too many institutional actors involved in the (absence of the) Single European Sky, leading to increased coordination among one another and/or even lobbying against each other. This has a huge cost and generates inefficiencies, which will ultimately lead to the entry of outside digital platforms into airspace management. If the airspace community wants to remain in charge (and not simply react to outside pressure in the future) the structure of the actors must be simplified, something which also will have to be done by the Commission, for example, by way of a systematic analysis of all the actors currently involved and by favoring in the future only those actors that work towards interoperability.

Single European Sky: the way forward

A Summary of Discussions by Teodora Serafimova

The 10th Florence Air Forum, for the first time hosted in Budapest, addressed the reasons for the late implementation of the Single European Sky (SES) and explored design options for the future vision of the SES. The latest 2015 Master Plan and the SESAR Airspace Study both aim to incorporate digital technologies into the European ATM system. Given the upcoming redefinition of the future vision for the SES, the Budapest Air Forum provided a well-timed platform to discuss three essential questions:

The Single European Sky – why is its implementation late?

Which new ideas for a future architecture of the European Airspace?

The implementation of the vision, how will we get there?

The Single European Sky – Why Is Its Implementation Late?

What Are the Institutional, Economic, Legal and Political Impediments to the Implementation of the SES?

In order to achieve the ambitions of the Single European Sky (SES) back in 2004 the European Commission set four high-level objectives, committing itself to tripling airspace capacity in order to reduce delays both on the ground and in the air, halving the costs of ATM services, improving safety tenfold, and reducing by 10 percent the impact of aviation on the environment by 2035. Specifically, it aims at achieving these objectives by promoting the de-fragmentation of the European airspace and creating a more efficient ATM system. Yet, there are impediments to its realisation, which slow down the progress towards delivering the initial ambitions. In the context of this Air Forum, the roadblocks to implementation were discussed in four categories: institutional, economic, legal and political.

The existing SES legislative framework consists of four basic regulations relating to the provision of air navigation services (ANS), the organisation and use of airspace, the interoperability of the European Air Traffic Management Network (EATMN) and the establishment of common rules in the field of civil aviation and of the European Aviation Safety Agency (EASA). These have sought to establish roles and responsibilities for SES institutions, and have paved the way for SESAR – the technological pillar of the SES, together with dedicated EU funding to support its objectives.

Yet, as shown by the discussions at the air forum, we continue to observe limited progress in a number of SES areas, namely the achievement of the above-mentioned high-level objectives, the implementation of the Functional Airspace Blocks (FABs), the elimination of airspace structure constraints through Seamless European Airspace design, and the clarification of Eurocontrol's role in the SES. As a result, European airspace remains fragmented and capacity problems persist despite rapidly growing air traffic. Flight delays and airport capacity problems are reaching critical levels, which in turn is placing increasing pressure on the European ATM system's ability to cope.

Firstly, the implementation of the SES has been challenged by the excessive number of stakeholders acting in an uncoordinated manner and often adopting varying (if not opposing) interpretations of the same EU definitions (as has been the case of 'virtual centers' for instance). Forum participants agreed that overcoming this institutional barrier, which in turn results in significant costs and inefficiencies, necessitates a simplification of the institutional framework and clarification of stakeholders' roles and responsibilities.

The convergence of stakeholder interests can also be aided by new technologies. Technological developments in the field of digitalisation, as observed across other network industries, are already helping to enable better performance and cost-efficiency. Digitalisation holds great potential for the aviation industry, and will probably disrupt it altogether, through the creation of a centralised data layer across all ANSPs.

With this in mind, some participants mentioned the need for timely implementation of a digital infrastructure to support communication, navigation and surveillance (CNS) as well as flight data services at continental or worldwide levels through market mechanisms.

The current economics of the ATM sector have been another major impediment to the realisation of the SES,

as no market signals have been provided to neither ANSPs nor national governments to deliver on its objectives. To address this impediment, forum participants expressed support for proposals that would reward early movers and punish laggards. Moreover, the clear need to shift towards pricing of airspace usage that reflects the externalities of aviation and encourages a more efficient use of airspace resonated among forum participants.

Another regulatory ambiguity has been the question of introducing market competition in the European ATM system. Since ATM services have historically been national monopolies, Europe now finds itself in a situation with numerous separate services operating in parallel. While many agree that opening up the market to competition could bring important benefits for ANSPs, in the form of lower costs, increased technology penetration and reduced European airspace fragmentation, uncertainty remains as to the appropriate market design to make it happen. Moreover, a solution should be sought for the legal uncertainty surrounding the treatment of data – as a commercial good or an ATM infrastructure.

When it comes to the political barriers, the misalignment of interests at national and European levels have inhibited progress. National monopolistic service providers have focused on safeguarding existing commercial and national structures. To illustrate this, governments have shown little commitment to the implementation of the Functional Airspace Blocks (FABs), introduced with the SES legislative package. As a result, today European airspace continues to be fragmented and we still observe aircraft being serviced by different ANSPs in each Member State where different rules and requirements apply. What is more, the absence of a crisis has resulted in limited momentum and political support for change to challenge Air Traffic Controllers (ATCOs), ANSPs and existing market forces.

Which New Ideas for a Future Architecture of the European Airspace?

The European aviation sector needs a high-performing European ATM system to cope with growing traffic and ever-increasing global competition, while facilitating cost-efficiency and environmental benefits. With the end of the second reference period (RP2) approaching and ahead of the renewal of the European institutions, the EC urged forum stakeholders to 'think outside the box' when it comes to design options for the future architecture of European Airspace.

A close collaboration between the European Commission, EASA and national governments will be imperative in designing a new regulatory approach based on smarter, performance-based regulation. Forum participants agreed on the importance of setting clear direction through the introduction of long-term (en-route) objectives and performance targets, which in turn should be accompanied by daily, monthly or yearly performance requirements for ANSPs and ACCs.

Agreement on a joint technology path for the 2025-2035 period will be key for the European ATM system. To begin with, by 2025 the implementation of a free-route across ECAC Member States should be prioritised and the airspace optimised to accommodate growing air traffic flows. Subsequently by 2030, virtual centers, dynamic airspace configurations, and CNS 'as a service' will have an increasingly prominent role to play. Finally, a shift to flight-centric, or 'sector-less', operations and service-oriented ATM are expected to take off by 2035. In other words, ATM providers would be competing on a per-flight or per-airline basis, as opposed to regionally.

Automated and digitally connected vehicles are expected to disrupt the current structure of the ATM system. The future European ATM architecture will need to create and support data infrastructure in parallel with air-ground technology upgrades providing interoperable connectivity. This will be key to ensuring a scalable, flexible, secure, sustainable, cost-efficient and resilient system.

In addition to the technology dimension, the global long-term vision needs to incorporate organisational- and economics dimensions. While industry actors will be central to the deployment of the above-mentioned technologies, the European Commission has an important role in overseeing progress and ensuring interoperability.

Moreover, achievement of the technological vision will necessitate the right incentives to be put in place,

whereby early movers are rewarded for deploying future-proof and interoperable technologies, and late comers penalised. SESAR should prioritise the development of new concepts and technologies, capable of coping with the above-mentioned structural changes and paving the way for de-fragmentation. The ongoing discussions on the post-2020 EU budget should furthermore help to guide future investments and technology development in the right direction.

The Implementation of the Vision: How Will We Get There?

There was overwhelming consensus among stakeholders over the need to accelerate progress towards implementing the SES vision. The third session therefore dove deeper into possible ways of rectifying the stalled progress and accelerating the implementation of the SES vision by drawing on best practices and lessons learnt. Among the proposals put forward during the discussions were the need for improved industrial and institutional governance, setting the right political priorities, and enhancing cooperation between stakeholders.

The European Commission offered a vision of seamless service provision in an optimised airspace based on a flexible, "pay-per-capacity-used" model, allowing for extra capacity for contingency purposes. Moreover, it was agreed that civil and military activities are mutually supportive for the implementation of the SES vision, and that therefore all types of aircraft, including drones and military aircraft, should be incorporated. To this end, enhanced civil-military coordination in information (i.e. radar data) exchange will be key.

The ATM infrastructure should be fully interoperable, deploying SESAR solutions and allowing for virtualisation. Among the discussed technological solutions and developments were digitalisation in network-centric operations, remote and dynamic cross-border service provision, trajectory-based operations, open market for en-route services, and borderless airspace commoditisation. The resulting system must be resilient: safe, secure and resistant to cyberattacks.

Existing economic regulation of ANSPs, namely the SES Performance and Charging Schemes, have fallen short in reversing increasing delay trends. This is evidenced through the poorly implemented national FABs for instance, which in turn can be attributed to the absence of any incentives or penalties for non-compliance. Forum participants agreed that financing and incentives (or conversely, penalties) must be performance- and objective-based, with firm commitment from national governments to make appropriate investments. The human element and more specifically strong social dialogue was, moreover, highlighted as a fundamental part of the system, which in turn is there to ultimately serve the end user, or the passenger.

From a governance perspective, a key question to be clarified is how to break away from current monopolistic structures of ATM service provision and shift towards market competition. There was broad agreement among stakeholders that in order for new comers to penetrate the industry, infrastructure should be unbundled.

The allocation of specific responsibilities will be key to ending duplication practices and strengthening collaboration. A close and constant dialogue between EU institutions, national governments, industry and Eurocontrol will be central to achieving the common long-term objectives and supporting the realisation of the SES vision in its entirety.

Single European Sky: the Broader Context

Iván László ARNOLD, Advisor to the CEO, HungaroControl

Beside the delay crisis European aviation is facing and the unprecedented pace of technological development reshaping all the industries, the Budapest Air Forum has also considered the Single European Sky as a regulatory concept, if only briefly. I would like to elaborate further on this aspect of the discussions, underlining the need for value-based policy-making and regulation.

While the European ATM sector is facing serious and urgent challenges that require prompt responses from all stakeholders involved, the difficulties the regulator is facing today should not be underestimated. Even if the most obviously pressing problems are set aside for a moment, many serious challenges coming from the wider environment remain. These include global developments like climate change and technological disruption. These issues should be dealt with on the regulatory level and with a perspective reaching beyond the present sector boundaries and the prevalent sense of urgency stemming from the delay situation.

The challenge the European Commission as policy-maker and regulator is facing in respect of the Single European Sky is how to draft enduring policies and regulation under high uncertainty and complexity existing both inside and outside the ATM sector. Today, the question is not simply how to create the best circumstances for achieving economic growth, but also how to do that in a sustainable, smart, green and non-disruptive manner while properly addressing the public interest aspect of ATM. I suggest that policy-making today should not aim for anything less than addressing this question appropriately.

Indeed, the Single European Sky is a regulatory concept embodying both economic and non-economic (societal) regulation. Ideally, it should also define how competences and powers connected to the provision of air navigation services are divided between the EU and its Member States, but also between the State (EU) and the private sector.

Furthermore, the Single European Sky is not an isolated, self-standing system. ATM is part of the global system of aviation, and in turn, aviation is part of the global environment. When regulating the economic and societal aspects of the sector, the interdependences between the Single European Sky and its wider operating environment should be taken into consideration. As new regulatory theories emerge putting more emphasis on mission-oriented, inter-sectoral policy-making in addressing global challenges, the role of sectoral regulation itself should evolve. There is a need to avoid a false narrative of evolution within the ATM sector while losing sight of the broader issues at stake.

Clearly, ATM as part of the aviation value chain and its global environment needs a resilient and comprehensive regulatory and legislative ecosystem. This, in my view, can only be achieved once the public values on which policy is based are clarified. This aspect of the Single European Sky is especially relevant today, for several reasons.

First, the sector is facing a crisis similar to the one which triggered the establishment of the first High Level Group and the creation of the Single European Sky regulatory framework. Second, the 2017 special report of the European Court of Auditors has called for the clarification of the policy objectives of the Single European Sky, declaring that the high level goals established in 2005 for the initiative became partly unachievable and partly irrelevant. Third, the European Commission has recently established the Wise Persons Group with the objective of identifying the way forward for the Single European Sky.

Under such circumstances, the necessary conditions for developing a value-based policy system are given. Defining the public values underlying the Single European Sky policy is a task going beyond addressing a market failure or a system-breakdown such as the current capacity crisis. The Budapest Air Forum has touched upon several relevant aspects of the sector, including the disruptive potential of new technology and environmental concerns. There exist relevant EU policies as well, such as competition policy, EU policies addressing climate change and the internal market. Public values underlying the new sectoral policy should be defined on the basis of interrelations with the wider environment of the sector, the relevant legal obligations of the Member States and sectoral requirements. This is in effect a prioritisation exercise.

On the basis of the public values identified, a second step in the process is the definition of the policy objectives which may serve as a compass for both regulation and implementation.

There is a need to be innovative not only in technological development, but also in policy-making. The new ATM policy should not only define new markets but also how these markets are supposed to deliver public value. The new ATM policy should also begin reflecting on global challenges such as the effects of climate change. ATM policy may go beyond facilitating flights in the not so distant future; it is closely related to the right of States to determine how and to what extent their airspace may be utilised.

The harder the regulatory challenges seem, the more important it is to tackle them. Today, when the power of the state is eroding, it is especially difficult to respond to complexity and uncertainty at the regulatory level. As the Budapest Air Forum demonstrated, there is not only a clear need, but also a readiness for developing new modes of cooperation between public and private actors and smart, innovative, value-based policies to respond to new challenges.

Why the Delays in Creating the Single European Sky? An Economist's Perspective

Kenneth Button , Professor, George Mason University

There are few things that are even relatively certain but two of them are, first, that major infrastructure initiatives suffer from significant overruns and, second, delays in planned delivery are almost inevitable. The Single European Sky initiative, and for that matter the US NextGen initiative, both involving the creation of more integrated and technologically advanced air navigation systems (ANS), are simply examples of this.

The challenges in introducing something like a Single European Sky stem from the need to create a sophisticated, interactive, blending of hardware, software and orgware. All three intertwined components have to be mastered in a synchronised way to bring about success in a timely manner. While there is often much focus on the hard and software elements needed for the completion of major initiatives, in actuality it is often the orgware, the institutional structure in which the change is to take place and subsequently managed, that proves the most difficult to master.

In part this often stems from the predominantly engineering-based approach, with its command-and-control ethos, to significant infrastructure. While this may in many cases have merit in developing hard and software, it is proving less than efficient in creating operational orgware in the case of the Single European Sky. But even regarding the hard and software infrastructure there are challenges in creating institutionals for handling the organisational needs of what amounts to a series of public-private partnerships under the Single European Sky ATM Research (SESAR). Drawing up complete contracts involving parties with inherently different objectives is difficult at the best of times, but particularly so when the ultimate technology is not fully understood and modifying legal frameworks is complex. The problem is that, while often a virtue, human optimism often leads to excessive short target dates and cost over-runs.

But perhaps more important is that clear information about changing conditions and where resources can most beneficially be directed is missing from the process. Quite simply there are no good signaling mechanisms included in either the Single European Sky or NextGen initiatives. Both rely on administrative orgware which, as for example seen in the former Soviet economies, has major defects. In particular, there is been little attempt to use pricing mechanisms and associated incentive structures to guide prioritisation and to stimulate an efficient, phased adoption of technologies. What has been deployed is basically a 'toll system' with users of the ANS paying some form of allocated cost. Use of the system is then decided through an administrative structure, the network manager (Eurocontrol in the Single European Sky case).

In general terms, this tolling approach can be appropriate if the system is of optimal size and deploying optimal technology, but this is hardly a realistic scenario regarding European air space. By definition it is not ideal or else the Single Sky Initiative would not have been launched. Appropriate charges first allocate what space is available to those who would make best use of it. In doing so, because an economic price per aircraft movement acts on things like aircraft gauge, flight paths, and scheduling, it is also likely to increase the *de facto* capacity of the system for freight and passengers. Appropriate charges also provide guidance as to where bottlenecks exist in the system, where more capacity is needed, and also where less is. Appropriate charges also generate revenues that may be used to enhance capacity. Simple cost recovery only acts on the latter.

Does this mean there is no need for a network manager? Not at all, and economics recognises this. There are circumstances, notably unforeseen disruptions to ANS, such as those due to weather, strikes, or major accidents, that require a rapid response. But these are generally *ad hoc* actions, context based, and usually rely upon heuristics for their resolution; they are not the norm and generally second-best in their results.

The problems with the functional airspace blocks (FAB) are indicative of the lack of incentives. The FABs were established as a number of national air traffic control groupings within the European Union based on operational requirements regardless of state boundaries. In 2017 the European Court of Auditors found them to have failed to defragment European airspace as they have not been fully implemented. In economic terms, quite simply there was no incentive to adopt them, or

penalty for not doing so. Just putting a rather arbitrary administrative structure in place seldom produces the desired results, and even a second best system-wide set of economic charges is likely to be more effective in reducing fragmentation.

What seems to have been happening with the Single European's Sky is that there has been a lot of effort, some of it very fruitful, put into the hard and software side without thinking through the best orgware for its adoption and use. But the three 'wares' must ultimately be combined if a Single European Sky is to be realised, and this does not seem likely to emerge simply through more of the same in terms of bureaucracy and regulation. Economic pricing provides a basis for decision-making. Only a limited number of extremists would claim it to be perfect, but it provides benchmarks that help regulators to judge success and failure across a large system, to think though remedial actions, and act in themselves to provide guidance as to the best actions of those providing and using the system.

Further Readings

Florence School of Regulation Transport Area, 2018, *10th Florence Air Forum*

Summary of presentations

The 10th Florence Air Forum, for the first time hosted in Budapest, addressed the reasons for the late implementation of the Single European Sky (SES) and explored design options for the future vision of the SES. The new Master Plan and the SESAR Airspace Study both aim to incorporate digital technologies into the European ATM system. Given the upcoming redefinition of the future vision for the SES, the Budapest Air Forum addressed three essential questions:

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SESAR Airspace Architecture Study

This extended study, carried out by SJU, outlines proposals for the future architecture of the European airspace. The emergence of innovative concepts and digital technologies drive the stakeholders to define a new context for the upcoming Master Plan. For this purpose, it is becoming crucial to define the current EU airspace services for en-route operations and its supporting architecture. Additionally, the study discusses the problems that the new airspace architecture should address. Furthermore, service-oriented airspace architecture relying on digital technologies and cost-benefit analysis of each proposed scenario are planned in order to quantify the SES high level goals. This is to be done by the definition of a transition plan which should be well integrated into the European ATM Master Plan update campaign.

Baumgartner, M., Finger, M., 2014. The Single European Sky gridlock: A difficult 10 year reform process. Utilities Policy 31, 289–301

This paper presents the gradual liberalisation of European air transport, especially its most recent problems in the case of the Single European Sky (SES). Indeed, after successfully liberalising airlines and, to a certain extent, airports, the European Commission has embarked on the process of creating a SES. The article describes the process and main actors involved. It focuses in particular on the identification of the various actors' interests and explains the current gridlock of the SES as a result of conflicting objectives among the main players, which include, among others, the Member States and the European Commission. A way out of this gridlock may reside in a novel approach to unbundling different types of services and introducing competition.

Eurocontrol – European Aviation in 2040 - Challenges for Growth

This report presents a long-term analysis of planning decisions for aviation in Europe, specifically focusing on the capacity of the air transport network. In this study, the main investigation areas are the unprecedented increase in air traffic, the impacts of climate change and the influence of unmanned aircraft systems, or drones. The unprecedented growth in air traffic over the last ten years shows that there are challenges involved with coping with the future in European aviation. Starting with a stakeholder review, this study includes four scenarios to analyse the Challenges of Growth. The most likely scenario is the one called "Regulation and Growth", which suggests moderate growth regulated to reconcile demand with environmental sustainability issues.

European ATM Master Plan

The European ATM Master Plan is the agreed roadmap that connects ATM research and development activities with deployment scenarios to achieve the SES performance objectives. The initial version of the European ATM Master Plan, resulting from the first phase of the SESAR project's definition process, constitutes the basis for the development and deployment activities of the SESAR project.

This initial Master Plan was endorsed by the Council on 30 March 2009. A first important update of the ATM

Master Plan, approved in 2012, identifies the "Essential Operational Changes" that need to be implemented for the full deployment of the new SESAR concept by 2030. A second important update, approved on 15 December 2015, refines the vision bringing together performance and technology with an extended horizon up to 2035. It makes reference to the key features of the SESAR 2020 Research and Innovation programme and to the Pilot Common Project.

It is an evolving document. Each update of the ATM Master Plan reactivates the definition process, which adapts the requirements of the new ATM systems to the evolving SES performance objectives, and to the operational reality, and feeds these requirements into the subsequent SESAR processes (R&D and deployment).

ATM Cost-Effectiveness (ACE) Benchmarking Report for 2016

This report provides invaluable insights into the cost-effectiveness and productivity of 38 European Air Navigation Service Providers (ANSPs) in 2016, the latest year for which actual financial data is available based on information submitted in July 2017.

The ACE Report also examines changes in ANSPs' cost-effectiveness over 2011-2016 with a strong focus on the underlying performance drivers such as Air Traffic Controllers' productivity, employment costs and support costs. It also provides an outlook of the performance planned over the five-year cycle covering 2017-2021.

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Robert Schuman Centre for Advanced Studies

The Robert Schuman Centre for Advanced Studies, created in 1992 and directed by Professor Brigid Laffan, aims to develop inter-disciplinary and comparative research on the major issues facing the process of European integration, European societies and Europe's place in 21st century global politics. The Centre is home to a large post-doctoral programme and hosts major research programmes, projects and data sets, in addition to a range of working groups and ad hoc initiatives. The research agenda is organised around a set of core themes and is continuously evolving, reflecting the changing agenda of European integration, the expanding membership of the European Union, developments in Europe's neighbourhood and the wider world.

FSR Transport

The Florence School of Regulation (FSR) is a project within the European University Institute (EUI) focusing on regulatory topics. It works closely with the European Commission, and is a growing point of reference for regulatory theory and practice. It covers four areas: Communications and Media, Energy (Electricity and Gas), and Transport & Water.
The FSR-Transport Area's main activities are the European Transport Regulation Forums, which address policy and regulatory topics in different transport sectors. They bring relevant stakeholders together to analyse and reflect upon the latest developments and important regulatory issues in the European transport sector. These Forums inspire the comments gathered in this European Transport Regulation Observer. Complete information on our activities can be found online at: fsr.eui.eu

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