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COMMISSION STAFF WORKING PAPER

on preparing a deployment strategy for the Single European Sky technological pillar

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1. GENERAL CONTEXT

Europe has reached a very high level of integration in aviation and many aviation matters are now dealt with at European level making the air transport sector stronger and more dynamic. The Single European Sky (SES) initiative[1] has contributed greatly to this result through an effective cooperation between Member States, Institutions, Eurocontrol and stakeholders and an effective and efficient social dialogue. The objective of the SES is to enhance current air traffic safety, to contribute to the sustainable development of the air transport system and to improve the overall performance of air traffic management (ATM) and air navigation services, meeting the requirements of all airspace users.

The SES performance objectives aim at tripling capacity, reducing ATM costs by half, improving safety by a factor of 10 and reducing the environmental impact of each flight by 10%. The achievement of these performance targets will contribute to delivering sustainable mobility while ensuring competitiveness, cohesion, social welfare, safety and security for European citizens. These targets can only be achieved through a holistic approach encompassing five interrelated pillars on which the SES is built on: performance, safety, technology, human factor and airports.

Delivering the SES is of the utmost importance for the future of European aviation[2]. Recent events, such as the volcanic ash crisis[3], prove how fundamental and urgent it is to have a better integrated EU airspace through the SES initiative. A key enabler for accelerating the full implementation of the SES is the deployment of new ATM technologies and procedures.

The Single European Sky ATM Research (SESAR) Programme is the technological pillar of the SES. It is a three phase Programme that has defined, is developing and will deploy a high quality, new generation of ATM technologies, systems and procedures compliant with SES objectives and requirements (*SES technologies and procedures*). One of the key results of the SESAR definition phase is the European ATM Master plan (*Master plan*), which constitutes a commonly developed roadmap, endorsed by the Council of the EU and recognised by all the stakeholders, to achieve deployment of new generation of ATM technologies and procedures within the next 10-15 years. The *Master plan* steers the work programme for the development phase and similarly will be a key tool to govern the SESAR deployment phase.

The SESAR Programme is now in its development phase managed by the SESAR Joint Undertaking (SJU), the first ATM public-private partnership set up as an EU body. The SJU's mission is to ensure the modernisation of the European ATM system by coordinating and

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1 Regulations (EC) 549/2004, 550/2004, 551/2004, 552/2004, OJ L96, 31.03.2004, p.1-26, as amended by Regulation (EC) 1070/2009 of 21.10.2009, OJ L300, 14.11.2009, p. 34.

2 From the declaration from the High level Conference on the Roadmap towards implementing the SES - Madrid 25-26.02.2010.

3 Information note to the Commission on the impact of the volcanic ash cloud crisis on the air transport industry, SEC(2010)533 of 27.04.2010.

concentrating all the relevant research and development efforts in the EU. The SJU will develop and validate the new generation of ATM technologies and procedures that will constitute *SES technologies & procedures*. Its founding members are the EU and Eurocontrol and it counts 15 industrial members and several other associate partners.

The timely development and deployment of *SES technologies and procedures* will boost Europe's innovation capacity and the competitiveness of its industry worldwide allowing the EU to have a strong voice in standardisation bodies. For the aeronautical supply industry, the market perspectives for ATM modernisation are worldwide. SESAR has enabled the EU to enjoy today a strong position on international scene and has become a reference programme in the domain of ATM modernisation. This has facilitated the launching of several cooperative projects and agreements with third countries, which entail significant opportunities for European industry and employment reinforcing European leadership in this sector.

These three themes: SJU, *Master plan* and governance and funding mechanisms for the SESAR deployment phase are interrelated and considered as essential components of a deployment strategy for the SES technological pillar (*Deployment strategy*). This paper addresses these three topics and also explains the relationship between them and how they contribute to the Commission's broader objective of implementing the SES.

2. PREPARING A *DEPLOYMENT STRATEGY*

In its Resolution of 30.3.2009, the Council asked the Commission to present proposals for the preparation and transition to the SESAR deployment phase, focussing on governance and funding mechanisms. The Commission services are assessing the challenges and key issues related to a *Deployment strategy*, including its governance and funding/financing mechanisms. The first results indicate that it is a common opinion that the deployment of *SES technologies and procedures* will bring global benefits to air transport in Europe through increased performance of ATM. Furthermore, the choice of the *Deployment strategy*, and in particular the related governance and financing/funding mechanisms, could greatly influence the timeframe in which these benefits will be achieved as well as the distribution of these benefits amongst stakeholders.

ATM is a complex and evolving environment. The adoption of the second SES legislative package in 2009 has provided stimulus for accelerating SES implementation according to a roadmap[4] setting 2012 as the target for achieving major milestones. On the technological side, the research, development and validation activities of the SJU are reaching their cruising speed and a substantial update of the *Master plan* is planned by end of 2011. On the institutional side, the Commission is preparing for the next Financial Perspectives and the future phases of EU Programmes, such as the Trans-European Network and R&D framework programmes, which could play a role in *Deployment strategy*, and is also reflecting on the White Paper on Transport.

The Commission's services will continue to assess the complex legal, socio-economic and organizational aspects of deploying *SES technologies and procedures,* also in the light of the evolving context described above. At this stage, and with the intention to provide the Council

[4] Declaration from the High level Conference on the roadmap towards implementing the SES, Madrid 25-26.02.2010

with some first elements in reply to its request, they have identified the following **general principles** that should drive the *Deployment strategy*:

I. The SES and SESAR are a high priority for the EU Common Transport Policy

II. SESAR is an integral component of the SES and an essential enabler for its implementation

III. The deployment phase of the SESAR Programme is the natural and necessary sequence of its development phase

IV. The right conditions for deployment should be defined through the "SES method", while preserving the driving role of industry in this context

V. Effective governance is key to steer the deployment process

VI. The *Master plan* is an essential tool for deployment

VII. The SJU will successfully deliver expected results

VIII. The human factor plays a key role in ensuring the change process

IX. The deployment of *SES technologies and procedures* requires the involvement and buy-in of civil and military stakeholders

X. EU funding should be focused on projects delivering network benefits

These principles are further developed in the Annex.

Furthermore, in view of preparing a proposal on a *Deployment strategy* and presenting it to the Council in 2011, the Commission's services are exploring the following options for defining governance mechanisms for the deployment of SES technological pillar:

a) High level steering through existing SES framework

This is the baseline option in which, through the existing SES instruments and mechanisms, the Commission would drive the deployment with new Implementing Rules and Community Specifications to ensure the timely achievement of key milestones by the relevant stakeholders and avoid compromising the subsequent deployment steps. The responsibility for maintaining, executing and coordinating the *Deployment strategy* lies principally with the industry: users and service providers. The Commission, as regulator, would exercise an oversight function.

b) Designation of the "network manager"

Building on option a), the Commission could propose to extend the role of the network manager[5] to take the responsibility for coordinating, with the relevant stakeholders, the execution and maintenance of the *Deployment strategy*.

c) Establishment of a European partnership

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[5] Article 6 of Regulation (EC) 551/2004, OJ L 96, 31.03.2004

Also building on option a), the responsibility for organizing the execution and maintenance of the *Deployment strategy* could be entrusted to a European public-private partnership, involving the relevant pan-European stakeholders. The Commission would have a leading role in its setup building on the experience of the SJU.

Establishment of a task force

The relevant Commission services will establish a dedicated task force that on the basis of the principles described above and in conjunction with the next update of the *Master plan*, will:

– carry out detailed economic, technical and legal analyses that will provide input to the Commission for establishing a *Deployment strategy* and, in particular, to its impact assessment on the possible governance mechanisms, considering the above mentioned options

– provide input to the Commission for presenting precise proposals to the Council on governance and possible funding/financing mechanisms for a *Deployment strategy*

The task force, led by the Commission services and with the support of the SJU, would consult all relevant stakeholders and the Single Sky Committee[6] in order to perform its task. It should also include representatives of Eurocontrol and the European Aviation Safety Agency. The task force should deliver its conclusions by March 2011.

[6] Article 5, Regulation (EC) 549/2004, OJ L96, 31.3.2004

ANNEX

Ten Principles underlying an effective and efficient Deployment strategy

I. THE SES AND SESAR ARE A HIGH PRIORITY FOR THE EU COMMON TRANSPORT POLICY

Since the late nineties the growing European dimension has made aviation transport more dynamic and stronger than when it was dealt with on a State by State basis. This has given birth to performing new airlines and a very large number of new routes. It has also made the major traditional European airlines stronger in international competition.

Today, Europe is reaching a very high level of integration in aviation. Almost all aviation matters are now dealt with at the European level, based on a consistent framework which encompasses, in particular, ATM. Nevertheless, the restructuring of ATM is required to meet the challenges that lie ahead for air transport:

– Despite the economic and financial crisis severely impacting the airline industry since the last quarter of 2008, European air traffic will continue to grow in the mid-term. In 2009, the European ATM system controlled about 10 million flights. On some very busy days, more than 33.000 flights have been controlled. In 2020, the number of yearly controlled flights should reach 17 million, with peaks of about 50.000 flights/day

– The current fragmentation of the European ATM system is striking. It is organised on the basis of more than 60 controlled sectors and brings together national networks of air routes without any European optimization. As a result, each flight is in average 50km longer than needed, inducing needless fuel consumption, gas emission of about 5 million tons of CO2 and an additional cost of 1 billion EUR per year. The total cost of the current fragmentation is estimated to be 4 billion EUR per year

– Today's air transport contribution to green house gas emission is estimated at 3%. Without a technological leap to develop more efficient aircraft and ATM systems this impact would grow as the simple result of traffic growth

– Today's average ATM cost in the European airspace is about 800€ per flight. This is about twice the cost supported by the airspace users in the US airspace

The implementation of the SES is crucial for addressing these challenges and meeting the objectives of EU's common transport policy that aims at developing an efficient and sustainable transport system, which includes safe, regular and greener air transport services. The SES framework contributes to achieve these objectives by modernising ATM services and infrastructure, in particular aims at achieving the following performance targets:

– tripling current capacity

– increasing safety by a factor of 10

– reducing the environmental impact by 10% per flight

– reducing by half ATM costs

SES and SESAR contribute to the EU 2020 strategy. ATM modernisation, in fact is not only a European issue. By addressing global interoperability of ATM systems SESAR contributes to European growth through EU participation in open and fair markets worldwide, which, together with SESAR's contribution to the modernisation and decarbonisation of the transport sector, will boost the EU's innovation capacity and competitiveness of its industry worldwide.

II. SESAR IS AN INTEGRAL COMPONENT OF THE SES AND AN ESSENTIAL ENABLER FOR ITS IMPLEMENTATION

The SES ambitious performance objectives raise new challenges for the whole European air transport industry and can only be achieved through a holistic approach that encompasses five interrelated pillars standing on the SES legal framework:

1. the **Performance pillar**, comprising the Performance Scheme; the Functional Airspace Blocks; the charging regulation; the network manager (See Info sheet 1)

2. the **Safety pillar** aiming to achieve the highest safety standards through a total system approach. For this purpose, the competences of European Aviation Safety Agency (EASA) have been extended to ATM and aerodromes[7]. The early involvement of EASA in SJU's activities will facilitate transition towards deployment.

3. the **Technology pillar**, which is the SESAR Programme that will provide the new generation of ATM technologies and procedures developed and validated by the SJU and that are compliant with SES objectives and requirements (*SES technologies & procedures*). The new SESAR operational concept aims at moving from today's airspace based trajectories to the time based operations ("4-D trajectories"[8]), where all the relevant stakeholders have access to the most up to date and precise information through the System Wide Information Management (SWIM)[7].

4. the **Human factor pillar,** which places the human operators as a central element for implementing the changes to the new system and for building a genuine safety culture. The staff operating the ATM network will ultimately implement the legislative and technological aspects of the SES and, therefore, effectively manage the change brought by SES and SESAR.

5. the **Airport pillar** ensures that SES covers all segments of flight from departure to arrival gates ("gate to gate" approach). Airports are an integral part of the ATM infrastructure and constitute critical nodes for the network's efficiency. They will benefit from *SES technologies and procedures* and contribute to their synchronized deployment.

The SES cannot be fully achieved without the synchronised deployment of a harmonised and modernized ATM infrastructure based on *SES technologies & procedures*. Similarly, SESAR products cannot be successfully deployed without the SES framework. The SES provides the necessary instruments to set up the institutional and organisational framework capable of addressing the future challenges of air transport.

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7 Regulation (EC) No 1808/2009 of 21.10.2009, OJ L309, p. 51

8 More details can be found at: www.sesarju.eu

III. THE DEPLOYMENT PHASE OF THE SESAR PROGRAMME IS THE NATURAL AND NECESSARY SEQUENCE OF ITS DEVELOPMENT PHASE

SESAR was established as a three phase Programme comprising the definition, the development and ultimately the deployment of a new generation of ATM technologies, systems and procedures. Each phase is geared to support the following one and builds on the results of the previous one. The work programme of the current development phase is focused on deployment, which is the logical continuation of the efforts and investments made in the development phase. Therefore, continuity and maintaining the momentum achieved in each phase is essential for the success of the Programme.

IV. THE RIGHT CONDITIONS FOR DEPLOYMENT SHOULD BE CREATED THROUGH THE "SES METHOD", WHILE PRESERVING THE DRIVING ROLE OF INDUSTRY IN THIS CONTEXT

The *Deployment strategy* should promote favourable conditions for stakeholders and private investors by reducing deployment risks. This strategy consists in implementing all system, procedural, regulatory and human enablers supporting the SESAR operational concept. It will require the joint efforts of stakeholders: EU institutions, Member States, civil/military service providers/users, airports, equipment/aircraft manufacturers, ATM staff and pilots.

The SES method

The Commission represents the public interest and has the institutional responsibility to drive the process of implementing the SES exercising regulatory and oversight functions. Because of the trans-national and trans-European scale of the actions to be carried out, the Member States cannot effectively implement a *Deployment strategy* individually. An adequate and targeted EU intervention will ensure that the EU ATM infrastructure is more strongly driven by European objectives and network benefits.

The role played by the EU in SESAR has had a major impact on the success it enjoys today. The Commission's leading role in bringing the stakeholders to cooperate and rationalise their resources for modernising ATM through the "SES method" has allowed better use of EU and private resources. This method consists of:

– Efficient decision making involving stakeholders

– Rationalising efforts and resources

– Efficient governance

– Focus on performance

This approach, which has also guaranteed coherence in the modernisation of the European ATM system and undistorted competition on the ATM market, should be pursued in the preparation and implementation of the *Deployment strategy*.

Creating the right conditions for deployment requires a clear awareness of the related challenges and risks and of the necessary mitigation measures to be taken, but also of the benefits and opportunities it offers.

Focus areas

The following subjects have been identified as **focus areas** for establishing a *Deployment strategy*:

- **SES legal framework:** The SES is the legal framework for the *Deployment strategy* and will have to cater for the timely and synchronised deployment of new technologies and related investments ensuring the appropriate oversight

- **Transition to deployment**: Deployment of new equipment will occur gradually, preferably at pan-European level. This implies that for a transitional period, old and new technologies will co-exist, while service providers and users will have to ensure the continuation of safe operations. The transition towards deployment has, in fact, already started with the implementation of the SESAR baseline through "Implementation Package 1" of the *Master plan* (see info sheet 1). The experience gained from steering IP1 implementation is extremely valuable to understand the challenges of future deployment activities

- **Certification and standardisation procedures:** These processes are essential for enabling the timely introduction on the market of *SES technologies and procedures*. To facilitate these processes, the following actions could be envisaged:

    - arrangements with certification authorities, such as EASA, and standardization bodies, such as CEN, ETSI and EUROCAE, for establishing fast track procedures

    - contribution to working groups at international level (ICAO) to facilitate the adoption of new global standards

- **Fair access to European airspace** for all airspace users must be guaranteed

- **Preserving undistorted competition** between different equipment suppliers

- **Civil-military cooperation** needs to be enhanced through appropriate arrangements (See principle IX)

- **Promoting greener air transport:** The *SES technologies & procedures* will have to address societal concerns such a contributing to reducing noise and gas emissions generated by air transport while providing increased capacity and safety

- **Funding and financing** of the new ATM infrastructure is an issue for many stakeholders in the current economic context. It is therefore important to establish appropriate financing and funding mechanisms that facilitate investments that enable to pool and manage public and private funds for deploying *SES technologies and procedures.* Failing to establish such mechanisms, in due time, would lead to non-synchronised deployment, which would hinder the performance of the entire network and compromise the expected benefits. SESAR would also risk to loose ground at global scale with competing ATM modernisation initiatives, such as the USA's NextGEN programme that is advancing fast also in this field

- **Global interoperability**: SESAR must be interoperable with local or regional ATM systems worldwide to: ensure safe and seamless operations worldwide, increase market opportunities for the European industry and allow airspace users to maximise their return

on investment when investing into SES airborne equipments, which should be usable worldwide. SESAR has become a worldwide reference programme in the domain of ATM modernization. The SES and SESAR will be supported on the international stage through the new Memorandum of Cooperation[9] between the EU and the USA on civil aviation R&D. The Memorandum enables technical cooperation required for the SESAR-NextGen[10] interoperability and to support a joint EU/USA contribution to ICAO standardization process. Furthermore, exploratory talks should be pursed on technical cooperation with China, Brazil, the Gulf States, India, Mexico and other countries that have expressed their interest to cooperate in the SESAR Programme in view of concluding further agreements

– **Introduction of *SES technologies* on the market**: The ATM market is the main channel through which civil/military service providers/users and airports gain access to *SES technologies*. The results of the SESAR development phase will be delivered with a degree of maturity that brings them close to being marketed. Any manufacturer will have to have effective access to the ATM market through proposals for standards developed by the SJU.

V. AN EFFECTIVE GOVERNANCE IS KEY TO STEER THE DEPLOYMENT PROCESS

Defining appropriate governance based on SES instruments and that ensures coordination and synchronisation of deployment across the stakeholders and between airborne, ground and space segments is considered as a main priority as well as the biggest challenge for preparing the deployment of *SES technologies and procedures*. The effective coordination and synchronisation of deployment rests on a commonly agreed planning in line with the SES implementation roadmap and a reliable monitoring process enhancing and appropriately adapting existing processes and mechanisms.

Effective governance should:

– have the appropriate competence and authority to steer the deployment process guaranteeing the deployment of *SES technologies and procedures*

– be capable of integrating SES instruments into coherent governance mechanisms

– be capable of establishing and managing the appropriate connections with stakeholders and proposing mechanisms that reduce their risks linked to deployment

– set up efficient oversight and monitoring mechanisms

– advise the Commission on the need for further actions to improve the *Deployment strategy*

– enable pooling of different kind of resources

It is necessary to define governance mechanisms early enough to manage the deployment of the first *SES technologies & procedures* as they are made available. The transition towards deployment has, in fact, already started with the implementation of the SESAR baseline (see Info sheet 1), raising the need to establish a governance mechanism already at this stage. For

[9] Initialled on 18.06.2010

[10] NextGen is the USA's ATM modernisation Programme

this purpose, the Commission set up a temporary *ad hoc* steering group under the auspices of the Single Sky Committee to facilitate coordination and synchronization of stakeholder's on-going deployment activities.

VI. THE *MASTER PLAN* IS AN ESSENTIAL TOOL FOR DEPLOYMENT

The *Master plan* is the commonly agreed roadmap, maintained and executed by the SJU, for shifting to a new ATM operational concept to support SES objectives[8]. It constitutes a stable and credible planning allowing the stakeholders to anticipate new functionalities, aligning them with investment cycles and planning retrofit activities.

The *Master plan* is a living document that covers both the development and the deployment phases for SESAR. It steers the work programme for the development phase and, similarly, the *Master plan* will be a key governance tool of the *Deployment strategy*. Subject to the governance scenario to be implemented, the status and structure of the *Master plan* might need to evolve to constitute a common governing tool in a context where development and deployment co-exist. It should accommodate the roles and preserve the buy-in of stakeholders and reinforce the link with SES framework.

While providing the basis for the work programme of the SESAR development phase, the *Master plan* is also emerging as one of the key tools to plan and monitor the deployment phase. Depending on the governance scenario to be implemented to ensure deployment of *SES technologies and procedures*, the status of the *Master plan* might need to be reviewed to reflect its dual role in a context where development and deployment will co-exist while preserving stakeholders' buy-in.

VII. THE SJU WILL SUCCESSFULLY DELIVER EXPECTED RESULTS

By focussing research and development activities on deployment and actively involving stakeholders, the SJU provides an optimal response to the needs of the airspace users and service providers. It is important to ensure that SJU will timely deliver the expected results to reduce risks for the deployment phase.

As development activities reach their cruising speed, the Commission should strengthen its oversight to ensure their coherence with the SES objectives. In particular, the Commission should ensure that the SJU, through the commitment and support of its members, takes all the measures to dispose of the necessary expertise, to set up the adequate validation platforms and to launch the deployment process to provide early benefits without delay.

The SJU has become the EU's "technological ambassador" for promoting global ATM interoperability. The SJU will carry out, for the EU side, the cooperative actions in the field of SESAR-NextGen interoperability under the Memorandum of Cooperation, mentioned under principle IV.

By undertaking the public-private partnership approach at EU level, it is possible to ensure that the SES objectives of high societal relevance such as safety and decarbonisation are integrated and internalised in the Programme. This approach has allowed leveraging and pooling funding and know-how and reducing fragmentation created by similar national and

regional projects and harness the skills and innovation capacity of the private sector within appropriate risk sharing arrangements.

The SJU model should be further explored for an innovative public-private partnership scenario to govern the deployment phase. The SJU has proven to be a flexible and dynamic instrument that supports an interactive relationship between development and deployment by being able to adapt to the needs of the services providers and users and the evolving requirements of the SES as well as integrating evolutions of aircraft performance[11]. This interrelationship should be maintained beyond the current SJU in view of pursuing and extending the de-fragmented approach to R&D activities to a broader aviation sector.

VIII. THE HUMAN FACTOR PLAYS A KEY ROLE IN ENSURING THE CHANGE PROCESS

The human factor will be a central element for implementing the change to the new system and for building a performance scheme on a genuine safety culture. The *Deployment strategy* will have to ensure a high level of competence and timely training of ATM staff and pilots and ensure their fullest involvement in the planning, execution and monitoring of the deployment process.

In accordance with the Community Charter of the fundamental social rights of workers, the Commission has established sectoral dialogue committees by a decision of 20.05.1998 (98/500/EEC). The SJU has put the human factor at the heart of air navigation systems. Professionals from the air transport sector are involved in the programme to ensure that future systems are built to their needs and specifications: the social partners, ETF and CANSO, are members of the Administrative Board of SJU.

In the SES, the roadmap endorsed by the Madrid conference on Air transport held in February 2010, has given to the human factor an overarching role to play in the ATM policy and pointed out the need for specific consultation mechanism at Union level on social dimension in addition to the activities of the ATM sectoral Social Dialogue Committee. The Madrid Declaration has been implemented through a draft decision creating an expert group on the social dimension of the SES giving the right to the social partners to be consulted on all Commission proposals having a significant social impact. The experts group will advise the Commission on issues such as exchange of practices and experience on mobility and training, change management, understaffing and better allocation of human resources, human factor and new generation of professional and performance within FAB (see Info sheet 1). This draft decision, in line with the requirements of Article 10(2) of Regulation (EC) No 549/2009 laying down the framework for the creation of the SES, will be adopted by the European Commission before the end of 2010.

[11] Report from the Commission on the intermediate evaluation of the SESAR Joint Undertaking and its progress on the execution of the European Air Traffic Management Master plan, COM(2010)…..

IX. DEPLOYMENT OF *SES TECHNOLOGIES AND PROCEDURES* REQUIRES THE INVOLVEMENT AND BUY-IN OF CIVIL AND MILITARY STAKEHOLDERS

The buy-in of the stakeholders is essential to ensure their investments into *SES technologies & procedures*. It will depend on the delivery of effective results from the development phase and evidence that they bring benefits and enhance ATM performance.

The deployment of the *SES technologies & procedures* will eventually entail benefits for stakeholders as well as for the EU citizens. Some stakeholders will receive benefits only in the long term or will not receive commercial benefits (military, general and business aviation), but nevertheless will need to invest in the deployment of *SES technologies and procedures* to enable the system-wide benefits to be achieved. The benefits in terms of increased capacity, reducing delays, lower ATM costs, better environmental performance and improved safety will have a greater impact on the European network once a critical mass of equipped stakeholders effectively operate the new technologies and procedures.

In particular, the **civil-military cooperation** in the SES framework requires arrangements allowing the military stakeholders to benefit from technologies driven primarily by civil needs. SES legislation applies to all movements of military aircraft flying according to General Air Traffic (GAT) rules. In order to better integrate the defence dimension in the SES, the EU Member States have adopted a general Statement[12] to enhance civil-military cooperation and facilitate cooperation between their armed forces in ATM matters. Furthermore, the European Defence Agency (EDA) has been tasked to report, in autumn 2010, on a strategy to enhance civil-military cooperation and to contribute to a better integration of representation of the military needs and interests in the SES policy.

To facilitate the deployment of *SES technologies and procedures* by the military stakeholders, preserving fair access to the airspace and minimising the related costs, specific mechanisms could be activated:

– a single communication channel should be promoted to facilitate the exchanges of information with military users and service providers

– early identification of military needs in terms of SES technologies and functions through coordination and cooperation structures, such as EDA, OCCAR (*Organisation Conjointe de Coopération en matière d'armement*) and NATO Maintenance and Supply Organisation (NAMSO)

– launch of R&D projects through the SJU, in cooperation with the EDA, for interfacing the new civil technologies with the existing military equipment

– active involvement of the military stakeholders in the development activities and in the future deployment governance

Airports are also key elements to the European network and play a key role in facilitating the harmonised and synchronised implementation of *SES technologies & procedures and* are the interface between air transport and other transport modes. As the recent volcanic ash cloud crisis has demonstrated, it is fundamental to plan for airports' modernization in conjunction

[12] Statement by the Member States on military issues related to the SES, OJ L96/9 31.3.2004

with planning for rail and road networks to ensure a truly complementary transport networks. Through the Community Observatory on airport capacity, fruitful connections have been established with airport operators and slot coordinators with the objective to ensure consistency between airports and airspace capacity and improve predictability in particular through enhanced meteorological forecast at airports.

Eurocontrol is a key player in the SESAR Programme. Apart from its technical expertise and experience in ATM, its relationship with a wider range of stakeholders adds the fundamental pan-European dimension to the SES including SESAR. In partnership with stakeholders, including the military, Eurocontrol facilitates the implementation of cross-boarder operational improvements.

Eurocontrol is restructuring its Agency by separating regulatory support activities from service provisions activities. The new structure of the Agency will consist of three broad areas of work: Single Sky, Network management and SESAR. As each one of these areas has a direct impact on the implementation of SES and SESAR, the development of a *Deployment strategy* will have to consider the role that Eurocontrol could play.

Business and General Aviation may also require actions to facilitate the take-up of new technologies:

– a customised approach based on the identification of basic functions that are indispensable for the safe integration of business and general aviation aircraft in a SES based airspace and develop the adapted equipments

– adapt certification procedures and costs to the specific operational environment of Business and General aviation

– creation of adapted loans for this sector in cooperation with the EIB

X. EU FUNDING SHOULD BE FOCUSED ON PROJECTS DELIVERING NETWORK BENEFITS

EU funding for the deployment of *SES technologies and procedures* should be focussed on investments supporting SES objectives and delivering network benefits. Deployment financing should primarily be borne by the investors. Nevertheless, the *Deployment strategy* should aim at creating favourable conditions for stakeholders to finance their deployment investments. These conditions could be achieved by:

– using effectively the existing SES instruments, such as the "common projects"[13] and "charging regulation"[14], and development of sector-specific incentive schemes for a synchronised deployment of *SES technologies and procedures*

– coupling revenue from the user charges with targeted public intervention from the existing or emerging EU funds

– developing innovative financing structures capable of attracting both public and private sector investors (such as a "SES deployment fund"[15]) and, in this context, reflecting on

[13] Article 15 (a) of Regulation (EC) 550/2004, OJ L96, 31.03.2004

[14] Regulation (EC) 1794/2006 of 6.12.2006, OJ L341.The legislative procedure has not yet been finalised

public guarantees for new investments or adapting guarantees and facilities developed by the European Investment Bank (EIB)

– considering access to Emission Trading Scheme revenues

– cooperating with EASA for reducing costs and length of certification procedures for *SES technologies.*

These mechanisms are further developed in the Info sheet 2.

[15] See Info sheet 2

Info sheet 1

Review of the SES instruments

The SES instruments include binding measures, coordination and cooperation structures, as well as reporting and monitoring tools. These instruments should be used to ensure that key milestones of the *Deployment strategy* are achieved in time.

Regulatory framework

The high level conference on the implementation of the SES, held in Madrid in February 2010, resulted in the endorsement of the "Roadmap on the implementation of the SES"[16] by the Member States and stakeholders and in the "Madrid Declaration" confirming the commitment of all the actors to deliver the SES by 2012. The Commission is committed to:

– deliver the necessary Implementing Rules on the Network Manager function by end 2010

– deliver the guidance material on the implementation of the FAB in 2010

– appoint the FAB coordinator in 2010 and

– deliver the Performance Scheme and revised Charging Regulation in 2010, with the first target setting and reporting period covering the years 2012-2014

To ensure the operational improvements that are essential for the implementation of the SESAR operational concept, the Commission can initialise and maintain the regulatory roadmap through the SES regulatory framework. This roadmap will be integrated into the *Master plan* for information and planning purposes of the stakeholders. The initialisation of the Roadmap has started in October 2009 with the presentation to the Single Sky Committee of a preliminary list including 7 Implementing Rules and 10 Community Specifications focused on IP1 (see Principle VI). After the positive opinion of the Single Sky Committee in December 2009, the IP1 regulatory roadmap was forwarded to the SJU for its integration into the first update of the *Master plan*.

Standardization framework

The development of standards is a key step towards the industrialization and deployment of *SES technologies & procedures*. The Commission will closely oversee the activities related to the development of standards to ensure:

– Coordination between all European actors in the standards development chain

– Timely delivery of standards

– Undistorted competition amongst manufacturers on the European ATM market

– Interoperability with NextGen and any other regional initiatives to modernize ATM

– Efficient support to ICAO standardization effort

[16] See: http://ec.europa.eu/transport/air/single_european_sky/ses_2_en.htm

The Master plan

The *Master plan* is the cornerstone for any governance mechanism for *SES technologies and procedures* as it describes the high level common roadmap towards implementing the SESAR operational concept (see Info sheet 1).

The *Master plan* currently defines 3 implementation packages which build upon each other:

– Implementation Package I (IP1) contains the basic validated functionalities and technologies of the SESAR operational concept that do not require further research efforts and are available to be deployed. **IP1 sets the baseline for the future deployment of more advanced functionalities**

– Implementation Package II (IP2) is composed of ATM elements which need further research and development and that can be proposed for standardization and implementation as of 2014

– Implementation Package III (IP3) is composed of the most advanced elements of the SESAR operational concept allowing the full transition to the 4D trajectory management and time based aircraft operations, whose deployment goes beyond 2020

The *Master plan*, its current level of execution and its future role as a key tool to govern *SES technologies and procedures* are discussed in the Report from the Commission on the intermediate evaluation of the SJU and its progress on the execution of the European Air Traffic Management Master plan[17].

The SESAR Joint Undertaking

The SJU is responsible for SESAR development phase and the execution of the *Master plan*. The success of the SESAR development phase is the essential prerequisite to the full deployment of the SESAR operational concept[18].

Network management function

The network management function, defined in Article 6 of the airspace Regulation[19] and currently under development via an Implementing Rule, should ensure optimum use of airspace by management of routes and airspace from a European perspective allowing for executing preferred and shortest trajectories for the airspace users. This function will be exercised by the network manager who will also be responsible for coordinating scarce resources, such as transponder code allocations, radio frequencies and airspace design.

The initial scope of the network management could be extended to other functions to facilitate

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17 COM(2010)….. of ……

18 More details can be found at: www.sesarju.eu and in the Report from the Commission on the intermediate evaluation of the SESAR Joint Undertaking and its progress on the execution of the European Air Traffic Management Master plan, COM(2010)….. of …….

19 Regulation (EC) N° 551/2004, as amended by Regulation (EC) N°1070/2009

20 In accordance with Article 6.4(c) of amended Regulation (EC) 551/2004

21 The Implementing Rule on performance was adopted in July 2010, based on Article 11 of Regulation (EC) No 549/2004, as amended by Regulation (EC) No 1070/2009

22 Regulation (EC) No 550/2004, amended by Regulation (EC) No 1070/2009

the execution of the *Master plan*[20]. In any case, the network manager should contribute to optimize the use of airspace and ensure that traffic problems are tackled from a "gate to gate" perspective. The network manager will be in a position to assess, within its defined functions, the suitability of implementing a service recommended for deployment and to support, as required, its implementation. Consequently, the network manager could, within its competences, contribute to a coordinated implementation of *SES technologies and procedures*.

The Functional Airspace Blocks

The FAB aim at obtaining efficiency gains and delivering operational benefits through optimized cooperation and seamless service provision among the air navigation service providers (ANSP). The deadline for establishing the FAB is 4.12.2012. Currently there are 9 ongoing initiatives (Baltic FAB, Blue Med, FAB EC, FAB CE, Danube FAB, FAB South West, NEFAB, FAB UK-Ireland and Swedish-Danish FAB).

The FAB are bottom-up initiatives where the Member States may include actions such as common procurement and equipment maintenance strategies, common training of the operational staff, optimization and organization of air traffic flows within the FAB airspace, which ultimately should contribute to de-fragmented, more efficient and environmentally sustainable provision of air navigation services.

The FAB could represent an optimal platform for a regional approach to ensure harmonized deployment of *SES technologies and procedures* by coordinating the investment strategies, facilitating the training of operational staff and transfer of know how and further cooperating on the performance plans and, possibly in longer perspectives, on the charging policies and unit rates.

The performance scheme

The performance scheme[21] aims at improving the performance of the ANSPs in key areas such as safety, cost-efficiency, capacity and environment. The Commission, with the assistance of an independent entity, the Performance Review Body, will act as the regulator and will adopt targets for the European network in these key performance areas. Whereas the National Supervisory Authorities, after consultation with the airspace users and the service providers, as well as other stakeholders at State level or at FAB level, will elaborate targets and performance plans, consistent with and contributing to EU-wide performance targets.

The performance plans will contain the traffic forecast, the determined costs for the provision of the air navigation services, as well as investments necessary to achieve the performance targets. The performance plans will be accompanied by a plan to enhance airspace capacity while appropriately coordinating civil-military actions, as well as justification of the rationale on how the plans (national or at FAB level) contribute to the achievement of the EU-wide targets.

The performance scheme is both a governance tool, as the Commission will adopt the EU-wide targets aiming at increasing the operational effectiveness of ATM, and a monitoring tool, as the data included in the performance plans will contain elements on the planned and ongoing investments and the cost basis for the provision of the services.

In addition the Commission will ensure the compatibility and coherence between the local and

EU-wide targets. Via the comitology procedure the Commission may impose corrective measures in case the national or FAB level performance plans are not consistent or do not contribute to achieve the EU-wide targets.

Charging regulation

The Charging Regulation closely relates to deployment as users charges will be the main channel through which ANSPs will fund their investments into new *SES technologies and procedures* with the objective to meet the performance targets set in the national of FAB performance plans. As the charging scheme prescribes transparency of the cost base for charges, it will provide the Commission with better visibility on actual and planned investments of ANSPs and allows for monitoring their consistency with the *Master plan*.

The ANSPs should achieve a requested level of performance in terms of capacity, cost efficiency, environment and safety. The Commission has revised the current Charging Regulation (EC) No 1794/2006, which is expected to be adopted by end 2010, to connect the charging regime with a true performance approach. Therefore the "*full cost*" recovery system is replaced by "*determined costs*" covering most of cost factors and putting an end to the automatic full cost recovery mechanism. As a consequence, ANSPs and airspace users will share the risks for actual traffic and costs evolution as specified in the revised Charging Regulation. The costs of penalties (e.g. for not meeting the performance targets set in the national of FAB performance plans) cannot be put back in the cost base but must be borne by the ANSP.

Common projects

Article 15(a) of the service provision Regulation[22] , defines the scope of the common projects, which is to assist the successful implementation of the *Master plan* and support the objectives of the SES to improve the performance of the European aviation system in key areas: capacity, flight and cost efficiency as well as environmental sustainability, within the overriding safety objectives.

The Commission could also set up common projects compliant with appropriate legal, technological and financial criteria for network-related functions, which are of particular importance for the improvement of the overall performance of ATM and air navigation services in Europe.

Info sheet 2

Overview of funding and financing mechanisms

As requested by the Council in its Resolution of 30.03.2009, the Commission services have reviewed existing financing and funding mechanisms and investigated innovative ones that could support deployment *SES technologies and procedures*[23].

In this document the term "funding" does not imply any repayment from the beneficiary (ex. grants or subsidies). The term "financing" is a temporary provision of capital resources and is expected to be paid back in a given time, which includes returns to the financiers of principal and interest, rent or dividends on the basis of future cash flows generated over the lifetime of a project.

The estimated cost of deployment is 30 billion EUR[24] over the period 2008-2025. However, there is little information about the actual on-going investments to support the deployment of *SES technologies & procedures*. The initial deployment cost will have to be updated in order to better estimate the amount of the SESAR related investments required by the stakeholders compared to their existing investment plans. This work should be fully integrated in the SESAR development phase.

The major risks related to deployment of *SES technologies and procedures* and the related mitigation strategies directly influence the cost of financing and thus the ability of investors to participate in financing of SES ground infrastructure and/or aircraft equipage. For example, the clarity of the governance structure and commitment from concerned stakeholders to proceed with mandated equipage within agreed time frames creates trust and confidence that the technologies will be implemented and expected benefits will materialize. On the contrary, non-cooperative market behaviour of the *"last runner advantage"* creates lack of confidence in the ATM sector and sends negative signals to the financing community as to the credibility of the established planning framework.

Potential solutions for innovative funding and financing schemes

Private financing is today the major source of financing for infrastructure projects for many stakeholders. However, the following mechanisms could be explored as potential instruments to support the timely deployment of *SES technologies and procedures*:

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[23] The Commission has been assisted in this assessment by an external independent consultant, Booz & co. The full report can be viewed at: http://ec.europa.eu/transport/air/studies/sesar_en.htm

[24] *Master plan*, p. 84
http://www.sesarju.eu/sites/default/files/documents/reports/European_ATM_Master_Plan.pdf

- **EU funding mechanisms**: ATM and airport projects have been supported by the Trans-European Transport Network (TEN-T) Programme of the EU. The TEN-T rules foresee that individual projects are supported by the Member States' governmental authorities and, therefore, the funds cannot be channelled to private stakeholders *per se*. The availability of the TEN-T funds to support the deployment of new ATM technologies depends on EU policy priorities as well as on the budget allocation and capacity of the candidate projects to integrate the TEN-T objectives. The ATM and airport investments can be also supported by the cohesion or structural funds, which are managed by the Member States and depend on the priorities, which they set out in their national operational programmes

- **the European Investment Bank (EIB)**, with its special status of an institutional bank supporting EU wide objectives, could play a crucial role in supporting flagship initiatives such as the implementation of key ATM technologies. The EIB involvement in the financing of investments related to deployment *SES technologies and procedures* requires a clear structuring of risk (both related to project's viability and assessing the financing capacity of the individual stakeholders) to ensure EIB will be able to commit financing in line with its guidelines and policies. The EIB already offers a wide portfolio of products composed of equity funds, guarantees, secured finance and loans, such as: *"Loan Guarantee Instrument for Trans-European Transport Network Projects"*, the *"European Clean Transport Facility"* and the recently set up *"Marguerite"* equity fund to support investments in the fields of infrastructure and energy[25]. It also provides assistance to the public sector for setting up the public-private partnerships via the *"European PPP Expertise Centre"*[26]

- the **Charging Regulation** has the potential to support deployment of *SES technologies & procedures*. In fact, Article 12(3d) of the Charging Regulation allows developing sector specific incentive schemes that could "facilitate the deployment of the SESAR ATM capabilities". The application of the incentive schemes is under the authority of the Member States

- **common projects** could also be used to facilitate deployment of SES infrastructure of common interest. Elements of the reflection consist of elaborating the selection criteria of the common projects, linking the common projects to the financial regulations (TEN-T for example) and investigating private financing schemes, such as the user charges and adapted loans

- the **Emissions Trading Scheme** could contribute to financing of deployment of SES technologies, considering that aviation will be added to the scope in 2012 and the EU wide trading system implemented in 2013, and it can be reasonably expected that new generation of ATM technologies will improve footprint of aviation on environment

[25] See: www.eib.org
[26] See: http://www.eib.org/epec/

- after reviewing several models of public-private partnerships and analysing stakeholders' cost and benefit profiles and their financing capacities, the creation of a **"SES deployment fund"** (the Fund) has also been identified as a potential way forward:

  - the objective of the Fund would be to provide financial means to the stakeholders to cover the necessary initial capital outlay and allow them to deploy, in a synchronized manner, the necessary level of new ATM technologies and procedures (leverage effect)

  - both public and private investors could play a role in Fund as contributors. The Fund could in fact pool capital from public and private investors, revenues from the user charges and other public funding instruments

  - the possible development of a sub-entity of the Fund could be investigated where the technology providers (aircraft manufacturers and equipment manufacturers) would take the role of Fund financiers and offer financial solutions to other stakeholders to purchase their products

  - the ownership, management structure, investment guidelines and an institutional framework must be clearly defined to ensure that the capital is repaid to the Fund's investors and financiers

  - clear identification of cash flows, including the possible use of the user charges based on the provisions of the revised Charging Regulation, should be established to ensure that committed funds are repaid

  - the Fund would propose the financial products to the stakeholders who invest in the deployment of *SES technologies and procedures* to guarantee that these investments support the SES objectives. These products could comprise for example, soft loans for purchasing equipment and guarantee systems, including public guarantees, and other products based on the portfolio of EIB, to back up and lower the risks to the private investors

  - candidate projects or investments that could benefit from the Fund's products should comply with specific eligibility criteria that ensure: compliance with SES objectives; contribution to achieving network scale benefits; synchronized implementation of technologies across Europe and other aspects, such as interoperability

  - the functioning of the Fund would largely depend on deployment governance (which determines risk and risk control), directly influencing the financial risk of investors and the cost of financing, and deployment planning (which determines the actual size of investments required by each actor and their timing)