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COMMUNICATION FROM THE COMMISSION

State of progress with the project to implement the new generation European air traffic management system (SESAR)

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1. INTRODUCTION

On 25 November 2005 the Commission adopted a communication setting out the challenges facing the development of air transport in Europe over the next twenty years and proposing a Council Regulation on the establishment of a Joint Undertaking to manage an ambitious project for the modernisation of air traffic control in Europe, SESAR (Single European Sky ATM Research).

This proposal has been discussed in the Council, the European Parliament and the European Economic and Social Committee. The Committee adopted its opinion on 6 July 2006,¹ Parliament's opinion was adopted on 14 November 2006,² and the Regulation was finally adopted by the Council on 27 February 2007.

On 9 June 2006, the Council adopted conclusions stressing the importance of the SESAR project for Europe and requesting the Commission to start the preparatory work needed in order to set up the SESAR Joint Undertaking. It also asked the Commission to take stock of the SESAR project, and in particular the progress made with the definition phase, and to indicate the prospects regarding industry's participation in financing the project.

The purpose of this communication is to report to the Council and the European Parliament on the state of progress with SESAR, and in particular industry's participation in the project development phase.

2. BACKGROUND

In a little over a year there has been relatively little change in the air traffic control situation in Europe. Traffic is steadily rising (4.1% average increase in 2006 compared with 2005)³ in line with the forecasts. However, it is already clear that traffic is reaching saturation point, and all it takes is a critical event (such as fog, bad weather or breakdowns)⁴ to cause major delays throughout the European network.

While, for example as a result of the implementation of measures at Community level such as the "black list" designed to give European citizens greater protection against airlines regarded as unsafe, air safety in Europe was satisfactory in 2006, a number of accidents in other regions of the world, some of which are in all probability broadly attributable to air traffic

¹ TEN 232 Joint Undertaking SESAR.

² P6_TA-PROV(2006)0484.

³ Source: Eurocontrol.

⁴ For example, the difficult weather in Summer 2006 and the crisis at Heathrow in August 2006.

control,⁵ serve to remind us that safety can never be taken for granted but requires constant vigilance.

The Single European Sky, adopted in 2004, continues to make progress, in particular with the creation of national supervisory authorities responsible for overseeing air navigation service providers, and the adoption of seven implementing regulations, and over fifteen mandates assigned to Eurocontrol for the preparation of new implementing rules.

The Single Sky is also progressing geographically with the signature of agreements on the establishment of a Common European Aviation Area (CEAA) extending Community provisions, including those relating to the Single Sky, to neighbouring countries. Initially, the CEAA agreements will apply to the countries of South-East Europe, Iceland and Norway.

The institutional framework for European civil aviation is also developing, in particular with the growing importance of the European Aviation Safety Agency (EASA), which will ultimately become the authority responsible for all activities related to aviation safety in Europe. Vice-President Barrot has requested a high-level group of experts to reflect on the development of the regulatory and institutional context in Europe. The work of this group will be finalised in July 2007 and will make a decisive contribution to the progress report on the Single Sky which the Commission has to produce in 2008.⁶

Where technical matters are concerned, a number of actions have been launched, in particular in order to minimise the environmental impact of flights. For example, the Commission and Eurocontrol have launched a study of the feasibility of producing a tool to determine the precise impact of every flight in Europe. In addition, in the context of the Memorandum of Cooperation signed with the US Federal Aviation Administration (FAA), the Commission has launched a demonstration programme for "green" flight management procedures.

Even though a Single Sky in Europe is on the right track, there remain major obstacles to be overcome:

- the capacity of the system has reached its limits,
- the technologies are obsolete,
- the proliferation of different technical systems remains a concern, especially for air safety,
- the need for an approach based on the realities of traffic flows and not on geographical constraints.

The SESAR project is the only way of successfully bringing about the technological revolution needed in this area, and completing the work started in 2004 to achieve a Single European Sky.

3. PROGRESS WITH THE SESAR DEFINITION PHASE

Eurocontrol, the European Organisation for the Safety of Air Navigation, is responsible for the definition phase (2004-2008), which is being co-financed by the European Community (€30 million from the budget for trans-European transport networks).

⁵ For example, the mid-air collision on 29 September 2006 in Brazil between a Boeing 737 and an Embraer Legacy.

⁶ This group is chaired by Ms Tammenoms Bakker.

Following a tendering procedure, in November 2005 Eurocontrol signed a contract for the performance of the work involved in the definition phase with a consortium of thirty companies representative of the entire European aviation community. Within this consortium, special importance has been assigned to airspace users, who preside over the consortium's Executive Committee and participate actively in the work.

It should be noted that staff representatives and the military authorities are involved in the work of the consortium. Also, to ensure interoperability with the other regions of the world, non-European companies (Honeywell, Boeing and Rockwell) are participating in the work involved in the definition phase.

The project is divided into six milestones, each of which will be summarised in milestone deliverable reports (D1...D6), as indicated in the following diagram:

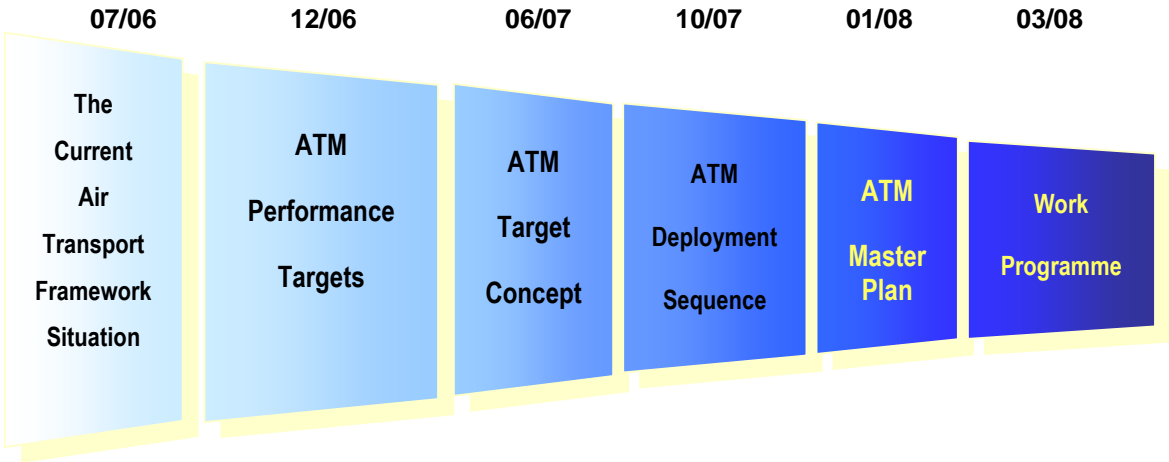


Fig. 1 - Definition phase milestones

For each project milestone the consortium holds a seminar to present its work to the entire aviation community. The number of participants at the three seminars held so far⁷ has increased each time, in particular as a result of the attendance of non-EU companies and organisations which are in this way regularly consulted and can make their contributions to the work of the SESAR project.

The work involved in the definition phase is progressing on schedule.

After over one year of existence, and following a start-up phase (over 600 people are involved in the definition phase), all the reports were delivered on schedule.

In particular, milestone deliverable report **D1 published on 31 July 2006** takes stock of the societal, economic and operational context of aviation in Europe today. It emphasises a number of current shortcomings in the European air traffic control system, the economic impact of which for aviation is **estimated at some €4.4 billion, a figure which should be**

⁷ Organised by the consortium in Geneva at the IATA Conference Centre on 28 March, 12 September 2006 and 24 January 2007.

compared with the figure of €7 billion which represents the total cost of the system.⁸ D1 also depicts a complex institutional and technical environment in urgent need of simplification. It concludes that an approach based on the elimination of fragmentation in Europe, and on compliance with performance targets, offering greater general flexibility to all air transport stakeholders, is essential.

In milestone deliverable report **D2, published on 22 December 2006**, the consortium proposes a vision of the development of the sector over the next fifteen years, together with a precise definition of performance criteria for the development of the new generations of control systems. **In particular, in report D2 the industry sets ambitious targets for the design of the new systems: a three-fold increase in capacity, a halving of unit costs, and an increase in safety by a factor of 10.** With regard to the environmental targets, however, SESAR was unable to indicate quantitative targets at this stage since they will depend on the operational and technical choices that will be made in report D3. However, report D2 did identify a number of short-term initiatives which could potentially bring about significant improvements estimated at €0.5 - €1 billion per annum.

The definition phase is managing to overcome something that has always been a great weakness of the air traffic control sector: all the stakeholders are working together towards the same end, and need to arrive at collective opinions, and make choices to which they are prepared to commit themselves. The project is well under way.

4. ELEMENTS OF THE SESAR OPERATIONAL CONCEPT

A fundamental element of SESAR is the operational concept, i.e. a technical and operational vision of the method of operation of tomorrow's air traffic control system. The vision proposed by the definition phase is both revolutionary and pragmatic.

4.1. A technological revolution

As already indicated,⁹ the current air traffic control infrastructure will probably be incapable of meeting the new challenges relating to the sustainable development of European air transport.

It is particularly unfortunate that the technological capabilities of the new generations of aircraft (and also of the current generations) cannot be fully utilised on account of the obsolescence of the ground equipment and of the ground-to-air telecommunications facilities. Moreover, all the improvements made possible by space technologies (Galileo, SATCOM, etc) need to be exploited to the full for air traffic control.

SESAR therefore proposes to structure the concept around the followings elements:

- Operations based on better forecasting

⁸ €2 billion attributable to economic inefficiency, €1.4 billion to non-optimised flights, and €1 billion to delays.

⁹ Communication from the Commission to the Council on the project to develop the new generation European air traffic management system (SESAR) and the establishment of the SESAR Joint Undertaking (COM(2005) 602).

The current air traffic control system is essentially *reactive*: the knowledge of the air traffic controllers on the ground regarding the real trajectory of an aircraft is so imprecise that their ability to anticipate problems is extremely limited, putting great operational pressure on the human operators (air traffic controllers and pilots).

In the context of SESAR, anticipation of problems will be possible:

- (a) by means of collaborative decision-making procedures involving the sharing of relevant information and structured discussions/negotiations between the various stakeholders (airports, air traffic control and airspace users) which will make it possible to assign traffic precisely to aviation infrastructures ("aviation highways", "green approaches", etc) taking into account safety concerns (spreading the traffic), economic concerns (taking the greatest possible account of the requirements of airspace users), and environmental concerns (minimising the environmental impact of flights).¹⁰
- (b) through better knowledge of meteorological information, the uncertainty of which is one of the most important factors affecting trajectory forecasts. Aircraft could serve as collectors of meteorological information and thus provide accurate information about atmospheric conditions at altitude, so as to improve the performance of weather forecasting.¹¹
- (c) by merging the different "trajectory" representations into a single one established by the on-board computers.¹² The requirements of the air operator (e.g. precisely specified arrival time, minimum cost or flight time, departure time flexibility, etc)¹³ will be fully taken into account in the trajectory agreed with air traffic control.
- (d) through accurate monitoring of the scheduled "trajectory", in particular by means of satellite navigation (Galileo), which will ensure extremely accurate aircraft positioning.¹⁴

– Establishment of an efficient telecommunications network

The current air traffic control system is based mainly on radio contact between the ground and the pilot's cabin. This is something of an anachronism, since it reflects the technologies of the 1950s, but it also represents an excessive amount of work for the human operators, entailing major risks of mistakes and misunderstandings resulting in flight safety problems.

SESAR will therefore set up an efficient network of ground-to-air data links, enabling in particular the accurate 'trajectory' information exchanges referred to above.

The telecommunications network will also enable all stakeholders to have effective and simultaneous access to flight information status. In this way, airlines will be able to know

¹⁰ These discussions will be reflected in particular in a network operations plan.

¹¹ This type of information could also help to improve the understanding of high-altitude condensation trails ("contrails").

¹² At present, the trajectories calculated by the on-board flight management systems are in fact different from those calculated by the air traffic control (flight data processing) systems on the ground, which is a major source of inconsistencies.

¹³ The SESAR definition phase combines all these elements in what it refers to as the "business trajectory".

¹⁴ "Required navigation performance" methods which allow the aircraft a maximum margin of error.

exactly where their aircraft are, what their place is in the arrivals "queue" at an airport; the airport will be able to know with certainty the status of the different flight preparation operations and when the disembarkation gate can be opened; all the operational information will in future be available for security purposes, enabling better anticipation of potentially critical situations and a more rapid and appropriate response.

– Optimisation of the use of airports

It is foreseeable that European airports will become an increasingly critical factor in the development of air transport. SESAR proposes a number of operational technologies and procedures which will make it possible to manage airport movements more efficiently:

- (a) "smooth" approaches¹⁵ which will make it possible to reduce noise and gaseous emissions during the landing phase (in conjunction with other initiatives such as the clean sky initiative);
- (b) better forecasting and detection of slipstream turbulence phenomena, which will make it possible for aircraft to be closer together when the risk of air turbulence is low;
- (c) modern systems for the planning of airport movements, including places in departure and arrival queues. This will make it possible in particular to reduce the number of runway incursions,¹⁶ and to minimise waiting times on the ground with the engines running, which are expensive for air operators and generate considerable emissions;
- (d) new sensor technologies (infra-red for example) associated with new synthesising techniques will be able to recreate nominal visibility conditions so as to make it possible to operate under better conditions at night and in bad weather.
- (e) "best practice" procedures enabling widespread application of techniques and procedures which have proved their merits on various platforms throughout the world.

– Increased automation of air traffic control tools to assist operators

SESAR's operational concept aims to keep the human operator at the heart of decision-making. Automation will make it possible to bring about a significant reduction in the pressure on operators, and help them to cope with the increase in traffic. In any event, they will continue to play the crucial role of guarantors of flight safety, even if the broad outlines of their tasks are bound to change.

In this way, the technologies and operational procedures developed in the context of SESAR will make it possible to share the workload between the air traffic controller on the ground and the pilot, for example where the latter is in a better position to take responsibility for certain constraints (eg maintaining a certain separation from the preceding aircraft on approach).

The following are examples of the automated tools and systems which will need to be produced:

¹⁵ "Continuous descent approaches".

¹⁶ Which remain a major factor in accidents on the ground.

- (a) all the trajectory negotiation planning and support tools,
- (b) trajectory allocation modification tools, including conflict detection and resolution tools,
- (c) automated tools for the management of movements on the ground and for take-offs and landings,
- (d) cockpit tools for the visualisation of surrounding traffic,
- (e) trajectory conformance monitoring tools.

5. PREPARATORY ACTIVITIES FOR THE ESTABLISHMENT OF THE SESAR JOINT UNDERTAKING

Mandated by the Council conclusions of 9 June 2006 to begin the work needed to prepare for the establishment of the SESAR Joint Undertaking, the Commission has made initial contacts with a number of potential members and has started preliminary discussions with Eurocontrol. The results of these discussions are set out below.

5.1. Position of the founder members

European Community

The European Community's estimated financial contribution to the SESAR Joint Undertaking is €700 million. This amount will come from the budgets of the Framework Programme for Research and Development and the Programme for the trans-European transport networks (TEN-T) in the form of grants in accordance with the specific rules for each instrument.

The total budget that the Commission envisages for the Seventh Framework Programme (FP7) for the period 2007-2013 is estimated and capped at **€350 million**. In FP7, the "Coopération" specific programme¹⁷ includes SESAR under the theme "*Transport (and Aeronautics)*". The 2007 work programme for this specific programme¹⁸ earmarks €10 million for the Joint Undertaking for 2007.

Under the **TEN-T Programme**, the Commission envisages including **€350 million** for SESAR in the 2007-2013 multiannual programme due to be adopted on the basis of the new TEN-T Regulation (which is now in the final phase of the co-decision procedure). SESAR is regarded as a major project and thus included among the *horizontal priorities*.

Indicative estimated breakdown of the Community contribution to the SESAR Joint Undertaking:

(Indicative amounts, in millions of euros)

	2007	2008	2009	2010	2011	2012	2013	TOTAL
FP7	10	65	75	50	50	50	50	350
TEN-T	50	50	50	50	50	50	50	350

Eurocontrol

¹⁷ Council Decision 2006/971/EC of 19 December 2006.

¹⁸ Decision C(2006)6839.

Le Provisional Council of 8 February 2006 confirmed Eurocontrol's participation in the SESAR Joint Undertaking as a founder member, and agreed to the principle of the organisation providing a financial contribution of €700 millions.

5.2. Participation of industry

The Commission has received twelve expressions of interest from industry in becoming members of the SESAR Joint Undertaking.

The cumulative investment in SESAR envisaged by industry amounts to a preliminary total of €900 million to €1300 million, broadly corresponding to the expected contribution.

Many other parties have also expressed an interest in participating in the project, even if this interest has not been formalised in a letter of intent. In particular, small and medium-sized air navigation service providers envisage forming an appropriate grouping which would make its contribution to the project.

Industry is willing to contribute above all by making technical resources available to the project, which will form a sound foundation for a partnership in which the research carried out in the context of SESAR will provide an effective basis for the development of industrial and operational products. The idea of an "industrial architect" for the technical supervision of the work has been put forward in some proposals and deserves more detailed consideration.

Evaluation of contributions in kind

The amounts indicated by candidate investors will be carefully and systematically verified during the negotiations that will be held between the Joint Undertaking and its future partners; they confirm industry's willingness to commit itself to the project.

The methodology for evaluating the contributions in kind is based on the well-known mechanisms of the research and development framework programmes. Where human resources are concerned, these contributions will be evaluated on the basis of the real auditable costs. To evaluate products or the use of material resources (experimental aircraft, simulators, control centres, etc), a transparent contribution evaluation methodology based on market prices will be proposed.

A number of non-European parties have expressed an interest in joining SESAR. The need to modernise air traffic control is a worldwide phenomenon, and a number of countries want to invest in new technologies as a result of the massive growth in air traffic. The possibility of involving these parties in the Joint Undertaking is a strong point of the European approach.

Allocation of intellectual property rights

The property rights arising from the results of the development phase will belong to the Joint Undertaking. Each member will be entitled to have access to these results exclusively for research, development and validation activities in the context of the SESAR work programme.

The Administrative Board will decide on the procedures for the granting of exploitation rights on the basis of requests made to it and needs to ensure the deployment of new systems. Where

the members of the Joint Undertaking are concerned, these procedures will be set out in the accession agreements.

Given the public-sector investment involved, rights of access to the development phase may be granted to the Member States for strictly non-commercial purposes.

Transition between the development phase and the deployment phase

On cessation of the activities of the Joint Undertaking and depending on the option chosen for carrying out the following phase, the transfer of all tangible and intangible assets created or ceded for the project will be decided upon by the Administrative Board.

Its decision will take account of the type of investment made, the interests expressed by investors in the context of their accession agreements (commercial exploitation rights, utilisation rights, property rights) and the needs of the project to ensure the deployment of new technologies on a non-discriminatory basis.

5.3. Other preparatory measures

One of the objectives of SESAR is to rationalise research and development efforts in Europe around a joint project and under the responsibility of the Joint Undertaking. The Commission has already undertaken to align with SESAR the R&D projects it is subsidising under FP6, in particular by including in the contracts clauses concerning obligatory alignment with the results of the SESAR definition phase.¹⁹

In the expressions of interest received by the Commission a number of candidates for participation in the Joint Undertaking clearly express their wish to align their programmes with SESAR. The same applies to Eurocontrol which has undertaken not to duplicate research and development efforts in Europe by carrying out a substantial proportion of its work in the context of the SESAR project.

It can therefore be asserted that, thanks to SESAR, the process of rationalisation of air traffic control research has begun.

6. CONCLUSION

The SESAR project, a technological component of the Single European Sky and an instrument that is essential for the development of safe and sustainable air traffic, is arousing much enthusiasm and a strong commitment within the European aviation community. The definition phase, which has been entrusted to Eurocontrol and an industrial consortium, is meeting the objectives assigned to it and is yielding promising results which industry in general endorses.

Industry has clearly indicated its wish to contribute to the project and to align its own activities on the European SESAR project. This represents a significant step towards the coordinated modernisation of air traffic control in Europe.

¹⁹ For projects arising from DG TREN's fourth call. Specific negotiations will need to be held for the other projects.