THE SINGLE EUROPEAN SKY AND THE IMPACT UPON EUROPEAN ATM RESEARCH

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ABSTRACT
It is recognised that the current complexity and limitations of the European ATM environment requires a new approach to its development and operation. This has resulted in the adoption of the Single European Sky legislation in January 2004, considered as the first major milestone in a revised and structured development process. The SESAR project has been developed as the technological arm of the Single European Sky, aiming to achieve by 2020 a high-performance European air traffic management infrastructure which will enable the safe and environmentally friendly development of air transport. The SESAR project is composed of three phases: Definition (2005-2007), Development (2008-2013), and Deployment (2014 -). The definition phase will deliver a European ATM Master Plan, which will map the future evolution of the ATM system to achieve the identified goals. The European ATM Master Plan will be a performance based, living plan reflecting commitments made regarding implementation in the shorter term and common research needs in the longer term, supporting decision making by stakeholders on the basis of shared validated rationale. The subsequent execution of the ATM Master Plan through the SESAR programme will have a direct and major impact upon the organisation, conduct and financing of European ATM research. Effectively, a significant challenge of the programme will be the integration and management of research and development activities within the framework of a Public-Private Partnership (PPP) venture, currently performed in a dispersed and uncoordinated manner.

1. BACKGROUND

Air transport is recognised as a safe, mature and irreplaceable method of transport which creates substantial added value for its customers and makes a significant contribution to World and European gross domestic products (GDPs). The European Air Transport industry is a major pillar in the European economy, contributing more than €220Bn to the European GDP and the employment of about 4 million people, facilitating mobility and business across borders. On average around 500 million passengers are transported every year by European airlines alone on more than 5,000 aircraft. It is estimated that 30% of exports from the EU are transported by air.

The European Air Transport Network will continue to contribute to the development of economic wealth to a much greater extent than in previous years. In particular this Air Transport Network will play a crucial role in supporting the integration of the new Member States into the European Union and the growing need for mobility of its citizens.

Underpinning this air transport network is the European Air Traffic Management (ATM) System. While its absolute economic value is small compared to the air transport industry at large (estimated 3% of employment), it plays a major role in the assuring the safe and efficient operations.

Air traffic growth is forecast to continue steadily to a level estimated at 2.4 more than its 2005 level by 2025, stressing the airport and Air Traffic Management (ATM) infrastructure in Europe well beyond its current maximum capacity. Existing plans and identified improvements are expected to absorb or minimise the impact of increased demand until 2013 when delays will once again be become significant. A number of external factors have a direct impact on today's ATM system, limiting the growth in capacity and inducing major additional costs for the users of the system. These factors include the lack of a harmonised and integrated view on ATM evolution, the lack of a mandatory regulation and implementation process, the lack of implementation of new (existing) technologies and the fragmentation of service provision.

Consequently, the present European ATM infrastructure must be transformed into an integrated ATM Network to facilitate air transport development, which will in turn cater for a strong and sustainable growth of national economies, while enhancing safety and minimising environmental impact. This transformation requires the application of new operational concepts which fully exploit developments in information technology and airborne intelligence, integrated and implemented in a uniform and consistent manner.

2. POLITICAL AND LEGISLATIVE CONTEXT

The European Council of October 2003 highlighted the importance of accelerating the roll out of European transport networks and of increasing investment in human capital, perceived as crucial steps to boost growth, better integrate an enlarged Europe and improve the productivity and competitiveness of European businesses on global markets. Attention has been drawn to the ATM problems in the European Commission Transport White Paper .

At the political level it was recognised that the current complexity and limitations of the European ATM environment requires a new approach to its development and operation, and has resulted in the adoption of the Single European Sky legislation in January 2004, considered as the first major milestone in the development process.

The Single European Sky legislation covers four major packages:

- Framework Regulation,
- Provision of Air Navigation Services,
- Organisation and Use of Airspace,
- Interoperability of Systems, Constituents and Procedures.

These four packages formulate a strong political and institutional impetus to change the paradigm in the way the overall Air Transport System functions today towards a more integrated, interoperable and less fragmented system, ensuring highest possible levels of safety, security and efficiency whilst minimising environmental impact.

3. SESAR TO SUPPORT THE IMPLEMENTATION OF THE SES

The successful implementation of the Single European Sky legislation in this complex environment requires a comprehensive and integrated programme of activities covering the entire cycle from research, through development and into implementation, assembling competences from all major actors of the air Transport sector.

The SESAR project has been developed to support these objectives, federating the competences and capabilities of the supply industry, the Air Transport Users and Operators in a well-focused approach, receiving political support at the highest levels.

Consequently, SESAR is recognised as the technological arm of the Single European Sky, aiming to achieve by 2020 a high-performance European air traffic management infrastructure which will enable the safe and environmentally friendly development of air transport. A major objective and significant challenge of the programme is to integrate and coordinate research and development activities which are currently undertaken in a dispersed and uncoordinated manner in Europe.

The SESAR project is composed of three phases: Definition, Development, and Deployment.

- The Definition Phase (2005-2007) aims to define the different technological steps to be taken, the priorities in the modernisation programmes and the operational implementation plans. The main deliverables of this phase are the European ATM Master Plan and the Work Programme for 2008-2013. The associated budget is 60 MEUR (funded by EC and EUROCONTROL on a 50-50 basis). The contract managed by EUROCONTROL with the 30-party consortium (including airspace users, ANSPs, manufacturing industry, airports) promotes an industry-led approach and aims at commitment to a shared implementation plan.
- The Development Phase (2008-2013) which will develop the new equipments, systems or standards (which will ensure a convergence towards a fully interoperable ATM system in Europe) and prepare the Deployment Phase. For its governance, a Joint Undertaking (JU) is planned to be established under Article 171 of the Treaty with an estimated annual budget of 300 MEUR.
- The main task of the Joint Undertaking is to manage the research, development and validation activities of the SESAR project by combining public and private sector funding provided by its members and using external technical resources and in particular by using EUROCONTROL experience.
- The Deployment Phase (2014-2020) is envisaged as a large scale production and implementation of the new ATM infrastructure. The infrastructure should be composed of fully harmonised and interoperable components which guarantee high performance air transport activities in Europe.

3.1. The necessity for an Integrated European ATM Master Plan

The development of a European ATM Master Plan has been a central requirement identified in the Strategic Aerospace Review for the 21st Century (STAR 21) report and forms the backbone of the overall programme. Once developed, taking into account the potential incentives and necessary trade-offs, it will constitute a common and comprehensive reference to all stakeholders and increase significantly the visibility not only on short- and mid-term investments and improvements, but also gives a clear objective for the long-term developments envisaged.

The European ATM Master Plan will be a performance based, living Plan with a 15-20 year time horizon, reflecting commitments made regarding implementation in the shorter term and common research needs in the longer term, supporting decision making by stakeholders on the basis of shared validated rationale. The Master Plan will be owned by all stakeholders, since it is their timely actions which will deliver the necessary improvements.

The European ATM Master Plan will provide an integrated view of:

- The characteristics of the 21st century airspace user;
- What are the performance requirements that ATM will have to satisfy over time;
- What benefits can be expected following the deployment of proposed individual improvements and when;
- What programmes have to be launched to support the objectives;
- The Research Landscape, the actors, competences, facilities and those that are missing;
- What ATC operations and services need to be deployed;
- What technology should be developed;
- How transitions are to be managed between successive steps over time;
- What financial and investment scheme is required;
- Regulatory / legislative / social actions to be undertaken;
- Certification and standardisation activities to be established.

The European ATM Master Plan will provide clear time based guidance material to contribute in establishing global inter-operability requirements in the international aviation context.

3.2. The Master Plan: a framework to mobilise and consolidate Research

Through the adoption of a very simplistic “time to market” lifecycle, several phases have been identified covering research, development and implementation. It is now fully recognised that these phases need to be consistently planned, with dependencies and milestones identified and the articulation between the phases managed. The ATM Master Plan will clarify the role of European ATM Research in the achieving the objectives of the SES implementation.

In recent years there has been a growing awareness that there needs to be structure introduced into the organisation and management of ATM research at a pan-European level to ensure a consistent and efficient approach to the challenges which are now identified. The importance of “Establishing a European Area of Research and Innovation” has been unambiguously affirmed by the Heads of State during the Lisbon Summit in Portugal (2000).The European ATM Master Plan will contribute to this objective through the creation a coherent and manageable research and implementation path toward a uniform, pan-European system and will ensure efficient use of scarce resources in its construction, to overcome the present fragmentation and duplication of research efforts in Europe.

The European ATM Master Plan will provide a sound basis upon which a cost efficient, “European research area” focused upon ATM may be established, stimulating the dynamism, excellence, creativity and productivity of European research. Acting as an internal market for research and technology, as well as a space for the productive co-ordination of national and regional research activities and policies, it will facilitate the creation and mobilisation of critical masses of resources, strengthen the complementary character of national activities, and improve the coherence of public research agendas throughout Europe.

3.3. The European ATM Master Plan: integrating supply industry capabilities

A long recognised shortcoming in the evolution toward a harmonised and integrated European ATM environment has been the limited and disparate involvement of the supply industry. With the consolidation of supply industry and the corporatisation of Air Traffic service provision, the conditions are created for the contribution of supply industry to be increased, thereby ensuring that the most adequate, cost-effective and world-wide interoperable solutions for the future ATM Network are proposed.

This participation is expected to:

- inject additional manufacturing industry expertise, processes and tools in ATM development from the outset;
- the leverage and articulation of R&D results with industrialisation and product developments;
- ensure the harmonisation of European ground, air and space industrial policies and ensure global inter-operability at an international level;
- introduce additional, proven programme management skills and processes acquired in complex objective driven, multi-disciplinary environments.

The European ATM Master Plan will allow Industry to take a more direct and early stake towards timely delivery of products suited to the planned applications in the operational field. This will in turn have a positive impact on the ability of both industry and its customers to identify and plan timely and efficient investments.

4. CONCLUSION

The success of the venture is largely dependant upon the ability to assemble the correct balance of representative actors from all horizons and domains of activity directly concerned, generally referred to as the “stakeholders”. Their needs, expectations and requirements will be the drivers in establishing the European ATM Master Plan, taking into account the inevitable trade-offs that must occur between the major performance axis, i.e. Safety, Security, Efficiency, Capacity, Environment and Sustainability.

Wide stakeholder appropriation will ensure issues relating to convergence and transition, which are in many cases show stoppers or serious brakes to evolution, will be addressed in a timely and efficient manner. Transition planning, accompanied by a long term strategy targeting the rationalisation of infra-structure and service delivery, with particular attention paid to the social dimensions of the stepped change can only be constructed and appropriated by the active participation of the end customer.

Short term convergence of investment plans together with the identification and planning of longer term investment are essential elements to the European ATM Master Plan where customers will contribute directly, allowing the timely realisation of expected benefits.

Specific, focused performance and delivery driven research in accordance with the European ATM Master Plan will ensure the federation of the European research community around common goals, eliminating much of the inefficiencies generated through diverse national interests and programmes. The professional management of the Master Plan through the proposed central entity will ensure “more research for the money” and that the results are transformed into products.

However, the research community must remain attentive as the temptation will be to prioritise and redirect funding to short term, “quick win” elements as pressure builds upon the project to show early benefits. The preservation of resources directed towards creativity and innovation are essential to prepare for steps beyond the current vision horizon.

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