

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

**Agenda Item 1 Introduction and assessment of a global air traffic management (ATM)
: operational concept**

THE ADVISORY COUNCIL FOR AERONAUTICAL RESEARCH IN EUROPE (ACARE) INITIATIVE

(Presented by the European Commission)

SUMMARY

The European Commission (EC) has launched the initiative for establishing the Advisory Council for Aeronautical Research in Europe (ACARE) one year ago. ACARE has started its activities in mid-2001 and has produced early results, including the definition of the Strategic Research Agenda, which provided guidelines for aeronautics research funding within the EC Sixth Framework Programme (2002 - 2006). This paper provides an overview of the working methodology and initial achievements of ACARE, which are meant to have an impact on the future air transport system worldwide, including air traffic management.

1. INTRODUCTION

1.1 The dynamics of the social environment and the evolution of air transport in recent years have led to stronger and stronger concerns about the well being of the former and the overall impact of the latter. Major advances in speed, range, availability of air transport have led naturally to rising demands on improvements in terms of noise and pollution, but also on delays, scheduling, infrastructures and traffic congestion.

1.2 These issues present fundamental challenges that will not be overcome by steady progress alone but will need an innovative, ambitious and more holistic approach. In year 2000, the European Commissioner for Research has invited a group of leading authorities in the field to set out an ambitious vision for the future of aeronautics over the medium to long term. Their report “*European Aeronautics — A Vision for 2020*” was published early in 2001.

1.3 It recommended the formation of an Advisory Council to create a Strategic Research Agenda (SRA) involving all those with a stake in the future of aeronautics in exploring and advancing the technologies that will lead to the realisation of the goals of Vision 2020. The Advisory Council for Aeronautics Research in Europe (ACARE) was formed in mid 2001.

1.4 The two top level objectives identified in the Vision 2020 report for Aeronautics in Europe were:

- a) to meet society's needs; and
- b) to achieve global leadership for Europe.

1.5 ACARE's main activity to date has been to define the SRA through pan-European working teams. Their initial findings have been:

- a) the top level objectives, even though ambitious, are achievable in Europe;
- b) important breakthroughs are necessary, both in technology and in concepts of operation;
- c) new ways must be devised to make the research system more efficient in all its forms;
- d) a number of additional and significant pan-European enabling mechanisms are required within the European Research Area;
- e) more investment will be needed from both public and private sources; and
- f) major corporations must continue to invest their resources in Europe, which in turn must provide a correspondingly receptive environment.

1.6 The establishment of these findings has involved a vast amount of work undertaken under ACARE's leadership, extending across European stakeholders in aeronautics, the European Commission and in the governments of Member States, European institutions, and across manufacture, operation, regulation and research. The creation of a single SRA focusing the diverse interests of Europe's stakeholders is an important achievement of the first year of activity.

1.7 The work has underlined the scale of ambition, constrained by a determination not to compromise the conflicting demands of cost, performance and society's needs at a low level but to extend our reach and grasp the opportunity of having more benefits in more ways. The SRA is focused on technology and the realisation that the great changes that are needed will be impossible without new technologies in new applications. It points also the way toward actions in other fields where equally important changes will be needed; in public policy, in regulation, and in areas of international cooperation.

2. THE STRATEGIC RESEARCH AGENDA

2.1 The strategic directions set out in the SRA look necessarily beyond 2020 since it will only be in later years that the results of some of the ongoing research will have their impact. In addition the SRA addresses additional enabling mechanisms that will be needed to ensure successful outcomes.

2.2 The technical content of the SRA is driven by five major challenges addressing the top-level objectives, stemming from the ambition to provide more affordable, cleaner, safer and more secure air transport. These challenges, each of them with clearly identified goals, contributors and solutions, are:

- a) *Quality and Affordability* — delivering products and services to the air community whilst increasing quality, economy and performance;
- b) *Environment* — meeting continually rising demand whilst reducing the environmental impact of operating, maintaining, manufacturing and disposing aircraft and associated systems;
- c) *Safety* — sustaining the confidence of the community on safety by reducing accident rates, notwithstanding increased traffic;
- d) *Efficiency of the Air Transport System* — increasing the efficiency of the air transport system by limiting congestion and delays, notwithstanding the demand of rising traffic, introducing radical new concepts; and
- e) *Security* — devising measures to increase security on a global basis, with a highly diverse and complex system and in spite of ever increasing traffic.

3. MEETING THE CHALLENGES

3.1 Solutions and technical contributions have been identified to meet these challenges, through a global approach in order to ensure optimum benefit for all stakeholders. To this end the SRA identifies both positive and negative interactions amongst the different challenges and highlights vital concurrent developments required in order to create breakthroughs necessary to achieve the top level objectives.

3.2 Evolutionary, progressive and incremental change will not suffice. Just as demands in twenty and more years time will be different in nature from those of today, so solutions will need to be different in nature, not only in degree. This will require step changes in concepts using innovative technologies to create a future system different from today's.

3.3 As an example, work carried out in the air traffic management area addressing the efficiency challenge has shown clearly that extrapolated development of the current paradigm of control over aircraft movements will not meet future traffic demands. Consequently, new concepts are being studied requiring new and critical technologies to be developed before they can reach operational maturity.

4. THE SRA ENABLING MECHANISMS

4.1 The Vision 2020 report was focused on delivering change, which is likely to be dramatic. ACARE has considered how best to exploit technical research and bring it to fruition. This must be seen in a Pan-European setting in which the Research Agenda will be implemented through research programmes subscribed to in a variety of ways by the stakeholders who fund research at company, national and European levels.

4.2 Five main enabling themes of forefront applied research programmes have been identified:

- a) a research infrastructure capable of performing at world leading standards;
- b) a competitive supply chain capable of exploiting European expertise, of contributing to the necessary research and of turning new technologies into competitive products;
- c) certification and qualification processes facilitating rapid introduction of new and innovative technologies into production models;
- d) an educational system delivering diverse and multi-cultural skilled workforce; and
- e) Trans-European synergy to make the best use of the research effort.

4.3 Alongside traditional mechanisms in support of the research enabling themes, new ones have been identified which can be divided into two categories: project based mechanisms and broad-based (transversal) mechanisms.

5. PROJECT-BASED MECHANISMS

5.1 Mechanisms for R&T exist already serving the whole spectrum of engagement, from basic research and concepts through to technology development and integration and for accommodating varying roles in company, national, trans-national and European level programmes. The existing mechanisms need to be continued and built upon but the following new mechanisms are identified, particularly to support trans-national and European programmes:

- a) Technology Integration Platforms, to ensure that technical concepts work reliably in integration and at the scale of the full system needs;
- b) Large Scale Test Beds, to be used flexibly by the whole supply chain for testing advanced systems; and
- c) Nursery, or Incubator, supporting conceptual work nurturing breakthrough thinking for the future.

6. BROAD-BASED MECHANISMS

6.1 These have been identified as:

- a) mechanisms improving the research infrastructure in Europe tapping the opportunities for Pan-European research efforts and concentrating on testing and simulation facilities, R&T programme structures and collaborative frameworks;
- b) mechanisms supporting the ambition to exploit energy and expertise of Europe's technology supply chain, enhancing awareness levels of customers and suppliers. A central objective is to establish a powerful information network with aeronautics contact points supported by a comprehensive web-based portal to enable easy knowledge transfer across the whole European technology supply chain;
- c) mechanisms to optimise the certification and qualification system, enabling advances in technology to be deployed in a safe and timely manner into innovative products;
- d) mechanisms to promote education, aiding the mobility of skilled and motivated people across Europe; and
- e) mechanisms to encourage Trans-European synergy of research in aeronautics. On top of existing activities, independent programmes are needed to sustain competitive advantages and meet regional needs, allowing opportunities for collaborative and complementary research programmes to be visible and to be subscribed to under the principle of voluntary participation.

7. BUDGET

7.1 Even allowing for the gains expected to be achieved through greater efficiency, it is clear that more funding will be needed. In producing the SRA it has been confirmed that the estimated figure quoted in Vision 2020 "possibly in excess of 100 billion euro" will prove to be correct, which represents a substantial increase relative to current funding levels. This funding will need to come from both public and private sources. This is in line with the general conclusions of the Barcelona European Council meeting for research in Europe in March 2002. It concluded that overall spending on R&D and innovation in the Union should be increased with the aim of approaching 3 per cent of gross domestic product (GDP) by 2010.

8. CONCLUSIONS

8.1 An SRA has been developed to cover activities within the European research area up until 2020, with the aim of contributing to fulfil the overall objectives for the future of European aeronautics.

8.2 The SRA is dynamic in structure and content. It will undergo periodic revisions in the light of R&D advances, arising from the combined efforts of all stakeholders.

8.3 The above conclusions are in line with the political agenda, as set at the Barcelona European Council meeting for Research in Europe in March 2002. It recommended that overall spending on R&D and innovation in the European Union should be increased with the aim of approaching 3 per cent of GDP by 2010.

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