

**STUDY FOR THE EUROPEAN COMMISSION ON THE
REGULATION OF AIRSPACE MANAGEMENT AND
DESIGN**

(Contract No. B2000/B2-7040/S12.260383)

FINAL REPORT

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EXECUTIVE SUMMARY

I. SCOPE OF STUDY: THE ISSUES AND CHALLENGES

The High Level Group Report (HLG Report) has defined the policy scope for the creation of a single European sky. This Study focuses on the conditions for regulation of airspace management and design.

The concept of a European airspace raises jurisdictional issues and highlights the need for specific substantive reforms and improved organisational relationships. Addressing these issues in a regulatory framework requires the ability to formulate policy at the European level in difficult areas. These include:

- the need to create affirmative and binding processes to manage civil and military requirements creatively in the national and European interests;
- the requirement to define the standards needed to create the airspace continuum demanded by the HLG and to determine the processes needed to ensure timely application of such standards on a uniform basis throughout Europe;
- the establishment of processes to reorganise airspace into what we call Functional Airspace Blocks (FABs).

The key idea of the FAB concept is that, in future European airspace design, the criteria of safety, efficiency and fairness will no longer be subordinated to constraints of historic political geography. In Part III, Chapter 6 of the Study we describe, analyse and compare three options that provide alternative paths for enabling ATM providers to create cross-border operations, particularly for enroute operations in the upper airspace. None of the options requires privatisation or any other specific ownership form of the service provider. However, EC and/or state regulators will have to make decisions as to provider selection criteria, the ability of service providers to compete for franchises, and for the establishment of effective oversight.

II. THE STUDY APPROACH

The following three assumptions have governed our analysis:

The importance of a functional approach. One of the key implications of the HLG Report is that airspace designs determined by national land borders no longer serve the

interests of airspace users or individual states, much less those of the European Community. The three goals of the ICAO Convention, namely safety, efficiency and fairness, require a truly functional approach to European airspace design.

The need for an integrated “package.” While this Study considers the findings of the Economic Regulation and Market Liberalisation Studies, it only addresses the regulation of airspace management and design and civil-military issues; it does not offer organisational prescriptions for the regulatory system overall. Nevertheless, we advocate an integrated “package” approach to ATM regulation so that all of the various requirements at the European level can be approached from a coherent and consistent baseline.

Consistency with international standards. A new framework for the single European sky should build upon the basic principles and policies of international aviation and avoid serious conflicts. This Study's proposal for a regulatory framework will work well within the ICAO parameters and achieve even greater compliance with, and more uniform implementation of, ICAO principles and rules than is the case under the current regime. ICAO already explicitly recommends that airspace design is based on the needs of traffic rather than on political geography.

III. IMPROVING REGULATION FOR AIRSPACE MANAGEMENT AND DESIGN

1. Operational Requirements

As elaborated in Part III of this Study, the WCP Team, drawing on policy and planning documents of leading technical and airspace policy development organisations, notably Eurocontrol, has considered and developed a 14 point programme of regulatory objectives to be advanced or implemented by European legislation. These goals include establishing:

- (1) **Functional Airspace Design.** A UIR Europe to encompass the upper airspace of the EU States plus Norway and Switzerland. At a later stage, an FIR Europe that encompasses all EU airspace could be envisaged.
- (2) **Uniform Airspace Classification.** Modular airspace organisation throughout the EU, allowing national adaptation and local tailoring of lower airspace, in accordance with ICAO standards, to maximise freedom of operation for all airspace user groups while maintaining safety.
- (3) **Sectorisation Standards.** Common principles for design of ATC sectors, including provisions for cross-border sectorisation; a European algorithm to be developed so that both design and capacity can be objectively assessed.
- (4) **Criteria for the European Route Network.** Binding criteria for the European ATS route network supported by timely national implementation of lower routes and associated IFR arrival and departure procedures.

- (5) **European Criteria for Segregated Airspace.** Principles and criteria for the collaborative development, design and implementation of segregated airspace, including financial mechanisms for relocation of training airspace.
- (6) **Flexible Use of Airspace (FUA).** Binding EU standards for the flexible use of the whole airspace in Europe based on clear and easy-to-follow principles.
- (7) **Efficiency of Navigation Standards.** Legal principle that direct routings are the preferred and economically/environmentally sensible way to use European airspace. Establish pan-European airspace initially as random RNAV area and subsequently as FRA, as benefits of the latter are validated.
- (8) **Civil-Military Cooperation in ATS Provision.** Consistent with national security, establish minimum requirements to be met by Member States.
- (9) **Partnership of Air Defence in Airspace Management.** Full integration of air defence into European airspace management.
- (10) **Partnership of Airspace Management and Air Traffic Flow Management.** European rules and procedures for interaction of ASM with ATFM to provide for continuous dialogue between these functions.
- (11) **Taking ATFM to a New Level.** Eurocontrol processes supported and enabled by the Commission to manage scarce capacities more dynamically and more rigorously, implementing the recommendations of the *Jaquard Report*.
- (12) **Stakeholder Cooperative Participation in Tactical Airspace Allocation.** European regulatory context that facilitates the application of so-called Collaborative Decision-Making (CDM) techniques to fully utilise capacity.
- (13) **Reorganising Service Jurisdictions in the Upper Airspace.** FABs to replace purely national UAC operations that are often too small or otherwise hamper the establishment of the upper airspace continuum required by the HLG.
- (14) **Efficient and Flexible Regulatory Organisation.** A cost-effective European Airspace Regulator through synergistic linkage of Commission authority and Eurocontrol expertise, organised to monitor and modernise rules, their implementation and their modification.

2. Requirements for an Institutional Network

The European Community (EC) should be at the heart of the institutional network for airspace management and design regulation in the territory of its Member States. However, relationships with Member States, Eurocontrol and ICAO/ECAC should be carefully defined.

The two main new structural ingredients of the EC/Eurocontrol/States structure would be:

- A European Commission Executive Secretariat containing a core of qualified staff over the whole range of the Commission's responsibilities; and
- An Airspace Policy Commission (APC) set up by Eurocontrol on the lines of the SRC -- and thus assuring Eurocontrol State participation -- and supported by an Airspace Policy Unit (APU), whose functions are set out and defined in a Memorandum of Understanding between the EC and Eurocontrol.

European Community. Member States, acting through the Council, should make use of the EC's competence under Article 80(2) of the EC Treaty and vest the Commission with the power to adopt legislative measures, approve airspace design and conduct review and enforcement processes (see in more detail below). To accomplish its tasks, the Commission should establish the above-mentioned Executive Secretariat within its DG Transport and Energy.

Member States. Member States are key players within the framework for European airspace regulation. Their full participation in the regulatory process is essential from the initiation of legislation through to implementation and review, with enforcement at the national level. However, to the extent that Member States transfer sovereign rights to the EC and vest the organisation with jurisdiction over airspace matters, EC policies and rules will prevail over national legislation and regulation.

Eurocontrol. Within the context of airspace regulation in Europe, Eurocontrol should have a two-fold role. It should first support the EC in its efforts to enact, review and enforce sound and efficient airspace management and design regulation within the EC and do this in the form of specific, agreed organisational commitments as outlined in Part III, Chapter 7 of this Study. Second, Eurocontrol should use its pan-European approach to improve airspace regulation throughout Europe.

Accordingly, tasks of Eurocontrol in these two areas would include service tasks (such as airspace modelling, route network design studies, and the definition of equipment requirements) and regulatory tasks (such as the conduct of technical consultations with states, the provision of a forum for civil-military coordination, and the provision of an interface between the EC and non-EC states). In addition to these on-going tasks, Eurocontrol should support the EC on an ad hoc basis, for example in EC investigation and compliance review proceedings.

The cooperation between the EC and Eurocontrol should be based on two instruments, *i.e.*:

- **Memorandum of Understanding** based on Article 2.2 of the revised Convention laying down details of the cooperation arrangements between the two organisations. This should operate on a stand-alone basis.
- **Accession Protocol** to be agreed between all members of Eurocontrol and the EC, which adapts certain of the revised Convention's provisions (such as representation, voting and financing) to the dual membership of the EC and its Member States.

ICAO/ECAC. ICAO and ECAC provide the international framework through which their respective members have developed airspace policy on an international level. The Chicago Convention and, in particular, its Annex 11 as well as non-binding material such as the ICAO ATS Planning Manual provide guidance for airspace management and design. Although it is not a member of ICAO and ECAC, the EC should comply with their policies and rules and, for this purpose, should intensify its relationships with these two institutions with a view to ensuring maximum cooperation. Member States should be required to act in ICAO and ECAC in accordance with common positions agreed within the EC's single European sky framework.

3. Creating Efficient Processes

The regulatory framework should create efficient processes for airspace management and design. It should address, in particular, civil-military coordination, approval processes for airspace design, and review and enforcement.

Civil-Military Coordination. Civil-military coordination is crucial to the success of efficient airspace regulation and for the achievement of the 14 point programme. The military must be integrated in decision-making processes.

However, the extent to which the EC has competence over military airspace matters is unclear. There are three options available to ensure that national security concerns are appropriately reflected:

- Coordination of the civil and the military outside the EC framework within, e.g., Eurocontrol;
- Creation of authority to deal with civil-military coordination under the EU's CFSP and implementation through EC action; or
- Positive coordination of the civil and military requirements within the EC coupled with a "red-button-facility" to safeguard essential national security interests.

Approval Process for Airspace Design. The EC should establish a review process for airspace design so that design proposals that have a negative impact on the development of the single European sky can be disapproved.

Review and Enforcement. The EC should establish efficient review and enforcement mechanisms which should comprise four major components:

- **Monitoring, review and reporting.** The Commission should be required to periodically publish status and progress reports which should address ASM/ATS/ATFM performance; and should include the identification of bottlenecks, the status of civil-military coordination, implementation of uniform European airspace regulation and Commission activities, and identification of priorities. The report should be based on reports by Member States and ATS providers, and voluntary input by aircraft operators, unions and other interested parties.

- ***Industry-specific inquiries.*** The Commission should have the power to initiate industry-specific inquiries as appropriate.
- ***ATS provider compliance subject to domestic review and enforcement.*** ATS provider compliance should primarily be subject to domestic review and enforcement. However, the EC should establish a mechanism whereby it can ensure effective enforcement.
- ***Member State compliance subject to EC review and enforcement.*** Member State compliance should be reviewed by the Commission through a compliance review system to be established at EC level. If non-compliance by Member States persists, the Commission should use the EC Treaty's infringement processes.

In all these processes, the Commission should be supported and advised by Eurocontrol.

4. Creating a Regulatory Environment for ATFM and CDM

ATFM regulation should continue to be accomplished within Eurocontrol to ensure Eurocontrol-wide implementation. Collaborative Decision Making (CDM) will initially be applied in the context of ATFM and should be based primarily on voluntary contractual relationships. It should involve only a low level of regulation, addressing issues such as confidentiality of data, which need to be handled within the ATFM framework. Eurocontrol will be able to make use of the revised Convention's improved regulatory processes when it enters into force. Eurocontrol should also establish an informal non-compliance mechanism, which should provide a forum for peer review and peer pressure.

Meanwhile, the EC should use its authority to:

- ensure the direct effect of Eurocontrol's "General Conditions" governing ATFM once adopted by the Council of Eurocontrol;
- require consistency of ATFM/flight planning and airport slots (possibly by amendment of the Slot Regulation); and
- require Member States to promote compliance and ensure enforcement of ATFM instructions issued by the CFMU.

IV. EC REGULATORY FRAMEWORK

The EC should adopt a consistent and efficient regulatory framework to advance the goals and implement the processes described above. The initial phase should ensure that the institutional setting for airspace regulation is in place and that immediate action can be taken by the Commission to improve the airspace management and design situation in the EC. Accordingly, in addition to defining the EC's relationship with Eurocontrol in a Memorandum of Understanding (and an Accession Protocol), the regulatory framework should consist of the following elements:

- **Single European sky umbrella regulation to ensure consistency of legislative “packages.”** The Council should issue an umbrella regulation for the establishment of the single European sky. This regulation should provide the framework to ensure the consistency of legislative packages (such as airspace management and design, equipment rules, and economic conditions and liberalisation of service provision). The Umbrella Regulation should, in particular, define the concept of a single European sky, establish its principles, and set up minimum requirements for further legislation. It should also provide a framework for civil-military coordination through a joint Committee for the Implementation of the Single European Sky (CISES) and establish a “red-button-facility.” Finally, Member States should be required to act within international organisations of which the EC is not a member in accordance with common positions formulated within the EC.
- **Enabling regulation for airspace management and design.** The EC Council, under the umbrella of the above framework regulation, should adopt an enabling regulation for airspace management and design. It should establish a single upper flight information region above flight level 285 (to be adapted by Commission legislation). The regulation should enable the Commission to adopt legislation according to pertinent comitology processes to implement the technical elements of the single European sky, including legislation to ensure effect of Eurocontrol's General Conditions for ATFM. The enabling regulation should establish monitoring, review and reporting mechanisms and compliance review mechanisms as well as the approval processes described above.
- **Commission legislation.** Under the authority of the enabling regulation, the Commission should adopt legislation that addresses issues such as airspace classification, sector and route design standards, standards for segregated airspace, and the flexible use of airspace.
- **Commission power to review airspace design and conduct compliance reviews.** Under the enabling regulation, the Commission should also have the power to adopt decisions to disapprove airspace design that fails to respect agreed European standards. Commission decisions will also be used as instruments in compliance review processes.

In later phases of regulation, the EC should consider the implementation of the more far-reaching elements of the reforms elaborated in the 14 point programme set forth above.

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PART I

INTRODUCTION TO STUDY

This Study (Final Report) was prepared by Wilmer, Cutler & Pickering (WCP) together with its supporting partners, DFS Deutsche Flugsicherung GmbH, Société Française d'Études et Realisations d'Équipements Aéronautiques (Sofréavia), and John Arscott and Peter Brooker of the Civil Aviation Authority of the United Kingdom (UKCAA).¹ The Study draws on the findings and initial conclusions set out in WCP's *Interim Report* submitted to the Commission on 17 January 2001. It also reflects further consultation with stakeholders and interested parties since the submission of the *Interim Report*.

CHAPTER 1: POINT OF DEPARTURE

1.1 Defining the Study Focus

This Study has broadly focused on two questions:

- What needs to be done differently in the area of regulating airspace management and design in Europe to achieve the goals set forth by the High Level Group for the single European sky; and
- What are the most appropriate policy, organisational and legal strategies for implementing the desired goals?

As set forth in the *Interim Report*, the findings of the Final Report of the High Level Group (HLG Report) have been taken as the governing strategic policy guidance for this Study. The HLG Report stressed the need for change. It identified efficient regulation at the European level as the catalyst needed to create the single European sky. However, it also emphasised the need to relate change constructively to existing institutions and processes.

Throughout the Study, we consider how existing relationships can be optimised in light of the concerns of interested parties and from the context of the current institutional situation. Having said this, we have regarded our central task to be identification and analysis of new regulatory structure and elements that will or may be needed to achieve the single European sky.

1.2 “Functional” Approach

Studies on Market Organisation and Economic Regulation have been performed concurrently to this Study by other teams. They bear importantly on our work. Whilst airspace is a strategic asset, it plays a fundamental economic role in modern life. As a natural resource, it is a production factor. The ability to organise and allocate it, determines to what extent competition can be permitted or encouraged in its exploitation.

¹ John Arscott and Peter Brooker acted in an individual advisory capacity.

The terms of reference of this Study, as well as the findings of the HLG, call upon us to approach airspace as a European resource.² Whether this should lead to a purely economic frame of reference is, however, another matter. Whilst safety and national security can also be defined in economic terms as “public goods,” they clearly require public interest mechanisms such as regulation to create them and maintain their quality.

Thus, when considering the question (being addressed by all three Studies) of whether and how to create efficient blocks of airspace not based on internal European borders, our methodology does not take us in a straight line to an economic frame of reference. We advocate a broader approach, namely a “functional” approach. The ICAO Convention calls upon its member states to pursue three goals in developing international aviation: safety, efficiency and fairness. A truly functional approach to European airspace design should thus stress all three of these criteria and do so in a mutually-reinforcing way.³

1.3 Integrated “Package” Approach

The HLG Report identified five areas of regulation that need to be addressed: safety, economic regulation, airspace management and design, civil-military cooperation and interoperability (of equipment and systems). Performance regulation, whilst it can be comprehended under safety and economic regulation, could also provide an additional focus. This Study has dealt only with airspace management and design and civil-military issues. It does not offer organisational prescriptions, as the other Studies have done, for the regulatory system overall.

From a legal as well as general policy perspective, we advocate an integrated “package” approach to Air Traffic Management (ATM) regulation by the Council, so that all of the various requirements at the European level can be approached from a coherent and consistent baseline. Once high-level rules have been set down by the Council, the Commission will be tasked with adopting medium-level implementing measures. In carrying out this task, the Commission should ensure that individual measures are consistent with each other and with the overall framework set down by the Council.

Having said this, we believe that regulation of airspace management and design has certain unique aspects and responsibilities. Airspace allocation issues are perhaps more likely to merit and require high level political decisions. The national security dimension is a primary aspect in the regulatory process itself. Decisions here create the building blocks or problem areas for the other areas of regulation.

² See Annex 3 for a copy of the terms of reference of this Study.

³ As discussed in more detail in Part II and emphasised throughout this Study, safety of course has primacy. It is also a business factor, since without safety there will be no confidence and without confidence no market. Efficiency should include in its scope enhancing capacity, spreading demand, reducing stress and thereby contributing to safety. The goals of fairness and economy can be achieved through the creation of European “blocks” of airspace. The principles and criteria for drawing up these blocks can equally extend beyond en-route airspace and be applied to military airspace blocks. More efficient and functionally useful organisation of blocks of airspace should also be pursued, for example, on behalf of Europe's military.

1.4 Study Methodology

1.4.1 Scope of analysis

The Commission asked us to investigate three general and seven specific areas affecting the content or conduct of airspace regulation. Broadly speaking, the scope of analysis implied by the terms of reference required us to:

- Examine prevailing systems of airspace regulation;
- Review a range of specific, substantive problems that have been driving the European policy debate about how to design and manage airspace;
- Consider the directions policy should or might take on these issues;
- Consider the role of European institutions in guiding or mandating these directions;
- Define a legal context and recommend a legal process for establishing the role of the European Commission; and
- Consider the best way to organise efficient, mutually supportive relationships with Member States, international bodies and especially with Eurocontrol.

1.4.2 Scope of tasks, team approach and composition

The tasks called for by the Study required a multi-disciplinary approach that could address in an expert way both the specifics of practical problems and broader policy and legal issues. WCP and its partners therefore created a team of experts *inter alia* to:

- Identify practical barriers and policy or legal constraints that inhibit efficient supply of European airspace capacity;
- Consider key factors on the demand side, such as the interests of competing users;
- Review systems for regulating or administering scarce capacity;
- Examine the role of organisational and legal innovation and identify where the competence of European institutions is needed to solve problems effectively.

The foregoing tasks required expertise in the operation, organisation and regulation of airspace management and design, as well as economic, military, political and legal issues associated with its reform, plus a project management approach to integrate these fields of analysis. Paul A. von Hehn, partner with WCP, acted as project manager as well as leading the legal policy analysis. Erwin von den Steinen, a senior advisor to WCP for aviation policy and institutional analysis, acted as research coordinator and co-manager of the project. Other leading contributors included:

- Technical, operational and civil-military analysis: Col. (ret.) Helmut Michels, Senior Consultant, and Klaus Joest, Senior Consultant, DFS Consulting.

- ATFM and CDM analysis: Dr. Michel Delarche, Head of Air Traffic Management Consulting Division, Sofréavia.
- Regulatory organisation: Dr. Peter Brooker, Planning and Corporate Director, Airspace Policy, UKCAA, acting in an individual advisory capacity.
- European and national security analysis: Air Vice Marshal John Arscott, Director Airspace Policy, UKCAA, acting in an individual advisory capacity.
- Legal Analysis: Dr. Stefan Ohlhoff and Deirdre Waters, WCP.

1.4.3 External dialogues

As set forth in Part II of this Study, our team has carefully considered the views of key members of the aviation community, as expressed in position papers or obtained in interviews. We have circulated a survey to all Member and Associated States to obtain national views on key questions. A number of meetings were organised with the Eurocontrol organisation which have contributed to the findings of the Study.

CHAPTER 2: STRUCTURE AND ORGANISATION OF THE STUDY

In addition to this first part, the Study has four further parts:

- Part II - Review of the current policy and legal setting;
- Part III - Examination of operational and organisational requirements and alternatives;
- Part IV - Consideration of new regulatory framework and legal solutions;
- Part V - Conclusions: Key messages and challenges.

In Part II, we review the positions of stakeholders and consider key policy premises. We then examine the current legal situation with respect to national regulation of airspace management and design.

In Part III, we and our partners consider policy requirements and organisational means for implementing the single European sky. Individual chapters have been deliberately structured and areas of responsibility assigned so as to provide expert focus. Reforms are proposed in the areas of:

- Airspace management and design procedures, including civil-military coordination;
- Air Traffic Flow Management (ATFM);
- Collaborative Decision Making (CDM);
- The removal of economic disincentives;

- Airspace policy processes to reorganise enroute ATC provision;
- Regulatory organisation.

In Part IV of this Study, we propose a new regulatory framework. We take a systemic view of the new legal requirements and their logical organisation in European law and procedure. We also recommend processes to:

- Ensure coherency and efficiency of ATM regulation overall;
- Promote compliance; and
- Enable continuing review of the regulatory framework in a transparent context -- in response to the needs of the aviation community and the broad public interest.

We then outline a series of specific regulatory actions and alternatives to establish the single European sky.

A critical variable in the reform process will be the Commission's new relationship with Eurocontrol. This should occur in the context of significant changes within the Eurocontrol organisation that will need to follow ratification of the revised Convention. Thus we devote particular attention to this issue in Part IV. We elaborate elements that might be addressed formally through a Memorandum of Understanding between the EC and Eurocontrol to establish cooperative relationships and responsibilities.

PART II CURRENT POLICY AND LEGAL SITUATION

CHAPTER 1: INTRODUCTION

Establishing the single European sky will require a regulatory framework for airspace management and design that (i) embodies new rules and processes, and (ii) relates constructively to the existing institutional and legal situation. Before framing new rules (in Part IV of this Study), we review current regulatory practices and basic concerns of stakeholders from two broad perspectives:

- **Policy development.** We review specific institutional and stakeholder concerns and current processes which will need to be taken into account in order to achieve the single European sky initiative and the recommendations of the HLG.
- **National legal context.** We consider the existing legal framework in EU Member and Associated States for the areas of airspace regulation addressed by the HLG recommendations. Areas considered include procedures for civil and military interaction, implementation of ICAO standards, and cross-border delegation of service provision.

CHAPTER 2: POLICY DEVELOPMENT

A significant aspect of the work of the HLG was its openness. At its outset, the HLG established and obtained the active participation of an Industry and Social Group. Not only representatives of “industry” in a narrow sense participated, but the aviation community as a whole (importantly including the military and key professionals such as pilots and controllers as well). Whilst the terms of reference of this Study did not call upon us to revisit ground covered by the HLG process or conduct a general review of stakeholder opinion, we have sought advice and reactions from a wide range of experts and leaders in the aviation community.⁴ These persons expressed strong views with respect to both the specific concerns of their groups and broader questions -- such as separation of regulation from service provision and reorganisation of airspace based on functional criteria as opposed to political geography.

⁴ In addition to the national regulatory bodies of the states cited in Chapter 3 and Eurocontrol, European organisations contacted (who provided position papers or views and invaluable insights to the Study Team) include: ACI-Europe, AEA, AOPA, ATC-EUC, CANSO, CMIC, the Concord Group, EBAA, ERA, ETF, IACA, IATA, ICAO Paris, IFALPA, and PRC/PRU.

2.1 Airspace Policy Concerns of Key Actors in European Aviation

In Part III of this Study we examine policy issues confronting future airspace regulation at the European level in-depth. Here we highlight selected concerns of the following key players in the system:⁵

- Civil users: airlines, business and general aviation, and aerial work;
- Military users;
- ATS providers;
- Professional groups (pilots and controllers);
- Airports; and
- Planning and policy development bodies.

Views and concerns of national regulators and the relationship with Eurocontrol, while touched on at various points in this Section, are dealt with systematically in other parts of this Study. Since the introduction of new technologies and processes is the topic of other major Commission Studies, we do not discuss the concerns of the ATM and avionics supplier industry.

2.1.1 Concerns of civil users

Europe's growing civil aviation community represents an enormous diversity of services and interests which in some areas can be sharply competitive. However, in the specific area of airspace policy, we have found very little internal conflict of interest among civil users. There is concern among general aviation and aerial work users about maintaining access to uncontrolled airspace.

There is a growing confluence of interest and concern among all civil users that enroute capacity in the upper airways must be expanded and streamlined. Regional operators, corporate services and even general aviation pilots (as all operate more turboprop aircraft) will place rising demands for access to upper airspace in a single European sky. Civil users are of course also very concerned about harmonisation procedures in lower airspace and eliminating bottlenecks in cross-border airspace. More Flexible Use of Airspace (FUA) stands very high on the general priority list. Specific concerns by one or several user associations are as follows:

- (a) **Equipment rules.** All airlines and aircraft commanders are vitally concerned about uniformity in the application of rules of the air and about harmonisation of requirements for systems compliance, avionics equipment and communications procedures. However, operators of smaller aircraft are particularly affected.

⁵ There are many ATM policy issues that concern other areas of regulation (e.g., safety, economic, interoperability of ground-based systems and equipment, as well as important performance aspects) which are only touched on indirectly or are not discussed in this Section.

Regional operators, business fleets and general aviation bear disproportionately higher costs. In their view, a critical task of European regulation is the need to ensure that (i) new aircraft equipment requirements as a condition of access to particular airspace are subjected to rigorous *a priori* cost benefit analysis; (ii) rules are precisely drawn so as not to unnecessarily restrict access or flexibility of specific users; and (iii) deadlines for the execution of refitting and introduction of new communications or navigations procedures are rigorously adhered to once they have been decided upon. Anyone delaying or blocking such implementation should be sanctioned.

- (b) ***Timely systems introduction of new navigation procedures.*** Whilst they understand the relevance and logic of trial projects, key user associations are very concerned that new systems approaches such as Free Route Airspace (FRA) not be applied piecemeal in Europe. A key task of the European regulator should therefore be, following testing and validation, to promote and insist on a general application in all major traffic areas of new techniques so that economies of scale and scope can be realised. Europe's important leisure services industry (which operates modern aircraft at very high rates between a large number of city pairs) and corporate and regional operators are particularly interested in greater efficiency of routes.
- (c) ***More flexible capacity access in terminal areas.*** Business aircraft are particularly affected in a negative manner by intensive allocation of airport slots that (i) makes it very difficult to conduct critical operations on short notice; and (ii) because of cascading congestion, causes departure or stacking delays of high priority traffic. For these operators, systematic harmonisation of airspace design and realistic, flexible airport capacity planning is particularly important.

2.1.2 Concerns of military users

The military aviation community, despite operating under constrained budgets, faces a diverse set of mission requirements for upper as well as lower airspace. These requirements include: air defence training, combat manoeuvring, ground support missions, mid-air refuelling, pattern flights, unmanned surveillance operations and weapons testing.⁶ Airspace planning and policy must meet two broad goals: facilitation of combat readiness to meet a wide array of challenges; and the ability to carry out rapid transition to military control of the air traffic system in the event of impending or actual hostilities. This implies a need for direct military participation in, and full awareness of, civil systems planning and organisation and (as discussed in Part III of this Study) flexible and integrated operating procedures.

2.1.3 Concerns of Air Traffic Service Providers (ATSPs)

The European ATSP community is in a state of transition. Thus, we can now see an institutional awareness of the fact that (while national views and situations still remain distinct) such a community at the European level indeed exists. Important members of this

⁶ For a more in-depth discussion, see Part III, Chapter 2 of this Study.

community strongly support the removal of historic political constraints on airspace organisation through progressive regulation. They want the European Regulator to facilitate innovation in airspace design based on safety and efficiency criteria. In Part III of this Study, we examine this issue in-depth.

2.1.4 Concerns of professional groups

Modern air transport depends on safety and service professionals whose critical evaluations are as important for the system's improvement as their day-to-day performance is for its stable operation. For purposes of airspace policy analysis, the views of pilots and controllers, as key operations managers, are particularly relevant. While long-term trends in technology may produce a partial shift of responsibilities for enroute navigation and separation from the ground to the cockpit, both professions face great challenges in adapting the so-called man-machine interface (a topic which lies outside the framework of this Study) and both will remain accountable for safety.

- (a) **Pilots' views.** European pilots are very concerned that airspace planning and classification establish both consistency and flexibility within a coherently organised and efficiently managed airspace. The concept of the single European sky is therefore strongly supported, just as there is concern about individual countries that have failed to integrate airspace management at even the national level. While there is obvious support for modernisation, pilots also stress the need to ensure that new procedures like FRA are not implemented without careful preparation.
- (b) **Controllers' concerns.** While civil controllers' organisations represent some diversity of viewpoint, we register a strong, general concern that European regulation not make a false choice; *i.e.*, that policymakers should not assume a logical correlation between the corporate organisation of service provision (where many controllers wish to retain public service motivation if not organisation) and functional restructuring of airspace (which on its merits should be explored). The controllers support the application of tested new technologies and procedures and strongly encourage investments in facilities as well as in human resources aimed at relieving congestion.

2.1.5 Concerns of airports

Europe's airports all represent local regions or communities; however, they have consciously and increasingly adopted and implemented a global business perspective. They understand their role as global and regional gateways. For them, transparent, efficient interconnection from "gate to gate" is absolutely essential. Thus, the airports support the single European sky process, and, while they do not fit directly into either "provider" or "user" roles, their well-being is at stake in all phases of airspace management. Thus, airports have a particular interest in local and regional airspace design and in ensuring that all levels of regulation and policies for airspace use (local, national and regional as well as European) support fair and efficient access to the system.

2.1.6 Concerns of planning and policy development bodies

The activity discussed here can be and often is deemed “regulatory.” However, the planning and coordination of airspace design in Europe provides an essential service to national and international aviation. Moreover, it also relies on inputs from service providers. Under the aegis of ICAO, Eurocontrol and national experts provide vital, ongoing service processes for international aviation. They develop, propose and coordinate new international routes, just as they explore the suitabilities and requirements of new technologies and procedures. Historically, ICAO has therefore played a policy development role; airspace policy has been one of its most prominent areas of activity. While structured politically to relate to member states (as individual, sovereign members), ICAO has also worked with European institutions such as ECAC and Eurocontrol and wishes to adapt constructively to any changes in Europe that might lead toward a more continental airspace (as exists in North America). ICAO, just as other established existing institutions, is concerned that proposed changes be coordinated at a formative phase and that unilateral changes in regulation be avoided.

2.2 Current Policy Processes and New HLG Criteria

Since the 1980's, European states, notably through ECAC as well as Eurocontrol, have significantly enhanced their commitments and efforts to coordinate, harmonise and integrate their ATM operations (including their airspace management and design processes) to facilitate a European level of performance. A number of important policy agreements have resulted, and valuable work continues.

Whilst the assumption by the EU of political leadership and legal accountability to achieve the single European sky is the only way to produce the binding commitments needed to realise these agreed strategies, the role of expert policy development bodies will, if anything, become more critical. Good decisions depend on good information and analysis.

As the Commission seeks to optimise the transition to a new system of regulation, there appear to be at least four elements of the current system that merit particular retention and even further development:

- A philosophy of regulation that embodies the primacy of safety;
- Independent auditing and performance benchmarking;
- Inclusive but also technically focused policy development processes;
- European-level research and development capability, including cost/benefit analyses of proposed technical requirements.

2.2.1 Maintaining and expanding the commitment to safety

The HLG Report stressed the need to maintain the excellent European record on ATM safety, whilst urging that the other two normative goals of international aviation regulation - efficiency and fairness -- receive far more attention than at present. As airspace policy

reform goes forward, the Commission should act to establish a positive link between policies to increase capacity, efficiency and uniform management of airspace and safety oversight of control procedures in that airspace.

From a policy management perspective, it will be essential to forestall any suggestion of a (false) trade-off between the goals of efficiency (properly defined) and safety. Whilst safety costs money, there can be no true self-interest in short-cutting safety. Thus, in markets like the United States, the strongest support for a strong federal safety regulation comes from industry. Industry knows that in this customer-driven market safety failures will be economically punished in three ways, namely by (i) being caught by the regulator; (ii) losing market share; and (iii) being sued in the courts. Therefore, industry self-interest calls for a high common denominator in safety performance.

2.2.2 Consolidating the role of the Performance Review Commission

Whilst not uncontroversial, the Performance Review Commission (PRC), established under the revised Eurocontrol Convention, has been widely admired for its determined efforts to develop a systematic picture of ATM performance and to promote informed, constructive criticism based on best practice comparisons. This work should be properly resourced, continued and probably expanded. The PRC has named problems and targeted bottlenecks. Thereby, it is setting the stage for a far higher efficiency and prioritisation of investment at the European level. The PRC, especially as it obtains better (perhaps also mandated) access to information, is excellently positioned to advise the Commission as well as the Council of Eurocontrol and can play a vital ongoing role in the development of airspace regulation.

2.2.3 Maintaining and expanding inclusiveness and the role of expertise

As it seeks to institutionalise further-reaching European policy development and implementation processes, the Commission will wish to follow the HLG's example of openness (which the Commission in fact shaped). An open, inclusive approach in which affected and qualified stakeholders can fully participate is required. This will facilitate the development of a regulatory process that responds efficiently to public interest and market requirements. Also, in the highly technical field of ATM and Airspace Management (ASM) regulation, it will be very important -- as was stressed to us by both national regulators and market participants -- to ensure appropriate reliance on expert knowledge and opinion and the application of technical criteria in the taking of technical decisions. Here, the current analytical and consultative mechanisms involving member states as organised under Eurocontrol, ECAC and/or ICAO will continue to play a critical role.

2.2.4 Appropriate R & D support

For some years, the Commission has sponsored significant research in aviation systems (for example the development of CNS) and has conducted important economic and technical studies of issues that might require regulation. Eurocontrol has meanwhile organised a wide range of important ATM research projects using both external support and the considerable capability of the Brétigny Experimental Centre. As the Commission initiates

a regulatory process that moves “further and faster” than has been heretofore possible, these analytical capabilities take on increased potential importance. The Commission should draw on these established resources for cost/benefit analyses of proposed forms of regulatory implementation.

CHAPTER 3: CURRENT REGULATORY PROCESS

This Chapter considers current procedures applied in EU Member and Associated States in the regulation of airspace management and design. Our examination is based, in large part, on the answers provided by the state authorities to our questionnaire on the subject.⁷

3.1 Regulatory Process

3.1.1 Investigative focus

The proposed framework for airspace regulation will involve regulation at both Community level and Member State level. The Community measures must also be implemented at Member State level in order to be effective. For these reasons, it is essential to understand the processes through which Member State regulation and implementation will have to pass. Our investigation focused on identifying the responsible authorities in the Member States and the processes by which regulation becomes obligatory on national players. Since a coherent framework for airspace regulation requires the active involvement of the military, our survey also requested information concerning civil-military coordination at the national level.

3.1.2 Investigative findings

In order to obtain a coherent overall picture of the regulatory processes at national level, we have divided our investigative findings into a number of interrelated sections:

- (a) **Type of regulatory bodies.** In all states that responded to our survey, regulatory bodies with responsibilities for different levels of regulation are involved in airspace management and design regulation. These bodies operate under national legislation governing airspace regulation. They include national parliaments, government departments including, in particular, the Ministries of Transport and the Ministries of Defence, and government agencies such as civil aviation authorities. Within this multi-tier framework, a number of states have placed primary responsibility for medium-level airspace regulation with a government department. Within Germany, for example, the Ministry of Transport is primarily responsible for formulating airspace policy and regulation. The German civil aviation authority,

⁷ The states who replied to our questionnaire are: Austria, Finland, France, Germany, Italy, Luxembourg, the Netherlands, Portugal, Spain and Switzerland. In addition to these responses, we have had consultations with other states such as Belgium, France, Germany, Norway, Spain, Sweden and the United Kingdom on the issues raised in our survey and received, in some cases, extensive supplementary documentation. See Annex 4 for a copy of the questionnaire that we sent to states.

Luftfahrtbundesamt, in contrast, has only very limited responsibility as regards airspace issues.⁸ It publishes route structures including regulations on routes for aerodrome departures and approaches. Within other states, such as France, regulation is primarily performed through an airspace directorate, which is a joint civil-military body representing the Ministries of Transport and Defence. Finally, there are states which primarily regulate airspace through civil aviation authorities. Examples include Finland and the United Kingdom. In the UK, the functions of the CAA are carried out by the *Directorate of Airspace Policy (DAP)*. The *DAP* acts under ministerial directions issued to the CAA under national legislation. The ministerial directions are issued jointly by the Secretaries of State for Transport and Defence.

- (b) **Scope of responsibility.** Throughout Europe, the regulatory authorities which have been entrusted with primary responsibility for airspace regulation, usually also have a very broad range of responsibilities in relation to national airspace. Generally, the authorities are tasked with the regulation of airspace design, policy, management and organisation. These include measures such as airspace classification, approval of route structures, the publication of segregated airspace information, and supervision and inspection of aircraft operators and service providers. The German authority is specifically tasked with arbitrating differences between users and the German ATS provider (*DFS*).
- (c) **Legal instruments for airspace regulation.** In all states which responded to our survey, the legal instruments which may be used for airspace regulation reflect the multi-tier structure of the regulatory bodies involved. In general, parliamentary acts establish the framework for airspace regulation. For more detailed regulation, all states make use of legal instruments such as ministry or agency regulations and administrative acts of general or specific application. These are generally published in Aeronautical Information Publications (AIPs).

In France, for example, there are four applicable levels of regulation. For general issues of air navigation regulation, the transport minister can issue a *décret*. As regards the permanent implementation, modification or cancellation of airspace structures, the transport minister has the power to adopt an *arrêté*, while temporary measures in this area will be taken by ministerial decision. Ministerial instructions provide guidance regarding the establishment of instrument approach procedures.

- (d) **Delegation of regulatory or regulatory support functions to non-governmental bodies.** Airspace design and regulation generally do not seem to be delegated to ATS providers or other non-governmental bodies by the relevant authority. However, there are a number of countries which entrust non-governmental bodies with regulatory support functions. In Germany, for example, *DFS*, under a framework agreement with the Transport Ministry, proposes the classification and design of airspace and conducts regular public hearings for users on modifications of the existing structure. The Spanish ATS provider *Aena* has a similar role.

⁸ The *Luftfahrtbundesamt* is mainly responsible for safety issues related to aircraft and cockpit/cabin crews.

Similarly, in Switzerland, the ATS provider *Skyguide* plays an important role in route network design within the classes of airspace set up by the civil aviation authority. In the United Kingdom the provider, the *National Air Traffic Services (NATS)* also plays an important substantive role in defining its airspace requirements which it is legally required to develop and submit. The *DAP* defines allocation policy among classes of users and consults widely to determine policy and optimise use of scarce resources.

- (e) **Coordination of civil and military interests.** Our investigation confirms the results of the HLG's Civil-Military Use of Airspace Sub-Group's analysis of civil-military organisation.⁹ Broadly put, the analysis stressed the need for airspace planners to understand the needs of the military, and it strongly endorsed both the FUA concept and the drawing up of common definitions and procedures for the handling of military air traffic in the various countries. At all stages of the analysis, the need for closer cooperation between civil and military was considered paramount.

As regards regulatory activities, all states have established mechanisms intended to facilitate the conciliation of civil and military interests and needs. Within some countries such as Belgium, Germany, and the Netherlands, the respective Ministries of Defence and Transport consult on regulatory matters that affect the interests of both the civil and the military. Others have established a joint military-civil committee for this purpose. For example, within Spain civil and military aviation authorities coordinate their activities through the joint CIDETRA committee. Within a number of states, for example Austria, consensus of the civil and the military is required for a number of regulatory measures. Others such as the Nordic states require the civil aviation authority to consult with the military but have invested the civil authority with ultimate responsibility and decision-making power. In the UK, the CAA facilitates civil-military coordination and “makes it work.” This is a legal obligation.

In the area of ATC service provision, the level of integration is rather disparate. Within some states such as the Nordic states and Germany, there is a high level of integration which is reflected in either the civil ATC provider controlling civil and military traffic or a fully integrated joint civil-military organisation. Other states still maintain separate ATC providers for civil and military with a variety of co-operative arrangements.¹⁰

3.2 The Status of Implementation of ICAO Standards

3.2.1 Investigative focus

Regulation at a European level will need to be compatible with international rules and practices in relation to airspace management and design. One of the primary bodies of regulation available at an international level is the ICAO Convention and its Annexes. Airspace issues are also addressed in non-binding ICAO material such as the ATS Planning

⁹ Report of 18 May 2000, pp. 11 seq.

¹⁰ For further details see Part III, Chapter 2, Section 2.4.2.

Manual. For an overview of the current situation, the survey that we sent to the national authorities inquired (i) whether ICAO rules were fully implemented through national legislation/regulation; (ii) whether there were any differences between the relevant ICAO rules and national rules; and (iii) if so, were the standards imposed at national level higher than those under ICAO.

3.2.2 Investigative findings

All of the states that responded to our survey stated that the ICAO rules are fully implemented into their national laws/regulations on airspace management and design. Within some countries such as Switzerland, ICAO Standards and Recommended Practices (SARPs) are directly applicable. Portugal specified that the rules contained in ICAO Annexes 2 and 11 are fully implemented, whereas the other Annexes are simply observed as a result of their international law status.

Despite the affirmative answers to the question regarding implementation of ICAO rules, a number of states responded that their national rules contained certain differences to the ICAO rules:

- Germany noted that it requires additional standards in relation to visibility requirements for VFR operations in certain airspace classifications. It also imposes transponder mandatory zones that exceed ICAO requirements in some parts of its airspace.
- The Netherlands noted that it imposes additional or higher standards than the ICAO rules in some cases.
- Spain noted three differences: (i) Terminal Control Area (TMA) charts that include more than one aerodrome are published in Part Enroute 6 (ENR 6) of AIP rather than in part Aerodrome (AD); (ii) elevations in instrument approach charts are published in feet, not metres; and (iii) some manoeuvres contained in instrument approach charts of air bases follow NATO military procedures instead of ICAO regulations.
- Switzerland noted that its national rules differed from those in Annex 11 in particular concerning airspace classification G. It pointed out that all differences are published in the Swiss AIP and ATM manual.

3.3 Delegation of Service Provision Functions

3.3.1 Investigative focus

A key element for the creation of a single European sky is the freedom of service provision, subject to the constraints of safety regulation. Therefore, the regulatory framework should provide scope for the introduction of competition for service provision; *i.e.*, the possibility of allowing different provider organisations to tender for (and be awarded) contracts for service provision in various Member States. Although the liberalization of ATM service provision is the subject of a specific study in the context of the single European sky project, our survey sought to identify the types of bodies to whom Member States would be willing to delegate service provision tasks and the limits they

would place on the responsibility of those bodies. Within the context of service provision delegation, we asked states which entity has final responsibility for airspace design issues. We also asked states to provide us with examples of cross-border delegations currently in place.

3.3.2 Investigative findings

We have sub-divided the issue of delegation of service provision functions into two categories: delegation to a private entity and delegation to another state.

- (a) ***Delegation to an entity with private ownership (either national or incorporated in another EU Member State).*** Not much consensus was found as regards delegation to a privately owned entity (either national or foreign). Only a small number of states including for example Finland, Italy and the United Kingdom allow such delegation. The laws of states such as the Netherlands and Portugal clearly prohibit delegation to an entity with private ownership. The situation in other states is much less clear. Spain for example noted that its national laws do not address the issue. In both Germany and Switzerland, ATS provision is delegated to companies organised under private law wholly owned or controlled by the respective governments. The German government currently examines whether and to what extent German constitutional law allows the privatisation of ATS provision which is, under German law, considered a police function to be carried out by the state.
- (b) ***(Cross-border) delegation to another state or state controlled body.*** Delegation to another state or state controlled body is widely accepted. In particular, it is a long established practice between the Nordic states. However, in Austria and Germany such delegation must be based on a ratified international agreement.
- (c) ***Responsibility for design following delegation.*** In all countries that responded to our survey the competent (domestic) state authorities (Ministries of Transport or civil aviation authorities) retained ultimate responsibility for airspace design. Mechanisms are in place for consultation between the domestic or foreign service provider and the competent domestic state authority. Usually, the ATS provider is required to propose modifications of airspace design; such proposals would need the approval of the state authority.
- (d) ***Examples of cross-border delegation.*** There are a number of instances in which countries delegate ATS provision to service providers in another state. Finland delegates service provision in areas in the gulf of Bothnia and the north-west of Finland to Sweden. It delegates service provision in the very north of Finland to Norway. France delegates service provision in a portion of its airspace in the Geneva area to Switzerland. Germany has service provision delegation agreements with many countries that share its borders (e.g., Belgium, Denmark, France, Luxembourg, and Switzerland). Italy has delegated service provision functions to France, Germany/Austria, Switzerland and Malta in respect of various interfaces. The Netherlands has delegated service provision to both Germany and UK for various parts of its airspace. Portugal has a delegation agreement with Spain in

respect of certain routes. Spain, in turn, delegates service provision functions to Portugal for specific areas. In addition to bilateral delegation agreements with France, Germany and Italy, Switzerland has an agreement with France on a cross-border military training area. Belgium and France also share a cross-border military training area.

CHAPTER 4: CONCLUSIONS

The current regulatory processes at national level allow, generally, for a considerable degree of flexibility in the management and design of airspace. Although set procedures are in place in all states, the involvement of high level politics tends to be kept to a minimum. In addition, cross-border delegation is already in place throughout Europe. Guidelines for such delegation have been developed and agreed by the Eurocontrol organisation, and are contained in the Eurocontrol “Model Agreement on the Delegation of Air Traffic Services.” As a result of these findings, we can state that (from a legal perspective) once initial political backing is received, the reforms necessary to achieve the single European sky should not involve a prohibitive degree of amendment to current national regulatory regimes.

Also, the European regulatory framework should build upon the implementation of ICAO principles and rules. It can work well within the ICAO framework and achieve even greater compliance with, and more uniform implementation of, ICAO principles and rules.

PART III

REGULATORY OBJECTIVES TO ACHIEVE THE SINGLE EUROPEAN SKY

CHAPTER 1: INTRODUCTION

Reforms should respond to demonstrated market or public interest needs. In this Part of the Study, WCP and its partners examine specific areas identified by the HLG and the Commission as requiring new regulation or organisational approaches. While the findings of the chapters that follow reflect full coordination within the Team, they also represent the specific expertise of their authors who are particularly qualified to make judgments in their areas of analysis.

CHAPTER 2: OPERATIONAL AIRSPACE REQUIREMENTS FOR THE SINGLE EUROPEAN SKY

This Chapter of the Study assesses airspace requirements from the perspective of a potential European service provider with particular experience in civil-military user coordination. It concludes that European airspace is still fragmented and far from being the “continuum” called for by the HLG. Establishment of a true single European sky airspace design will require European regulatory action and attention to address deficiencies in ten areas.

Section 2.1 provides a summary description of each problem area and proposes measures to be taken. Key substantive questions of airspace management and design policy and regulation, including civil-military relations and applications of new navigational procedures, are then considered in-depth in the analysis that follows.

2.1 Overview of Action Areas and Regulatory Requirements

2.1.1 Functional airspace design

- (a) **The problem.** Airspace over the 15 EU Member States, Switzerland and Norway is divided into 39 Flight Information Regions (FIRs) and 19 Upper Flight Information Regions (UIRs). The division level between upper and lower airspace of the states is not uniform.¹¹ FIRs/UIRs in Europe are based on political borders rather than on the optimal accommodation of regional and international air traffic flows. Problems caused by congestion or bottlenecks on air routes cannot be solved in a timely and adequate manner.

¹¹ “The artificial division between Upper and Lower Airspace in some cases facilitates ATS provision, but the lack of a common division level throughout the ECAC region often leads to extra coordination procedures” (Eurocontrol Airspace Strategy for the ECAC states, Para. 5.12).

- (b) **Proposed measures.** Establishment by the European institutions of a common UIR Europe encompassing the upper airspace of the EU Member States plus Norway and Switzerland (as associated states). At a later stage, an FIR Europe that encompasses all EU airspace could be envisaged. Service provision is determined by establishing Upper Control Areas (UTAs).

2.1.2 Uniform airspace classification

- (a) **The problem.** Today's Air Traffic Services (ATS) airspace classification, as measured by ICAO standards,¹² lacks conformity and standardisation. Civil and military airspace users face disparate conditions of access to and freedom of movement within the European airspace.
- (b) **Proposed measures.** Establish a modular airspace organisation throughout the EU Member States, taking into account the Eurocontrol "Airspace Strategy for the ECAC States," including upper and lower airspace, but allowing national adaptation and local tailoring of airspace in accordance with ICAO standards, to allow maximum freedom of operation for all airspace user groups while maintaining safety.

2.1.3 Sectorisation standards

- (a) **The problem.** Sectorisation does not follow commonly agreed and binding rules. Consequently, "the stated capacities of nominally similar sectors vary significantly"¹³ and constrain capacity. Furthermore, the sectorisation at the interface between adjacent states is primarily focused on national interests rather than the demands of cross-border traffic flows.
- (b) **Proposed measures.** Establish common principles for the design of ATC sectors, including provisions for cross-border sectorisation, and development of a uniform European algorithm for the determination of sector capacities, so both design and capacity can objectively be applied and assessed. It shall be a task of the service providers to determine and publish capacity figures.

2.1.4 Criteria for the European route network

- (a) **The problem.** Today's European ATS route network is a compromise between national interests and traffic demands rather than being strategically and economically driven. Airspace capacity depends to a very high degree on the efficiency of the trans-European ATS route network.
- (b) **Proposed measures.** Establish binding criteria for the development of the European ATS route network supported by timely national implementation of lower routes and associated IFR arrival and departure procedures.

¹² ICAO Annex 11, Para. 2.6.

¹³ HLG Report, Para. 62.

2.1.5 European criteria for segregated airspace

- (a) **The problem.** The dimensions and geographical locations of segregated airspace are mostly based on a specific historical background and are not always a result of up-to-date comprehensive and collaborative civil-military planning.
- (b) **Proposed measures.** EC issuance of principles and criteria for the collaborative development, design and implementation of segregated airspace, including mechanisms for financial compensation of relocation of military training airspace. Follow up by an overall assessment and revision of segregated airspace in Europe.

2.1.6 Application of FUA concept

- (a) **The problem.** European airspace is not managed as flexibly as the Eurocontrol FUA Concept envisages and as growing air traffic demands. Target dates for implementation have not been met in some European states.¹⁴ Though they have formally committed to it, the Eurocontrol FUA philosophy has not been fully accepted by all parties concerned.¹⁵
- (b) **Proposed measures.** Establish binding EC standards for the uniform application of the flexible use of the whole airspace in Europe based on clear and easy-to-follow principles.

2.1.7 Application of efficient, flexible navigation routings

- (a) **The problem.** Trans-European air traffic is channelled through the existing fixed ATS route network. Thus, high-density air traffic flows inevitably meet at fixed crossing points or junctions of airways. This results in airspace capacity problems which can hardly be solved by the ATSPs concerned. According to the CFMU 2000 Report, a few bottleneck areas cause almost half of the total Air Traffic Flow Management (ATFM) delays in Europe.¹⁶
- (b) **Proposed measures.** Establish in law the principle that direct routings are the preferred and economical/ecological way to use European airspace. Establish pan-European airspace, initially as Random Area Navigation (Random RNAV) area¹⁷ and subsequently as Free Route Airspace (FRA) leading to spreading up European air traffic flows in the horizontal plane.

2.1.8 Organisation of civil-military cooperation in ATS provision

- (a) **The problem.** Organisation of civil-military cooperation in ATS provision differs significantly among EU Member States. Existence of separate national civil and

¹⁴ Eurocontrol Airspace Strategy for the ECAC states, Annex 8.

¹⁵ Performance Review Commission, PRR 3, Para. 8.5.13.

¹⁶ Performance Review Commission, PRR 3, Para. 6.4.1.

¹⁷ ICAO ANP European Region, Part IV ARN Paras 6.4.3 and 6.4.4.

military ATS systems and organisations can impede uniform and timely European airspace management and the implementation of changes.

- (b) **Proposed measures.** European rules, consistent with national security, should establish minimum requirements to be met by Member States. Integration, collocation, or at least system integration of the military area control services into real or “virtual” joint air traffic control centres is deemed necessary in the medium term.

2.1.9 Partnership of air defence in airspace management

- (a) **The problem.** The role of the air defence radar units, despite their being important partners of civil and military ATC in airspace management, is not adequately addressed in ECAC/Eurocontrol documents.
- (b) **Proposed measures.** Fully integrate air defence into European airspace management in all Member States.

2.1.10 Partnership of airspace management and air traffic flow management

- (a) **The problem.** Notwithstanding the fact that Airspace Management (ASM) and ATFM are, together with ATS, integral parts of Air Traffic Management (ATM), efficient European rules and procedures for interaction of ASM with ATFM, and vice versa, do not exist. This results in airspace capacity losses.
- (b) **Proposed measures.** Establish general principles and implement uniform European rules and procedures for interaction of ASM with ATFM by ECAC/Eurocontrol that provide for an open and continuous dialogue between these functions.

2.2 Establishment of an Operating Airspace Continuum

An airspace continuum can be defined as a coherent block of airspace designed on the basis of uniform principles and criteria. An airspace continuum will become an operating continuum if uniform airspace management procedures and safety standards combined with seamless ATS provision are applied.

The following four elements are considered to be essential components of an operating airspace continuum:

- Uniform high safety standards;
 - Uniform airspace design beyond national borders;
 - Uniform airspace management; and
 - Seamless air traffic management
- on a national level (civil-military ATS cooperation, ATS/Air Defence cooperation) and

- *on a European level* (coherent civil-military planning, standardised systems, trans-national procedures, *e.g.*, cross-border service provision, implementation of Reduced Vertical Separation Minimum (RVSM), RNAV, FRA).

Uniform and seamless airspace legislation/regulation throughout Europe is a prerequisite for the achievement of such an operating airspace continuum.

2.3 Airspace Concept Europe

Regulation of European airspace must be based on a clear European vision and well-defined targets. This can best be developed through an “Airspace Concept Europe” integrated into the worldwide ICAO airspace concept. Formulated by the European Regulator, it would constitute an umbrella for individual regulation. It should comprise two parts:

- Airspace design (ASD); and
- Airspace management (ASM).

2.3.1 Essential elements of European airspace design

According to agreed European policy: “Airspace design corresponds to the processes to be implemented in order to increase the capacity through the development and implementation of advanced navigational capabilities and techniques, improved ATS networks, optimised airspace structures and sectorisation and capacity enhancing ATM procedures. Airspace design involves a set of complex activities and interrelationships and forms part of the regulatory function.”¹⁸ The HLG Report, moreover, calls for a coherent airspace design and identifies the upper airspace as pan-European airspace which needs to be treated as a continuum and managed accordingly.

Beneath this pan-European airspace the HLG envisages a national structure responsive to local requirements, but compatible with pan-European planning and design.¹⁹ However, there is also a need for an airspace structure to meet demands of “regional” air traffic since these are different from pan-European and local requirements. Regional airspace, therefore, shall be implemented in addition to pan-European and local airspace layers.

¹⁸ See also ECAC Institutional Strategy for ATM, Appendix 3 Paras. 12 & 13.

¹⁹ HLG Report, Para. 40: “Airspace is a common resource and should be designed and managed as such without internal frontiers (Single European Sky). The upper airspace should be organised to ensure maximum efficiency of overflight and in consistency with the lower airspace; lower airspace is devoted more to approach and departure from airports and to flights over short distances or by general aviation. This implies that beneath this pan-European airspace there would be local requirements (local constraints, complex airport requirements), but compatible with pan-European planning and design.” HLG Report, Para. 60: “... The upper airspace needs to be treated as a continuum ... The common planning process must be capable of ensuring that an integrated pan-European airspace is developed and maintained, with due regard for national planning processes taking into account such matters as local constraints, complex airport requirements and security and defence requirements. This would result in the creation of a pan-European airspace architecture based on a common planning and network design process. Beneath this there would be a national structure responsive to local requirements, but compatible with pan-European planning and design ...”

Presently no commonly agreed division level between upper and lower airspace in Europe exists. In the majority of the European states, Flight Level (FL) 245 serves as vertical division line, but in a considerable number of states (e.g., B, F, NL, I, CH) this is FL 195.²⁰ Resulting from the progressive establishment of the trans-European “Highways of the Sky” (ARN Version 4) as part of the Eurocontrol Air Traffic Management Programme (EATMP), there are plans to raise the vertical division level in the European core area to FL 285 or 295.

The division of airspace into pan-European, regional and local airspace layers should be based on the characteristics of traffic. In this way, highly appropriate vertical division levels derived from traffic behaviour could be determined to replace the current, mostly historically-derived, levels between upper and lower airspace.

It can generally be stated that a pan-European airspace should be established where pan-European air traffic prevails. This is the case in those levels where horizontal trans-European air traffic movements (overflights) are predominant over vertical movements, *i.e.*, climbs and descents from and into airports.

Today, over-flight air traffic starts to dominate from about FL 300 upwards. It is anticipated that the performance and the flight profiles of next generation civil aircraft will not dramatically differ from those of today. In addition, most of the military air activities being performed under national or NATO auspices will continue to take place at levels below FL 300. This will principally not change, even though more frequent use of the upper airspace by new fighter aircraft (e.g., Eurofighter) can be expected in Europe.

The implementation of RVSM at and above FL 290, which is planned in the ECAC area for the year 2002, will play an important role in the final determination of the division level between pan-European and regional airspace, since it will not be advisable to split up the RVSM airspace within which a special regime (aircraft equipment) is valid.²¹

Following the principle of characterising airspace correspondent to air traffic behaviour, “regional” airspace should encompass a band of flight levels suited to accommodate short and medium haul intra-European flights, e.g., city-pairs, flights to hubs. All other airspace below shall be determined as “local” (national) airspace.

Therefore, one of the very first decisions the European Regulator would have to take is to identify the interface between pan-European, regional and local (or national) airspace. This would ease the creation of European FABs irrespective of national borders.²²

2.3.2 Upper flight information region Europe

The division of airspace into Flight Information Regions/Upper Flight Information Regions (FIRs/UIRs) in Europe is very diverse. Some countries published only a single FIR for the

²⁰ Eurocontrol Airspace Strategy for the ECAC states, Annex 8.

²¹ Taking into consideration all above-mentioned aspects, FL 285 appears to be an appropriate division level between the European upper and lower airspace.

²² For further definition of the FAB concept, see Part III, Chapter 6.

entire lower and upper airspace (A, DK, B/Lux, NL, GR), some implemented single FIRs/UIRs (CH, IR) and others divided their airspace into several FIRs and/or UIRs (D, F, GB, S, FIN, I, SP, P, N). Currently, there are 39 FIRs and 19 UIRs in the Member States, Norway and Switzerland.

ICAO recommends that “the delineation of airspace, wherein air traffic services are to be provided, should be related to the nature of the route structure and the need for efficient service rather than to national boundaries.”²³ ICAO recommends furthermore “that states, taking into account the need for cost-effective introduction and operation of CNS/ATM systems, give consideration to co-operative efforts for introducing more efficiency in airspace management, particularly through globalisation of upper airspace management, in order to facilitate the safe, orderly and expeditious flow of air traffic.”²⁴ Thus, ICAO encourages the implementation of a globalisation concept for the establishment of FIRs, especially in relation to upper airspace.²⁵

A common UIR encompassing the upper airspace of the EU Member States, Norway and Switzerland and managed as a continuum would allow European planning to overcome regional bottlenecks. Full exploitation of the advantages of such a UIR can be obtained if non-EU states along the main European traffic flows also join the initiative. The European Regulator would assume ultimate responsibility for establishing an upper airspace continuum where responsibility of the ATSPs would be delineated by respective Upper Control Areas (UTAs) that are designed irrespective of national borders. The design of UTAs should be taken as a unique opportunity to establish FABs as large cross-border areas wherein control responsibility is assigned to one ATSP or a group of ATSPs. This provides for a more efficient use of airspace, systems and manpower, thus reducing costs for airspace users. At the same time, uniform and coherent upper airspace planning should be harmonised with the developments in the lower airspace. Thus, it will be essential to develop overall principles and criteria which can be easily accepted and adopted by states.

As an important measure, it should be considered as a next step to establish FABs in regional airspace below upper FABs or separate where appropriate to solve cross border problems for medium haul intra European traffic.

The implementation of a UIR Europe would stipulate/challenge a more widespread application of cross-border service provision and consequently foster regional cooperation of service providers, leading to joint ventures or multi-national upper area control centres (UAC). (See also Chapter 6 below).

At a later stage, a single FIR Europe that encompasses lower and upper European airspace could be envisaged.

This would ease the implementation of uniform airspace management and design especially in regional airspace, benefiting intra European short and medium haul air traffic.

²³ ICAO Annex 11 – Air Traffic Services, Para. 2.9.1.

²⁴ ICAO Basic ANP, Appendix A, Para. 5.1.

²⁵ ICAO Report of the Third Caribbean/South American Regional Air Navigation Meeting, Buenos Aires, Para. 5.2, October 1999, Doc 9749.

2.3.3 ATS airspace classification/new traffic environment

At present, each European state applies its own principles of ATS airspace classification, so there is almost no compatibility.²⁶ Disparate conditions of access and freedom of movement of civil and military airspace users result. While the upper airspace in most countries is classified either entirely or largely as controlled airspace (airspace classes A, B or C), differences are more evident in the lower airspace, where considerable portions of the airspace are uncontrolled (class G, open FIR).

To overcome these long recognised problems, Eurocontrol has developed the “Airspace Strategy for the ECAC states.”²⁷ Among other things, it proposes a “Traffic Environment Model” for adoption throughout Europe which would replace the existing seven ICAO ATS airspace classes from A to G by the year 2010. A step-by-step approach for the realisation of ultimately two airspace categories (intended and unknown traffic environment) is foreseen by 2015.

The concept of the new traffic environment has not yet reached maturity, since details have still to be worked out. It is not yet clear how the type of ATS service provided within a given block of airspace will be made known to the user, especially to the user flying according to visual flight rules (VFR), and how differentiation within the environments unknown (U), known (K) and intended (N) or, at a later stage, U and K can be made in order to define the necessary adaptations of local requirements.

However, it appears feasible as a first and important step to make the transition to a harmonised, simplified airspace organisation by (i) uniformly implementing ICAO ATS airspace classification; and (ii) simultaneously reducing the number of airspace classes to a defined standard set. Thus, following Eurocontrol strategy, the upper airspace and large parts of the lower airspace could be classified as class C (where flights according to instrument flight rules (IFR) and visual flight rules (VFR) are subject to ATC clearance). This would correspond to the “N” environment of the ECAC Airspace Strategy.

Below and outside class “C” airspace down to a level above ground to be specified, a European layer of airspace class “E” should be established which nearly corresponds to the “K” environment. Then, from the ground up to the lower limit of class “E” airspace, a European layer of class “G” airspace would exist which would correspond to the “U” environment (see Figure 1). In this context, the current airspace organisation in Germany might serve as a reference model since it represents a clear and easy to understand pattern of a few airspace classes (see Figure 2) that allows maximum exploitation of the available airspace for IFR flights while leaving freedom for VFR flights to operate.²⁸

[See following pages for Figures 1 and 2]

²⁶ Greece has not yet introduced airspace classification.

²⁷ ASM.ET1.ST03.4000-EAS-01-00, Edition 1.0, Edition Date 18/01/01.

²⁸ It corresponds widely with figure 5 of the Eurocontrol Airspace Strategy.

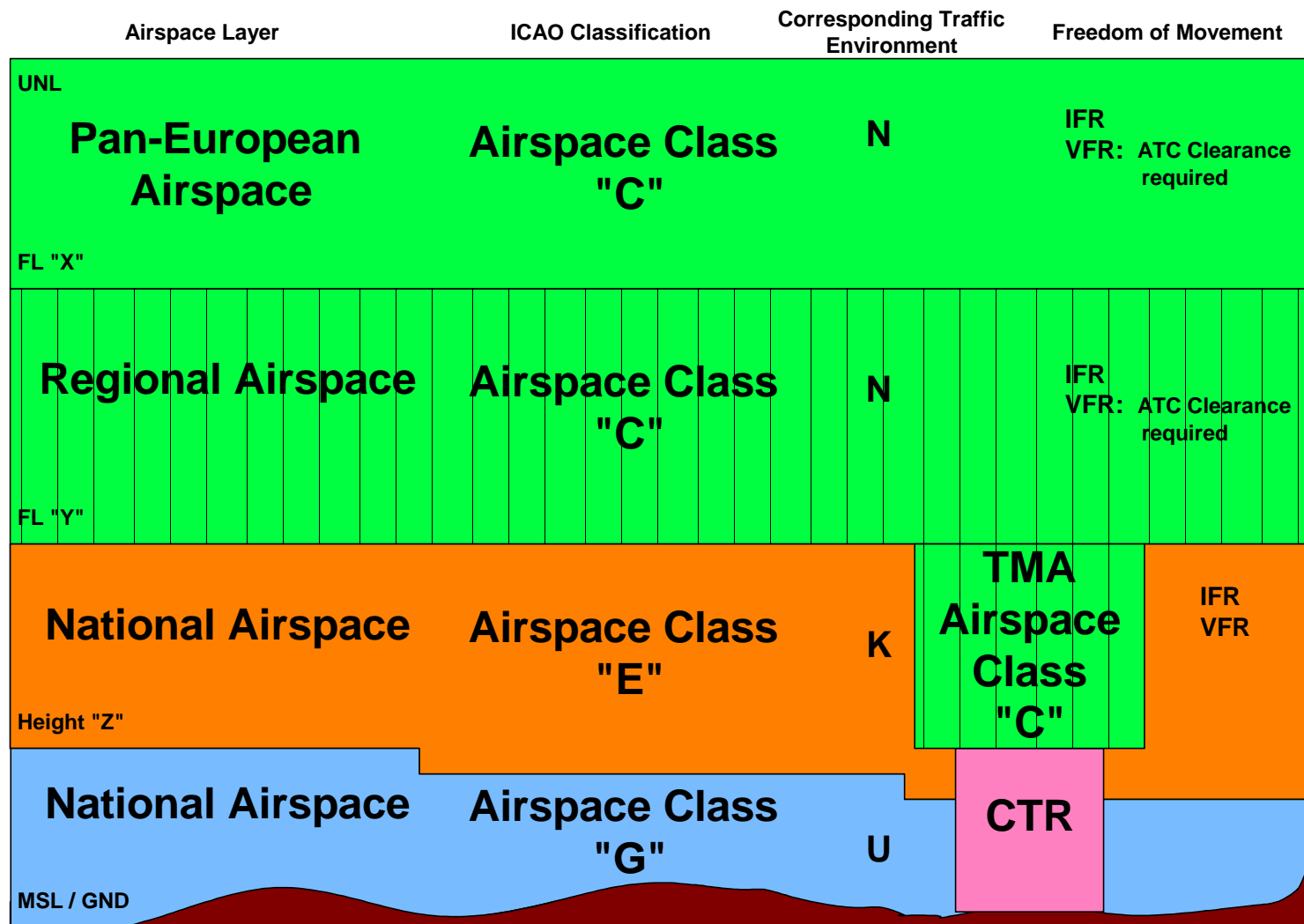


Figure 1: European Airspace Layers

Harmonised and Simplified Airspace Organisation (Proposal)

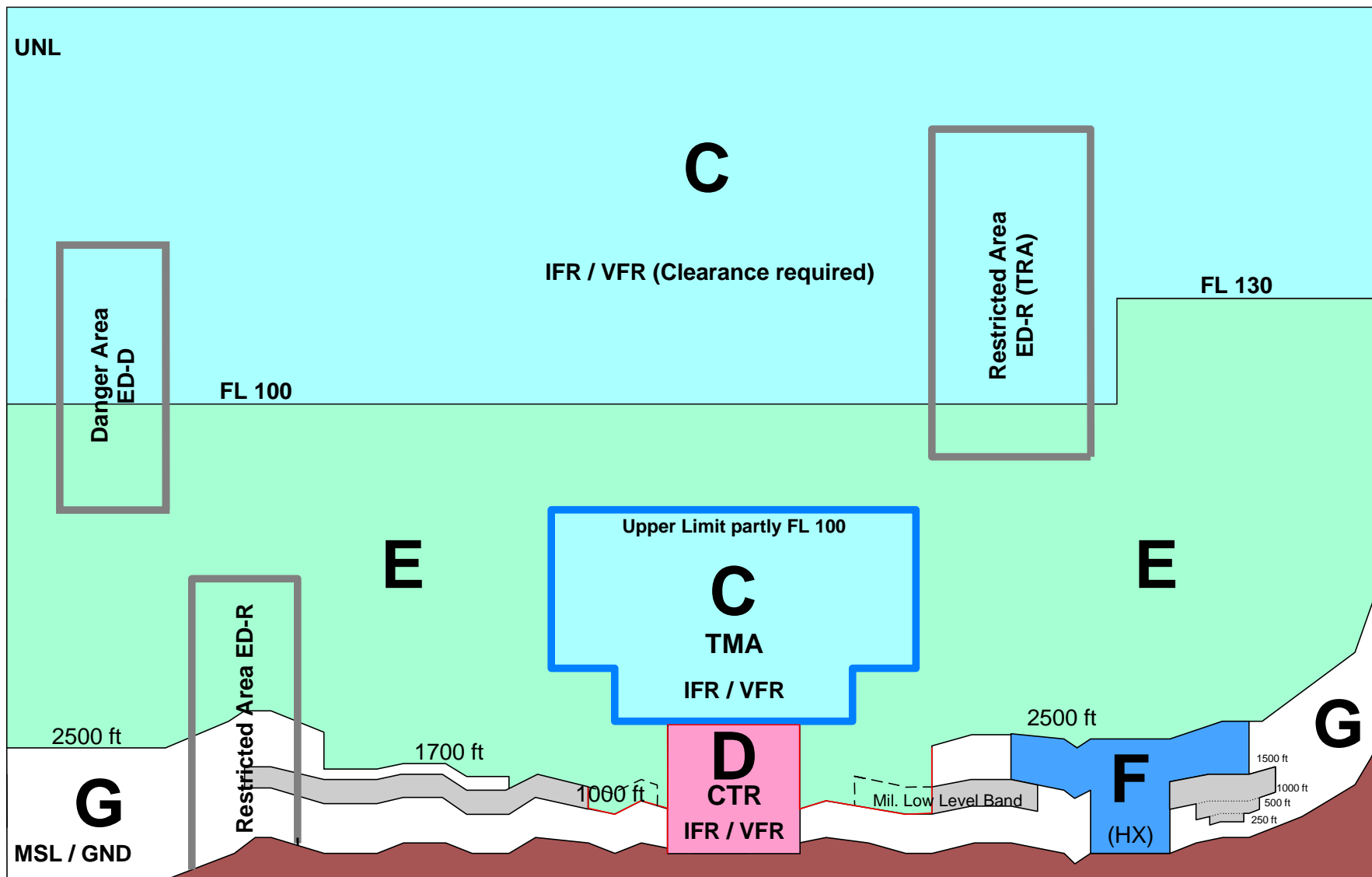


Figure 2: Airspace Structure
Federal Republic of Germany
ICAO Classification

The European Regulator should establish standard pan-European, regional and local airspace elements through uniform regulation of applicable airspace classes in European airspace from ground to unlimited, since airspace as such is a continuum. This task is complicated and difficult. However, problems could be solved by a European regulatory approach.

Within the general requirement for uniform classification, detailed design of regional and local airspace should be left to states/ATSPs. Classification involves determining the ATS services to be rendered and the degree of freedom of VFR flights. Generally applicable principles and criteria for the establishment, modification and cancellation of airspace, especially in the vicinity of IFR airports, should be determined while taking account of the interests of the various user groups.

The Eurocontrol "Airspace Strategy for the ECAC States" highlights that "it is necessary to establish within each State joint objective criteria for the design of airspace and to develop a modular airspace organisation using new or adapted flexible airspace elements which would ultimately be dynamically allocated in accordance with agreed criteria."²⁹ In a single European sky, these criteria could be established uniformly for all EU Member States by the European Regulator.³⁰

2.3.4 ATS route network (ARN)

Airspace capacity in Europe depends to a very high degree on the efficiency of the trans-European ATS route network.

Since there are strong interdependencies between route network, instrument arrival and departure routes to and from airports/aerodromes and sectorisation, the planning of the European ATS route network shall be accomplished in a collaborative process between ICAO, Eurocontrol and the national ATSPs concerned. Eurocontrol should continue to coordinate this route network development activity. However, the endorsement of the overall European ATS route design and its implementation should rest with the European Regulator in order to overcome individual national or ATSPs interests. Therefore, the European Regulator should establish binding criteria for the development of the European ATS route network.³¹

Currently, the planning and implementation of new routes is a lengthy and burdensome exercise. The task of implementation and maintenance of a pan-European ATS route network lies beyond the ability of individual EU Member States. As a member of Eurocontrol, the EC, with the power of its Member States, should contribute to improved and quicker planning and implementation, together with ICAO and non-EU member states of Eurocontrol.

²⁹ Eurocontrol Airspace Strategy for the ECAC states, Para. 6.6.1.2.

³⁰ For this purpose, the Catalogue of Criteria for the Establishment of Airspace issued by the Federal Ministry of Transport, Building and Housing of Germany may serve as an example; *see* Annex 2.

³¹ These criteria could basically be derived from "Concept and Criteria for Medium Term EUR Route Network and Associated Airspace Sectorisation." Eurocontrol, EATMP ARN Version 4, dated 12.10.00

2.3.5 ATC sectors

Air traffic control in area control centres (ACCs) and approach control offices (APPs) is currently organised on the basis of sector structures. The main reason for the division of the airspace into sectors is to ensure that the traffic amount a controller has to handle at any given time never exceeds his/her control capacity. "Sectorisation is the means of subdividing the totality of control tasks into manageable portions, at which throughput and capacity can be quantified."³²

Position and dimensions of a sector depend on a variety of complex and interdependent factors, such as ATC systems in use, functionalities, system support and associated operating concepts of the ATS providers, international and local ATS route network, civil-military cooperation and coordination, complexity and density of air traffic, working methods of ACCs and APPs, *etc.* Therefore, the implementation of new sectors and determination of sector design are dependent on operational needs and should principally be left to the ATSPs.

In Europe, however, the sectorisation of airspace does not follow commonly agreed and binding rules. Consequently, "the stated capacities of nominally similar sectors vary significantly and the system is far from optimum,"³³ and "at present many of the constraints in the ECAC ATM system are caused by a lack of adequate sector capacity."³⁴ Furthermore, the sectorisation at the interface between adjacent states is, in general, primarily focused on state territories and national interests and secondly on the demands of international air traffic.

It should be the role of the European Regulator to establish common principles for the design of ATC sectors, including provisions for cross-border sectorisation, and to establish an algorithm for the determination of sector capacities so that both design and capacity can objectively be applied and assessed. It shall be a task of the service providers to determine and publish capacity figures.

Furthermore, consideration should be given to developing modular sector configurations responding to varying traffic flows (daily/seasonal).

2.3.6 Segregated airspace structures

General air traffic (GAT) and operational air traffic (OAT) have different requirements concerning the use of airspace whose nature is incompatible in many respects.

To protect national security interests and defence needs, the performance of military training flights and exercise of specific operational procedures is indispensable. As a consequence, the availability of adequately sized training airspace is a prerequisite for maintaining the operational readiness of the military air, sea and ground forces.

³² Eurocontrol Report on ARN Version-3 Development Process.

³³ HLG Report, Para. 62.

³⁴ Eurocontrol Report on ARN Version-3 Development Process, A.2.1.

Furthermore, there is a need for military authorities to have at their exclusive disposal airspace for weapons testing, missile firing, bombing, gunnery, *etc.*

Segregation of portions of the airspace is mandatory to allow special use of the airspace and to separate/protect aviation from special military airspace activities. Consequently, segregated airspaces are implemented over all Europe. They comprise prohibited areas, restricted areas, danger areas (over the High Seas), and temporary segregated airspace (TSA). In the upper airspace of Europe, there are currently more than 500 segregated airspaces (of which more than 10% are permanently excluded from general use (see Table 1 below)). In the lower airspace, the situation is even more complex.

**Table 1 Segregated Airspace in the Upper Airspace of Europe
 (according to National AIPs)**

Identification Area	2
Prohibited Area (P)	7
Restricted Area (R)	95
Danger Area (D)	203
Temporary Segregated Area (TSA) <ul style="list-style-type: none"> • 92 in Finland [active when published by NOTAM] • 27 in France [active 24H] 	128
Air to Air Refuelling Area [in UK]	8
Military Exercise and Training Area [in UK]	4
Cross Border Area (CBA)	8
Temporary Reserved Area (TRA)	34
Military Exercise Area [Air Defence Exercise Area in Germany]	9
C-Area [C-Areas only in Greece]	3
Training Area [in Switzerland, used civil-military]	26
Sum	527
Active 24H	70

The airspace established for military purposes will not always allow an unrestricted air traffic flow. On the other hand, the training airspace available to the Armed Forces is limited by the existing ATS route network. In Europe, agreed criteria for the establishment of segregated airspace as regards comparable dimensions and geographical positioning are

lacking. This results in historically implemented airspace structures which are not tailored to today's demand in Europe either for military or civil aviation.

The most adverse effect on the flow of general air traffic in Europe, however, stems from the absence of coherent national and international planning for an optimal regional civil-military establishment of segregated airspace.³⁵ Central civil-military planning is essential to initiate a complete assessment and revision of geographical positions, dimensions, hours of operation of segregated airspace in Europe.

A corresponding Europe-wide initiative needs to be taken by the European Regulator to issue principles for the design and implementation of segregated airspace which would serve as a basis for the above-mentioned revision.

These principles, elaborated in a collaborative European civil-military process, should set rules for the determination of horizontal and vertical extensions of such airspace and the general distance they could be located away from military airbases using the areas. Thus, for comparable military activities or weapons, comparable dimensions of segregated airspace would exist in Europe (same platform, same weapon, same airspace) and, within this framework, the implementation of cross-border training areas and the possible relocation of military activities has to be encouraged.³⁶

Furthermore, segregated airspace shall be subdivided into functional elements enabling an activation of airspace tailored to the actual demand of military traffic. Additionally, the military can respond to civil air traffic requirements by activating or closing relevant TSA segments.

In addition, the European Regulator should explore ways to offer incentives/subsidies for states to realign/relocate military training activities.

A good target case to tackle early could be to elaborate solutions to the extreme capacity constraints imposed on civil air traffic flows in the area 100 NM around Nattenheim VOR (NTM) -- interfaces France/London and France/Brussels and France/NTM. The problems associated with channelling rapidly growing large volumes of civil air traffic into corridors created by the position of military training areas in Belgium, France and Germany could not be solved in the last decade (see Figure 3). Without a new impetus there will be no adequate solution found. Therefore the European Regulator, working together with the expertise and resources of Eurocontrol, should start a new initiative.

[See next page for Figure 3]

³⁵ The situation of the high-density air traffic area between Benelux, France, Germany and Great Britain may serve as typical example. Eurocontrol, ANT/24, WP 9, Map 1 (Figure 3).

³⁶ HLG Report, Para. 72.

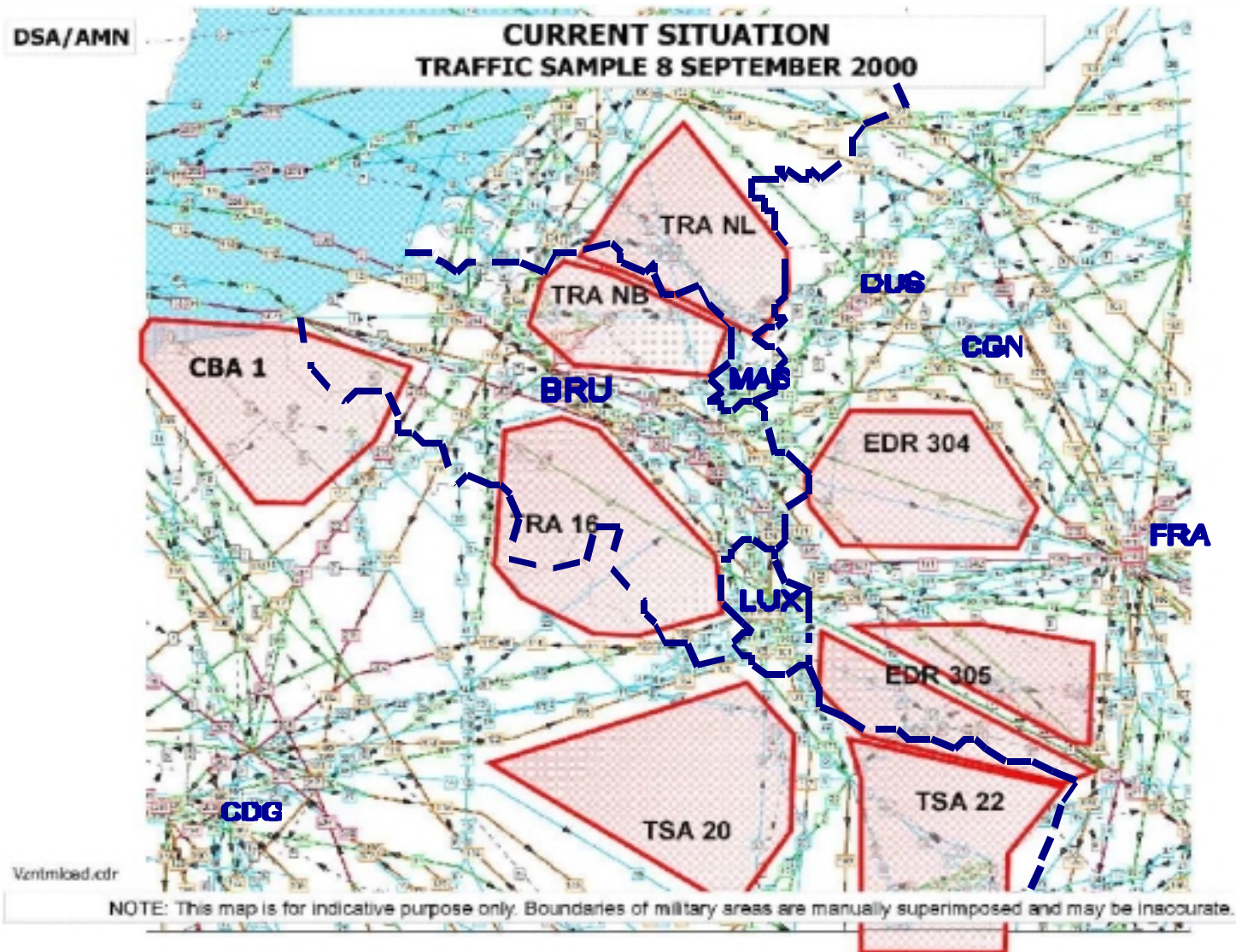


Figure 3: Military Areas

2.4 Essential Elements of European Airspace Management

As defined by Eurocontrol: “Airspace Management (ASM) is a generic term covering any management activity provided for the purpose of achieving the most efficient use of airspace based on actual needs and, where possible, avoiding permanent airspace segregation.”³⁷ This Section discusses its essential elements.

2.4.1 Flexible use of airspace

A single European sky requires the optimal sharing of airspace between the various users, especially civil and military. Due to the high number of segregated airspaces and the density of the ATS route network in Europe, optimised joint use of airspace requires dedicated airspace management.

The Eurocontrol FUA concept, both supported by the NATO Committee for European Airspace Coordination (CEAC) and endorsed during the Meeting of the European Ministers of Transport (MATSE/4) in 1994, is the only known concept to date which is capable of realising the establishment of the airspace as one continuum, so that it is no longer considered as either civil or military.

Through the introduction of the FUA concept, the flexibility of airspace use can be increased, thereby offering additional capacity to the air traffic system. FUA is based on three levels of ASM:

- Strategic ASM Level 1 – Establishment of national airspace policy and structures through a high-level civil-military national body;
- Pre-tactical ASM Level 2 – Day-to-day allocation of airspace through one or more civil-military national Airspace Management Cell(s) (AMC); and
- Tactical ASM Level 3 – Real-time use of airspace through putting the FUA into practice in everyday flight operations by close cooperation between all parties involved, *i.e.*, civil and military ATC, aircraft in flight, military units.

The FUA concept has not yet brought about the expected and required results. The reasons for this are manifold and complex:

- Implementation of the FUA is behind schedule. A number of countries have not yet completed or have not even started implementation of phase 1, which comprises, among other things, the establishment of civil-military Level 1 (high level) and Level 2 (AMC) bodies and the translation of the FUA into a national plan as agreed between civil and military authorities. Some states have not yet introduced Level 3 civil-military coordination³⁸ so that, in Europe, the overall output from FUA is practically lower than

³⁷ Eurocontrol EATCHIP ASM Handbook, Explanation of Terms.

³⁸ “... In France, some TSAs are located in dense traffic areas, which in the absence of real time coordination, creates significant difficulties for civil air traffic.” (Performance Review Commission, PRR 3, Para. 8.5.8).

intended, in spite of significant results in some states which have successfully implemented the full FUA concept.

- The FUA, where implemented, is not applied uniformly. Different philosophies for its application exist in various countries. In some states, there are priority rules for the use of segregated airspace, in others there are no such rules. In some states, military training areas are not published, so they do not have the status of TSAs. In some countries, penetration of activated segregated airspace is possible, whereas in others it is strictly prohibited. In some countries, segregated airspace are principally registered as active during their published hours of operation regardless of the real military demand, *etc.*
- Although nearly all of the numerous Restricted and Danger Areas in Europe are not used continuously 24 hours a day, they are presently not all subject to flexible use. As a result, available airspace capacities cannot be used.

In addition, there are inherent weaknesses and deficiencies within the FUA concept, reducing its potential results:

- Level 2/3 procedures and tools that will enable actual allocation/segregation as close as possible to real-time usage of TSAs have not yet been established. “There is now a need to move closer to the times of operations allowing first a more accurate planning and later on a dynamic airspace allocation.”³⁹
- The use of Conditional Routes 2, which have been regarded as the most powerful tools in FUA, is only marginal⁴⁰ due to slow and laborious activation and publication and due to the lack of consistency with ATFM, that may lead to confusion.⁴¹ The inability of airlines to generate dynamic flight plans also contributes to the overall deficiencies.
- In the mechanism foreseen for booking of segregated airspace by military users, no due account is taken of the unpredictable nature of military operations, which are dependent on weather conditions. TSAs that have not been booked the day before are, principally, not available to the military on the day of the event if there is an unforeseen and urgent need for training airspace. Consequently, there is a tendency on the military side to make precautionary bookings, in order to ensure the availability of training airspace at any time. The result of this is that the expected increase of flexibility and capacity in airspace use is not achieved.
- Furthermore, it is considered very difficult, if not impossible, to balance civil demand on airspace, which is based on actual and predicted traffic figures, against military

³⁹ Eurocontrol Airspace Strategy for the ECAC states, Annex 6, Para. 8.6.1.8.

⁴⁰ “A Eurocontrol survey ... showed that, in the last three years, less than 50% of the potential users made use of conditional routes in flight planning. It can be concluded that, when open, CDRs are not used effectively by civil traffic” (Performance Review Commission, PRR 3).

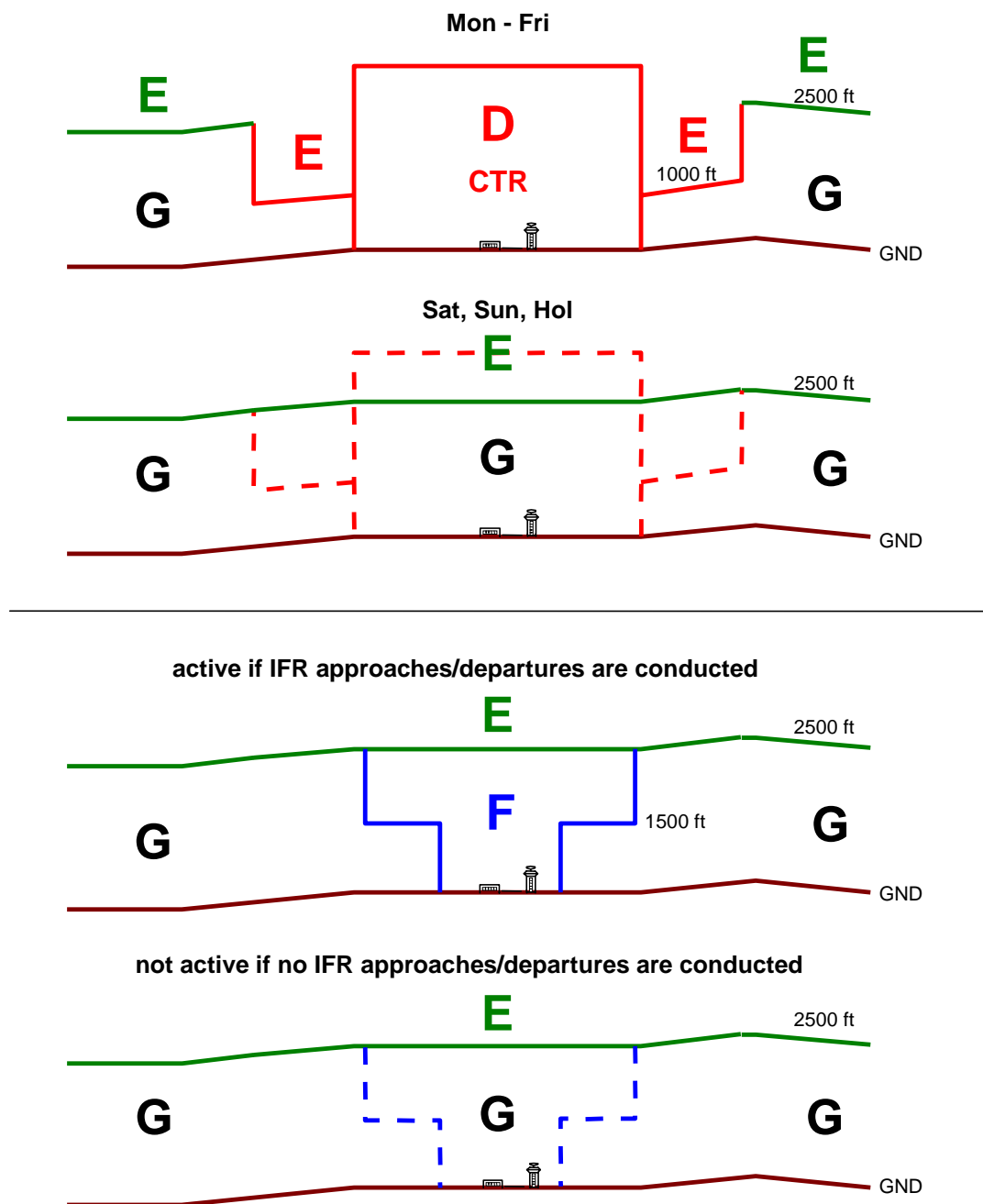
⁴¹ “In case of a flight having an ATFM slot such that the CDR 2 cannot be flown, the flight plan shall be changed so as to use an available ATS route. It should be noted that the revised FPL may result in a revised ATFM slot” (Eurocontrol EATCHIP ASM Handbook, Para. 4.6.2.8).

training needs and national security interests, which by nature cannot be expressed in figures (e.g., the question whether 60 or 100 or more GAT flights per hour are more important than one military exercise with one, two, three or more fighter aircraft during the same time cannot be answered satisfactorily). The civil-military negotiation process proposed in the present ECAC FUA concept needs to be modified to apply simple and automatic procedures. They should be based on mutual understanding and consideration of the different needs, on mutual confidence, free of any reservations and on clear priority rules.

- Air Defence is not addressed in the Eurocontrol FUA Concept.
- Currently, the Eurocontrol FUA is applied to the upper airspace. There is no practical reason for this restriction since FUA can also be applied in the lower airspace, following the same principles. The only management tool to be added will be “dynamic airspace classification” in the vicinity of certain airports and aerodromes⁴² (see Figure 4).

[See next page for Figure 4]

⁴² In Germany, terminal airspace has long been subject to flexible use. For this purpose, so called HX airspace has been established. Consequently, Control Zones (CTR), including the corresponding classes of surrounding airspace, of aerodromes that are not permanently in use (e.g. military aerodromes on weekends) are not permanently active.



*** Airspace concerned**

Control Zones (Airspace "D")

- of most military and some civil aerodromes
- generally not active Sat, Sun, Hol

Parts of Airspace "E" with Lower Limit 1000 ft/1700ft

- in the vicinity of the above mentioned aerodromes
- generally not active Sat, Sun, Hol

Airspace "F"

- in the vicinity of uncontrolled aerodrome with IFR flight operations
- not active when no IFR approaches/departures are being conducted

Figure 4: Flexible Airspace Classification (HX) in Germany*

- Statistics about hours of operation versus booking times and times of real usage of segregated airspace are not mandatory in the FUA. However it should be envisaged to establish a sound statistical database in order to make airspace management transparent to airspace users and ATSPs. It also will be beneficial for booking agencies to base their needs on actual demand. The armed forces need training in segregated airspace and cannot therefore allow general access to TSAs. However this airspace is in most cases only needed for relatively short periods spread throughout the day.⁴³

The very diverse interpretation of the Eurocontrol FUA philosophy and the current disparate situation as regards its implementation in Europe clearly highlight the absence of uniform regulation and enforcement powers in Europe. In order to facilitate a uniform and optimal application of the flexible use of airspace, the European Regulator should issue standards for the application of the FUA in EU Member States based on the following principles:

- *Uniformity.* EU Member States shall implement FUA applying the same principal rules according to an agreed time scale. Improvement measures shall be introduced uniformly at the same dates.
- *Completeness.* FUA shall be applied within upper and lower airspace of Member States. With the exception of Prohibited Areas, all airspace structures shall be subject to flexible use.
- *Confidence.* Neither the civil nor the military side shall put into question demands on airspace utilisation. Opening or closure of segregated airspace will be negotiated according to agreed procedures.
- *Priority.* Allocation of published training airspace to military users shall have priority over civil users, so that the armed forces can use all airspace established for military purposes whenever they need to. Thereby, account shall be taken for the unpredictable nature of military operations.⁴⁴
- *Consideration.* The military shall undertake to automatically open all training airspace to other airspace users in periods when no military activity is taking place or expected or planned. In view of the military priority status with respect to the utilisation of military training areas, military users have to be considerate towards their civil partners. They are under obligation to agree to AMC requests for changing their

⁴³ Statistics made in Germany in 1996 and 1997 showed that, on average over the day, upper TSAs were booked for approximately 20% and lower TSAs for approximately 40% of the time of published hours of operation. Similar results were identified when studying an overview of French TSAs usage of September 1999.

⁴⁴ "A major aspect of the concept is the common civil-military understanding, that in the assignment of published training airspace the military users will be given priority over civil users. Units submit their demand for utilisation one day in advance and are given the right of reassignment on the day of the event in case of unforeseen and urgent requirements limited to individual well-justified cases. Thus flying units will always be in a position to use training airspace if needed, so avoiding preventive TSA booking" (HLG, Civil-Military Use of Airspace Sub-Group Report, Para. 4.3).

airspace activities in favour of civil air traffic in case of heavy demands, provided this is not seriously detrimental to their training or mission objectives.”⁴⁵

- *Sharing.* Transition of activated TSAs by GAT shall be enabled in all cases where this is not detrimental to military operations and to safety. Military or civil units responsible for monitoring or control of military traffic within TSAs shall be capable and authorised to provide separation to GAT in order to ensure that, after prior coordination with ATC, transition of segregated airspace is possible.
- *Simplicity.* FUA Procedures should be simple and easy to apply by controllers and airspace users in order to achieve full use of the FUA measures.
- *Transparency.* AMCs shall collect statistical data on booking in terms of times and level bands as well as the real usage of TSAs, in order to provide adequate information for analysis, assessment and decision making.

In sum, efforts need to be undertaken for the further development of the European FUA Concept by:

- Creating efficient level 2/3 tools and procedures to operate as closely as possible to real time in order to efficiently support ATFM;
- Simplifying and encouraging the planning of CDR 2;
- Establishing standards for the collection, preparation and evaluation of comparable statistical data on the use of segregated airspace;
- Introducing binding priority rules;
- Replacing the currently foreseen negotiation process in favour of automatic processes based on rules of confidence and consideration;
- Making FUA an irrevocable principle for all European airspace; and
- Including air defence into the overall FUA concept.

2.4.2 Civil-military ATS cooperation in airspace management

Efficient use of airspace can only be realised if seamless and efficient ATM is provided within national airspace and beyond. ASM is one of the main functions of ATM. Civil and military ATSPs are complementary partners in the ATM system. FUA and European airspace management, therefore, will not be as efficient as required without operational and technical interoperability between civil and military ATS.

Across the EU, civil-military air traffic service provision is not organised uniformly. While local ATC (Tower, Approach Control) at and around airports or military aerodromes is

⁴⁵ HLG, Civil-Military Use of Airspace Sub-Group Report, Para. 4.4.

generally provided by the respective civil or military organisation, the control of civil and military enroute air traffic and traffic in terminal control areas (TMAs) is organised very differently.

In EU Member States, the following civil-military ATS environments can be identified:

- Integrated area control service and centralised approach control service for civil and military air traffic is executed uniformly from the same control facilities by one civil organisation (D, DK, FIN, S). National airspace management is based on uniform principles and procedures.
- Collocated (national) area control service and centralised approach control service is executed by separately managed civil and military organisations using the same control facilities and the same system. Civil and military controllers work side-by-side (A, I, PO) or in different or the same control suites (UK West Drayton/Scottish). National airspace management is based on common principles and procedures.
- Collocated (international) cross border area control service provision is executed from a multinational civil control centre managed by a civil organisation and hosting a military ATC unit using the same facilities and the same system. Civil and military controllers are working in the same operations room. Airspace management is achieved by the international organisation operating the control centre (Maastricht UAC) following national regulations for the airspace concerned.⁴⁶
- Virtually collocated area control service and centralised approach control service is executed by separate civil and military organisations from separate control facilities. However, by system connection/integration they operate in a virtual collocated environment (NL).⁴⁷ National airspace management is based on agreed principles and procedures.
- Separate area control service and/or (centralised) approach control service is executed by separate civil and military organisations using separate control facilities and separate technical systems (B, F, GR, SP). National airspace management is based on agreed procedures.

Undoubtedly, an integrated environment is, in principle, the most flexible one that allows a timely operational and system-related adaptation to changing demands of civil and military air traffic. Here, the balance between competing civil and military requirements is achieved within one organisation that has taken over responsibility for both civil and military air traffic services provision.

A collocated or virtually collocated environment may bring about nearly the same efficiency in ASM as in an integrated mode, provided the level of cooperation between civil

⁴⁶ Until 1997. Thereafter, the military unit was integrated into DFS.

⁴⁷ Gradually, full system integration is envisaged in NL so as to operate from a common virtual control centre.

and military ATS organisations is high.⁴⁸ Reaction to changing demands and adaptation or modernisation of systems, however, require consensus between the civil and the military organisations, which may not be easy to achieve, since different organisations may have to cope with different budgetary conditions and allocation of costs or may have diverging interests.

In separated ATS environments, the level of cooperation between civil and military ATS organisations depends not only on the technical systems in place for coordination and the interaction in airspace management but also on the degree of competition for airspace. “In some countries this system works very satisfactorily for the overall community. However, in some countries with separate civil and military ACC/ATCC, the direct civil-military coordination has not yet advanced to this level and urgently needs to be adapted.”⁴⁹

It can be noted that a single European sky cannot be established as long as national skies are not managed uniformly or jointly by their civil and military ATS organisations.

States should be aware that the rapidly growing civil air traffic will demand a higher degree of closely coordinated or integrated civil and military ATS provision. Civil-military service within the same airspace should be provided by the same ATC facility as far as possible. Integration, collocation, or at least system integration of the military area control services into real or virtual joint air traffic control centres is deemed necessary in the medium term.

For obvious reasons, an integrated or collocated civil-military ATS environment can provide the best platform for a single national sky which is a prerequisite for a single European sky. It bears the best potential to respond to the growing demands of civil and military aviation.⁵⁰ Clearly, there is an optimum civil-military organisation which can come close to fully satisfying both civil and military needs. Further Studies are needed in this area.⁵¹

⁴⁸ If, due to competition, the level of cooperation between separate civil and military ATS organisations is low, the level of efficiency in ASM, despite of collocation, is also low. *E.g.*, in Germany, regional military ATC was collocated to civil ATC (except Munich and Frankfurt ACCs) for many years before being integrated into DFS in 1993. Before the integration, fundamental problems between civil and military organisations in Germany made progress in ASM very difficult.

⁴⁹ “In some countries this system works very satisfactorily for the overall community. However, in some countries with separate civil and military ACC/ATCC, the direct civil-military coordination has not yet advanced to this level and urgently needs to be adapted” (HLG, Civil-Military Use of Airspace Sub-Group Report).

⁵⁰ “The emerging traffic situation with the need to satisfy the defence needs call for a closer relationship between civil-military air traffic control organisation through the effective application of direct coordination between civil and military controllers. Furthermore, in order to improve the coordination in ATM matters without boundaries constraints it might be very useful to promote the evolution of the national civil military organisation in Europe towards a similar and harmonised organisation to enhance the cooperation at the same level of responsibility” (HLG, Civil-Military Use of Airspace Sub-Group Report, Para. 6, Conclusions).

⁵¹ Performance Review Commission, PPR 3, Para. 8.5.13.

2.4.3 Cooperation of ATS/air defence in airspace management

The HLG found that “Notwithstanding the configuration of air traffic control organisations, each nation retains a separate air defence organisation with interfaces with the civil and/or military ATC units as appropriate.”⁵²

Air defence plays an important role in airspace use and airspace management in Europe. Thus, training or operational missions within all parts of national airspace as well as military operations in segregated airspace are frequently performed under the responsibility and control of air defence radar units. Close coordination with the ATC units concerned by means of automatic data exchange and dedicated direct telephone connections is a prerequisite.

While due account is taken of the role of Air Defence as partner in airspace utilisation and airspace management in national regulations (through legislation, Letters of Agreement, *etc.* as well as NATO documents), this relationship is not adequately addressed in relevant ECAC/Eurocontrol documents. For example, the EATCHIP FUA Concept does not refer to air defence.

A European Regulator should initiate the integration of air defence into European airspace management.

The necessity for this can be derived from the following: in day-to-day business, the access of segregated airspace for civil air traffic on a tactical basis (level 3) is paramount for an optimal use of the airspace. However, with the exception of a few countries (*e.g.*, D, UK and S), air defence controllers are not trained or authorised to provide radar or vertical separation to GAT transiting segregated airspace under the control of ATC. Therefore, in most of the states crossing of active segregated airspace by GAT on a tactical basis (level 3) is not practiced when air defence is exercising control. As a result tactical ASM level 3 cannot be applied whenever air defence is involved.

2.4.4 ASM/ATFM interrelation

ASM is an integral part of ATM and can only function in interrelation with ATS and ATFM.⁵³ In the overall relationship between the three elements, ASM and ATFM are most sensitively linked to each other. ASM is needed to address and balance airspace demands of differing airspace user groups. ATFM is based on the airspace capacity available; thus, ASM supports ATFM through airspace allocation. Whilst ATFM and ASM shall not become a merged function, they must maintain an open and continuous dialogue.

⁵² HLG, Civil-Military Use of Airspace Sub-Group Report, Para. 6.1.

⁵³ In order to achieve an ECAC-wide improvement in airspace use, the link between ASM and ATFM has to be harmonised at all the three levels. The benefits resulting from the introduction of the FUA Concept will only materialise if ATS, ASM and ATFM procedures and timetables are compatible” (EATCHIP ASM Handbook, Para. 6.1.1.3).

ATFM is decisive for the functioning of the overall air transport system and is needed to accommodate the demands of General Air Traffic. OAT, due to its characteristics cannot be subject to ATFM. ATFM must be managed by a pan-European body.

ASM and ATFM are (together with ATS) integral parts of ATM. However, the interaction between ASM and ATFM, and *vice versa*, does not yet allow for the necessary linkages between the different levels of coordination of the FUA Concept (Level 2/3). Such interaction is of utmost importance for day-to-day operations of European aviation and for a full use of available capacities.

Both airspace management and air traffic flow management are operational issues; they form part of the service provision and a regulator should not directly interfere with them. However, due to the fact that ATFM is not only a national but also a European task that is closely interrelated to ASM, a European Regulator should provide for the general principles and implementation measures of ASM and ATFM.

2.4.5 Free Route Airspace (FRA)

Trans-European air traffic is channelled through the existing fixed ATS route network. Thus, high-density air traffic flows inevitably meet at fixed crossing points or junctions of airways. This results in airspace capacity problems which can hardly be solved by the ATSPs concerned. Presently, a few bottleneck areas cause almost half of the total ATFM delays in Europe.⁵⁴

Achieving more airspace capacity by conventional approaches to adapt route structures and ATC sectors is limited. Therefore, new approaches to enhance capacity and increase flight efficiency are needed. Additional capacity can be created by the introduction of Reduced Vertical Separation Minimum (RVSM) in Europe's upper airspace between FL 290 and 410 from 2002 on.

Moreover, the exploitation of the airspace in the vertical plane must be synchronised with its full exploitation in the horizontal plane in order to accommodate the expected growth of air traffic. Thus, HLG found that "in the longer term" ASM "should facilitate the introduction of new concepts *e.g.*, FRA starting with upper airspace above a certain altitude and reducing in stages to optimise capacity."⁵⁵

Airspace exploitation in the horizontal plane can be achieved by abandoning today's fixed ATS route system for the benefit of an air traffic system using the whole airspace, thus avoiding concentration of traffic at established crossing points and easing conflict situations. Following the implementation of Basic Area Navigation (B-RNAV) in Europe in 1998, aircraft can operate on tracks joining any two points, within prescribed accuracy tolerances, without the need to pass specific ground facilities. In Europe, existing ATS systems do not yet adequately support these navigation capabilities of aircraft operators to plan and fly user-preferred trajectories on a systematic basis.

⁵⁴ Performance Review Commission, PRR 3, Para. 6.4.1.

⁵⁵ HLG Report, Para. 60.

Eurocontrol has developed the Free Route Airspace Concept (FRAC) and is currently working with the civil and military ATC authorities of Belgium, Denmark, Finland, Germany, Luxembourg, the Netherlands, Norway and Sweden in the so-called Eight-States Free Route Airspace Project. This project serves as a pilot project and should lead to further ECAC-wide application. The definition of FRA is that: "It comprises specific airspace within which users shall freely plan their routes between an entry point and an exit point without reference to the ATS route network. In this airspace, flights will remain subject to Air Traffic Control."⁵⁶ FRA will encompass the upper airspace of the eight states vertically from a base level yet to be determined (FL 285 or higher) to the highest operating level of managed airspace. FRA is an integral part of the overall airspace, interfacing with underlying and laterally adjoining airspace through the fixed route network.

The decision on the implementation of FRA will depend on the results of a feasibility study conducted for the eight states to be completed by the end of 2001. The implementation, however, depends on the availability of adequate ATS system support for the ATC services in the eight states and Maastricht UAC. While it can be assumed that current and planned regulations concerning the mandatory carriage of on-board equipment (B-RNAV, RVSM) are sufficient to meet the airborne system requirements for free route operations, specific system support, such as Medium Term Conflict Detection (MTCD) and very advanced Flight Data Processing System (FDPS), is required on the ground and must be regarded as an absolute prerequisite. This condition is expected to be fulfilled by 2006.

FRA will fully meet military requirements. Segregated airspace structures will remain in existence and civil and military traffic must have equal access to FRA. Adaptations to procedures for the conduct of special military operations (*e.g.*, air-to-air refuelling (AAR), air defence exercises, NATO E3A orbits) can be developed. In general, FRA will respond to the needs of OAT since air traffic in this airspace operates according to the principle of freedom of movement, which is a basic requirement of OAT.⁵⁷

FRA can be considered as a major impetus towards the realisation of a single European sky. It requires, among other things, the creation of large cross-border sectors, and a harmonisation of airspace classification. Efficient airspace management will be the most important issue with respect to civil-military cooperation. Enhancements of civil-military cooperation and of the FUA concept will therefore be one of the prerequisites.

FRA could be realised in an evolutionary process. So, even if it proves to be difficult to fully implement FRA in the near future, there is still the possibility of a phased approach which would gradually ensure more flexibility in airspace utilisation.

As a first step, high-level rules should be established in the Community to ensure that, with effect from a date to be determined, each flight is entitled to a direct routing as far as the traffic situation permits, considering national security, safety or ATFM requirements.

⁵⁶ Eurocontrol, Information Brochure – July 1999.

⁵⁷ Results obtained in simulations so far showed that spreading of GAT in FRA alleviates control of transiting OAT by offering more space available within the civil air traffic stream.

As a second step, the pan-European Airspace (UIR Europe) should, in addition, be given the status “random RNAV area.” Within random RNAV areas, random RNAV routings, *i.e.*, unpublished tracks, may be flight planned by operators and subsequently flown under radar monitoring when required. ICAO recommends the establishment of RNAV areas wherever possible.⁵⁸ The use of random RNAV areas is similar to FRA. The main differences are that the fixed route network will remain in existence and that planning and use of random RNAV routings may be subject to restrictions. Thus, random RNAV routings may be limited to specific flight level bands, and/or time periods (*e.g.*, night-time, weekends) or to areas of a constantly low traffic density or to other factors, depending on the particular ability of ATC to handle traffic on unpublished tracks.

After having gained substantial experience concerning direct and random air traffic routings, a FRA could be established as a third step.

The more states participate and the larger the areas are where air traffic can move freely, the greater will be the benefits from the FRA concept. This is why FRA is an important issue for Europe.

CHAPTER 3: ATFM ISSUES

3.1 Introduction

This Chapter reviews the functional demands for Air Traffic Flow Management (ATFM) and considers organisational steps required for its further development as a vital element for the single European sky.

3.2 The Role of European Traffic Flow Management

ATFM is mainly concerned with the global balancing of traffic demand against airspace capacity.

Its functions start at the so-called “strategic level” (comparing airspace capacity against demand forecasts and repetitive flight plans which are known several months in advance). Other phases are the “pre-tactical level” (assessing demand against capacity at day D-1, to determine where restrictions must be imposed on congested sectors), and the “tactical level” during which flow restrictions are actually imposed and users are assigned slots under a First-Planned-First-Served queuing discipline.

In Europe, ATFM was initially managed by national coordination cells, until it was decided at the beginning of the 90’s to create a central European-wide entity in charge of conducting a global planning of flows, the Central Flow Management Unit (CFMU).

The CFMU started its operation in 1995 as a dedicated common operational service within Eurocontrol. As has been demonstrated in the United States, establishment of the single European sky is not likely to diminish the need for ATFM. It is expected to remain a

⁵⁸ ICAO European Region ANP, Part IV – ARN, Paras 6.4.3 and 6.4.4.

permanent feature of a continental system, in which local traffic imbalances will often require demand management measures at the systems level to maintain safety and efficiency of operations.

A key aspect of the overall fairness and efficiency of ATFM processes is the matching of demand against capacity declared by ACCs, and hence the need, at a pan-European level, for a capability to audit declared capacity and compare performance, even if, as explained elsewhere in this Study, an algorithmic tool for determining the typical capacity of any given sector remains to be developed.

3.3 The Operational Situation Today

The analysis presented below is inspired by the “Independent Study on the Improvement of ATFM,” also known as the *Jaquard Report*.⁵⁹ That study was launched last year at the initiative of the Eurocontrol Council, through a delegation to the Inspection Générale de L’Aviation Civile et de la Météorologie (IGACEM). Its results have been widely distributed and discussed in European ATFM circles, and have attracted many positive comments.

Five years after its initial implementation, the CFMU, and more generally the European ATFM system have yet to cope with saturation issues and overcome weaknesses which make their current operations less smooth than they should be.

The key ingredients of ATFM improvement are to provide:

- more added value from an operational standpoint, owing to new functions; and
- better coordination.

[See next page for Figure 5]

⁵⁹ “Independent Study for the Improvement of ATFM” submitted by Philippe Jaquard (IGACEM) with the support of Sofréavia and WCP (11 September 2000).

3.4 Main Inefficiencies of the ATFM System

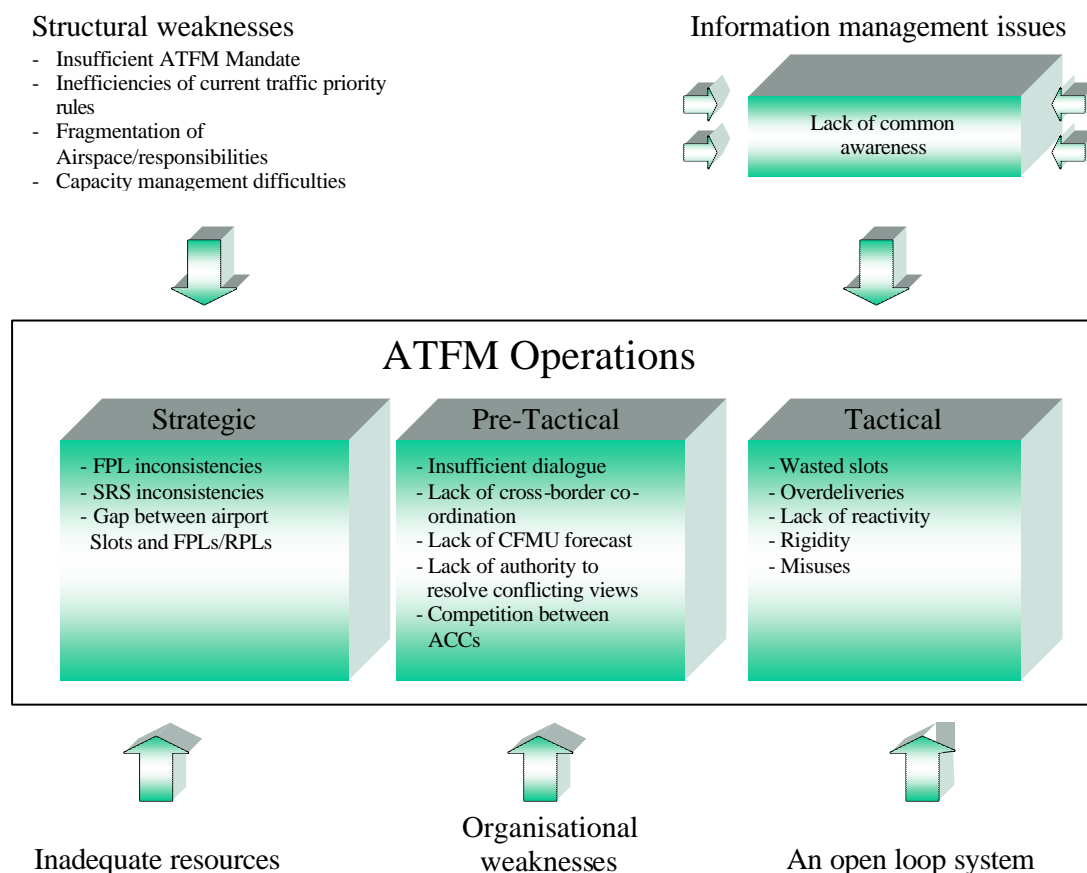


Figure 5: Main ATFM Inefficiencies

The previous diagram gives an overview of the main ATFM inefficiencies. As described below, these are of both a general character (e.g., “structural problems deriving from the overly narrow operational scope of the task) and more specific (e.g., pertaining to specific organisational steps such as the strategic, pre-tactical and tactical phases of ATFM):

- (a) **Structural inefficiencies.** ATFM mandate has become too restrictive. Indeed, ATFM is still too much a synonym for slot allocation mechanism; its meaning should extend to include the optimisation of traffic patterns and capacity management. Moreover, the assessment of possible new strategies regarding the slot allocation mechanisms have shown that today criteria are not optimised. Of course, the fragmentation of airspace and the division of responsibilities do not facilitate the mission of the CFMU. There are important efforts to be undertaken to implement coordinated capacity management procedures which do not exist today.
- (b) **Strategic phase inefficiencies.** Experience shows that one of the major issues is flight plan inconsistencies. Indeed, once a flight plan is dispatched by the Initial Flight Plan System (IFPS), copies as held by Airline Operators, ATS Providers and

the CFMU may sometimes diverge. A study was conducted by Centre d'Etudes/Expérimentation de la Navigation Aérienne (CENA) in France three years ago, and its findings have been confirmed by the preliminary results of a on-going multi-country study undertaken by Sofréavia under a Eurocontrol contract. Both studies show that the appearance of discrepancies between parallel copies of flight plans is quite frequent: this phenomenon affects about one flight plan out of three. The exact operational impact of these discrepancies, however, remains to be assessed. Most of them do not really affect safety or capacity. What can be said at this stage is that the mere existence of numerous discrepancies encourages ACCs to protect themselves against the risk of sector overloading (because an aircraft may in reality arrive after or before the CFMU-planned time). A symmetric risk of wasted capacity (as unnecessary load limitation actions may be taken) is thereby created. Inconsistency issues touch not only the Flight Plans but also the Standard Routing Schemes (SRSs), whose definition and publication processes are not simple and efficient. Finally, ATFM and airport slot allocations are not today systematically checked for consistency, and this contributes to the malfunctioning of the system.

- (c) ***Pre-tactical phase inefficiencies.*** The enlarged use of a mechanically-driven process and the absence of specialisation of Eurocontrol flow managers are the principal causes of the diminished dialogue between the CFMU Flow Management Division (FMD) and the Flow Management Positions (FMPs) located in the ACCs. Moreover, limited initiatives regarding cross-border coordination and lack of accuracy of the CFMU forecasts (due to late decision making process) highlight that pre-tactical activities suffer from an absence of recognised authority.
- (d) ***Tactical and real-time phase inefficiencies.*** Moreover, the lack of coordination with airport operators leads to non-coherence of airport departures with CFMU slots which is the main cause of over and under-deliveries to en route control sectors. Today, the absence of real-time feedback, the rigidity of the CFMU systems and rules and the deficiencies in enforcement, flexibility and incentives, illustrate the lack of reactivity of the whole ATFM system.
- (e) ***Organisational difficulties.*** One of the major issues is the relation between FMPs and the FMD. In their relationships with the CFMU, a number of ACCs have complained about difficult discussions with the FMD because of its lack of experience with ATFM matters. Moreover, relations between FMPs and FMD tend to become more and more mechanical, with little room for negotiation or discussion and less and less systematic and regular coordination. Speaking more generally, a gap still exists between the ATC and the ATFM worlds. The scales of perspective differ. One proposes a local solution without regarding the consequences at a wider level, while the other may be too quickly ready to penalise a local area to optimise the system on a broader scale.
- (f) ***Lack of a capacity audit function.*** As there is currently no mechanism for assessing and comparing capacity supplied at the level of control sectors and/or ACCs, the system works under an “open loop” regime, without receiving any direct

feed-back regarding ATC efficiency in relation to ATFM and the global impact of local declarations of capacity limitations.

3.5 The Regulatory Situation Today

Today, the CFMU does not have the legal power to issue ATFM instructions directly applicable to and binding upon ATFM users. Rather than ATC slot allocation control (a function mainly held by domestic provider), the role of the CFMU is more to facilitate and coordinate the exercise of national ATFM functions.

While Eurocontrol has participation by institutions whose nature is regulatory, its specific operating institutions, including the CFMU, also have mandates to provide services.

The fact that the CFMU is not yet seen as the central service it should be is also reflected in the multiplicity of contact points within the CFMU and a variety of services and applications. Transforming the CFMU into genuine central service should go hand in hand with an organisational streamlining of its user interface.

The evolution of the system is coordinated through the European ATFM group (EAG), in which airline and ATS providers are represented. However, the role of this group is both oversight-oriented (to monitor and harmonise efforts of all ATFM stakeholders) and operations related (to specify evolution of the CFMU). This double function is at odds with the global philosophy of separating oversight from operations, and it aggravates an already slow development process.

Part of the organisational difficulty lies in the hybrid nature of the CFMU as a provider of :

- a central planning service of flights for the whole of Europe;
- a wealth of statistical data on the performance and day-to-day compliance of other actors in respect of ASM and ATFM, especially ACC and airlines; and
- technical advice on regulatory issues, based on its unique expertise in the field of ATFM operations in Europe.

Therefore, any regulatory intervention in the area of ATFM should take into account the positive aspects of this multiplicity of roles played by the CFMU.

The 1997 revised Convention, when ratified, should give Eurocontrol more legal power; although member states will retain control over enforcement of ATFM measures.

The revised Convention gives a more prominent role to the CFMU, but still with some significant limitations:

- the CFMU communicates flow control measures to Aircraft Operators and air Navigation Services, but cannot directly issue ATFM instructions to Aircraft Commanders (Art. 19.1).

- in case of non-compliance, enforcement action can only be initiated by Eurocontrol with the explicit agreement of the concerned State (Art. 19.3 (b)).

The revised Convention will invest Eurocontrol with a strengthened framework for ATFM. In particular, the CFMU will be entitled to communicate flow control measures directly to aircraft operators and air navigation services (though it cannot issue en-route ATFM instructions to aircraft commanders). Also, the regulatory process for the adoption of rules and principles applicable to ATFM will be improved. However, there are a number of shortcomings in the revised Convention ATFM regime. Its enforcement system is weak. States will ultimately retain control over enforcement of ATFM rules and measures.

3.6 Findings and Recommendations

Institutional reform must strengthen the mandate of the CFMU. In line with general requirements for a strengthened and more uniform commitment by all actors in the system to play fairly and efficiently, on the one hand, and for a credible enforcement of such commitments both by the CFMU (in its operations) and by a separate ATFM regulator, on the other, we make below a number of recommendations. These begin with a set of short term practical improvements some of which could benefit from EC regulatory intervention. They are followed by suggestions for less specific and more structural changes.

(a) **Short-term improvement of ATFM operations.** Some of the practical recommendations listed here may benefit from specific regulatory intervention, preferably undertaken in a coordinated way by the EC and Eurocontrol. A renewed policy impetus to improve ATFM in Europe could thus be given through the enforcement powers that the EC enjoys and Eurocontrol lacks.

- In order to optimise current capacity, to simplify the current route network design and to use it in an efficient way, a consistent route and traffic orientation policy scheme is needed. All route or traffic orientation design could be regrouped into a new central service entity for ASM working in close coordination with the CFMU. (Please also see Figure 9 in Part III, Chapter 7). There should be only one document, perhaps the Route Availability Document, used by Airline Operators for the choice of the available routes. An EC regulation establishing the goal of a single reference document describing all the restrictions on route availability at a European level could be helpful in this respect.
- There may exist significant discrepancies between the strategic notion of airport slots and the pre-tactical notion of "CFMU slots," for those flights going into areas where flow control has to be enforced. Airport co-ordinators should provide the CFMU with their slot database, so that a consistency check can be automated in the IFPS. An EC regulation making it mandatory for European airports to communicate their slot structure to the CFMU could assist that process.

- As for the flight plan consistency issues, a lot of errors could be avoided if the rules applied to the processing of flight plans, which already exist, were more strictly implemented: consistent IFPS checks; no changes after the flight plan activation. Here, the problem is more one of education and assistance than of putting new regulations in place.
 - Airport operators, who have been kept distant from the ATFM system, should become key players and become proactive with respect to CFMU slots. Their involvement should be supported by Collaborative Decision-Making (CDM) tools to be developed in cooperation with the CFMU (see Chapter 4 below).
 - All actors must have a better understanding of the impact of their decisions in the ATC network. The best way is to bring global awareness to the operators of the system, by giving them the opportunity to have an instantaneous perception of the air traffic situation in Europe.
 - Significant emphasis should be put on the development of communication support, simulation, monitoring and post-analysis tools as well as staff formation.
- (b) **A stronger common commitment towards ATFM measures.** As recommended by the *Jaquard Report*, this commitment could be materialised by the development of a new charter (subscribed by all the actors) defining common practices concerning ATFM services and relationship with ATC.

A further stage of development could take the form of a rule-making process starting from that Charter and leading to a formal adoption of new “General Conditions” for ATFM that are required by the revised Convention.

- (c) **Independent regulatory oversight for CFMU services.** The performance and quality of service of the CFMU, as the planner and operational director of European air traffic flows, has to be subject to oversight. However, at present no independent or separated regulatory body has been assigned to provide systematic oversight.

While Eurocontrol’s Performance Review Commission (PRC) and its Performance Review Unit already play a role in assessing the performance of elements of the ATFM system, they are not staffed to provide requisite oversight, even if that were deemed consistent with their heretofore independent performance review function.

Certainly, if it is determined that the PRC’s present auditing independence (which can be applied against the regulators as well as the regulated) should be maintained, then a new body should be established to regulate provision of the ATFM service. A model for such a regulator is presented in Chapter 7 below. This regulator might also oversee European capacity planning and route design, as well as that of the CFMU, and thus be in a position to encourage and evaluate the effectiveness of the cooperation

- (d) ***New non-compliance procedure.*** The limited enforcement powers of Eurocontrol can be balanced by a non-compliance procedure, putting pressure on the actors which do not comply with European rules, or a charter signed by all stakeholders. Such procedures could be established in the framework of the new performance oversight body, or they could also have an independent character.
- (e) ***A contractual approach to CFMU service provision activities.*** Implicitly or explicitly, the CFMU acts as a service provider to a number of other entities, including:
- Commercial operators of air transport and individual airspace users;
 - National/regional ATS providers; and
 - Various expert groups and performance oversight entities in Eurocontrol.

It could be beneficial to all parties to formalise the various service provision activities of the CFMU, as a set of contractual agreements.

This approach would permit and facilitate:

- Definition of the criteria against which the performance of the CFMU would be assessed by its regulator;
- Statement of the commitments made by the CFMU towards its various customers (and the reciprocal commitment to be made by the users of CFMU services); and
- Future evolution towards a greater autonomy of the CFMU as a provider of a complete range of ATFM-related services.

All of the current functions of the CFMU -- provider of ATFM services, provider of performance statistics, provider of technical advice in support of ASM and ATFM standardisation) -- could be subsumed under this contractual approach. Each type of service contract would define a reporting line to a specific type of customer and a performance commitment that may be separately monitored by a regulator.

However, this longer term perspective should not be seen as a substitute for short and medium-term regulatory measures for ATFM. These should be an integral part of the integrated regulatory package described in Part IV of this Study.

CHAPTER 4: CDM ISSUES

4.1 Introduction

This Chapter examines the possible contribution of Collaborative Decision Making (CDM) in the achievement of the single European sky and considers steps needed to facilitate

exploitation of the new process. In the broadest sense, CDM covers the strategic, pre-tactical and tactical phases of flight planning. This Chapter focuses on CDM in the pre-tactical and tactical phases.

4.2 Summary of Findings and Regulatory Implications

In the pre-tactical and tactical phases, CDM is a process for exchanging information between ATS providers, airport operators and aircraft operators. Its purpose is primarily to optimise the utilisation of scarce capacity and additionally to provide aircraft operators with a more flexible flight re-scheduling environment.

CDM was initiated in the United States some five years ago. Owing to cooperation between the private sector and the FAA, the concept quickly demonstrated success by improving flexibility and reactivity of the ATFM system.

The Brétigny Experimental Centre is investigating the applicability of the concept in Europe. Field trials are scheduled this year at some European airports (*e.g.*, Brussels, Zürich, Barcelona).

From an operational standpoint, CDM can be seen as a functional subsystem at the intersection of ATFM/ATS on the provider side, and Fleet/Flight Management on the user side. From a technical standpoint, CDM relies on the real-time exchange of flight and slot (re)planning and (re)scheduling information. These exchanges are conducted onto a secure virtual network (an Intranet or something functionally similar).

Three main issues are at stake in the deployment of CDM, that may require regulatory attention at the European level:

- Establishing an acceptable and uniform context for user cooperation in Europe;
- Protecting data property rights and the confidentiality of information; and
- Establishing regulatory oversight of the CDM process in order to ensure fairness.

4.3 Findings: Concept and Organisation of CDM in Europe

The general idea of CDM in the pre-tactical and tactical phases is to:

- Maintain fairness - *i.e.*, make sure that any operator can still get the total number of departure and arrival slots allocated to him; and
- Enhance efficiency - *i.e.*, to provide capacity in a more timely and adaptive fashion than is done today.

The objective of CDM is to make the allocation of departure and arrival slots and of intermediate routes more flexible and more responsive to any late change and to tackle the rippling effect of flight delays (initially caused by airspace/airport saturation mechanical problems, meteorology, connecting flights, *etc.*)

The overall effect to be expected from CDM is especially important in terms of passenger delays. Instilling more flexibility in slot/route allocation and flight coordination processes would allow operators to prioritise and assign the greatest delays to flights that would have the least impact on their customers.

This could imply modifications in the rigid administration of the First-Planned-First-Served priority rule, and therefore require buy-in from the ATFM community. CDM should be particularly helpful in controlling what are termed “reactionary delays”, *i.e.*, minimising the knock-on effect delays to flights that must connect to other flights or in other cases of operational dependencies between arrivals and departures (*e.g.*, at a hub)

As a systematic procedure, CDM was introduced some five years ago in the United States and has been increasingly employed by the FAA in working with users. Airlines have organised operation centres that collaborate actively in dynamic information management (in the US, the CDM updated “aggregated lists” are distributed to the participants every five minutes). In Europe, CDM is receiving increased attention. Eurocontrol, at the Brétigny Experimental Centre, has been organising pilot studies to investigate the applicability of the concept in Europe. Field trials are scheduled this year at some European airports (*e.g.*, Brussels, Zürich, Barcelona).

From an operational standpoint, CDM can be seen as a functional subsystem at the intersection of ATFM/ATS on the provider side, and Fleet/Flight Management on the user side.

From a technical standpoint, CDM relies on the real-time exchange of flight and slot (re)planning and (re)scheduling information. These exchanges are conducted on a secure virtual network (an Intranet or something functionally similar).

4.3.1 Organising the CDM partnership around the CFMU

As a collaborative process, CDM simultaneously provides services to and imposes responsibilities upon its participants. Confidence and trust are practical requirements to make it work. Thus it is useful to think of it in terms of a partnership, in a sense similar to the membership of a club.

The main potential CDM partners in Europe are:

- Commercial Air Transport operators;
- Airport & TMA ATS providers;
- Enroute ATS providers; and
- CFMU.

The natural pivot point for CDM activities would be the CFMU. It would dispatch periodically updated aggregated sets of CDM data to all the participants.

Organising that partnership would require a number of letters of agreement or contracts between commercial operators and Airport ATS operators on the one hand, and the CFMU on the other hand, regarding the respective commitment of the parties to provide CDM data.

Establishment of such mutual obligations between the CFMU and its partners would also be in line with the recommendation made in Chapter 3 to develop a more explicitly contractual approach to the general provision of CFMU services.

The mandate of the CFMU already encompasses the exchange of user demand and provider capacity information. Thus, additional authority in that respect should not be needed (However, the introduction of CDM might lead the ATM community to introduce new technical coordination functions and associated application protocols between the CFMU and the ACCs.)

In the future, participation into the CDM data exchange scheme managed by the CFMU could be made mandatory, once the initially voluntary CDM scheme has proven its worth.

- (a) **Protection of CDM data.** CDM data are based on industry data that should be considered proprietary and not releasable without the approval of the data providers. No CDM or aggregated-CDM data should be distributed to non-participants of the CDM partnership without the explicit agreement of its owners.

CDM data are intended to support daily management of aircraft flight operations. Only aircraft operators that provide individual CDM data shall receive aggregate data from the CFMU (*i.e.*, you have to become a member of the “CDM Club” to benefit from its information sharing scheme).

Proprietary CDM data and aggregated CDM data should be authenticated, access controlled and filtered.

It should be noted that the problem of personal data protection is now specifically covered by the revised Eurocontrol Convention (Appendix 2.5) but the protection of commercially sensitive data is not explicitly part of the activities delegated to Eurocontrol by its Member States.

However, since this aspect may be dealt with through contractual arrangements subject to commercial law, and Eurocontrol has the full legal personality to enter into service provision contracts, this should not be major source of legal/regulatory problem.

- (b) **Fairness issues.** One of the problems of ATFM in general and CDM in particular, is that a win-win situation can be reached only if all the participants play the game honestly. The implementation of CDM can be successful only if all the participants provide good quality data.

In the world of ATFM, it is well known that certain companies provide timely and accurate data of their movements and scheduling decisions while others are utterly unreliable.

An important aspect of the problem is that the current rigidity of CFMU procedures does not create sufficient incentive for airlines to play the game: in fact, as explained below, it is sometimes preferable, from an individual airline standpoint, to pre-emptively include the expected impact of CFMU-imposed delays into its schedule. Introducing more sophisticated punitive regulations is not necessarily the right answer.

Illustrative, key operational issues to be tackled by the CDM are:

- The delay-masking tactics used by the operators, which are based on Expected Off Block Time (EOBT) differences between the airlines and the CFMU. After their perception of the likely ATFM delay, airlines tend to indicate optimistic EOBTs that are compatible with their estimate of the corresponding CFMU-allocated departure slots (*i.e.*, with the tolerance interval centred on the CFMU Take Off Time or CTOT yielded by the load-smoothing algorithm run by the CFMU), and they do not update their EOBT, so as to try and escape going through the CFMU slot rescheduling process. Today, if they change their EOBT to a more realistic one, then their previously assigned departure slot is lost. The development of CDM slot-swapping protocols would significantly alleviate this problem, especially at airports where a given company represent a significant fraction of the overall traffic. It should also be noted that a statistical side-effect of such tactics is to transform a fraction of the company delay into ATFM-caused delay (*i.e.*, the difference between the nominal EOBT and the “real” one looks like an ATFM-imposed delay, while it is in fact a company delay which is “absorbed” into the ATFM system.)
- For similar reasons, there is a tendency among airlines to provide over-optimistic estimates of the turn-around time for shuttle flights (as a consequence, the rescheduling of other flights cannot be optimised).
- Another problem that derives from these delay-masking tactics, is the late communication to ATFM of airline decisions regarding delayed or cancelled flights. (As a consequence, scarce and valuable slots may be wasted entirely.) The CDM partnership scheme would obviously improve the situation by allowing for a swifter reallocation of unused slots.

Various CDM oriented coordination protocols for slot-swapping, multiple slot-sliding *etc.* are being investigated by the Brétigny Experimental Centre for implementation in the near future, after a campaign of experimentation to be conducted this year at various European airports (alluded to above).

As previously suggested, penalty-oriented regulation is not necessarily the right answer to ATFM problems. The development of positive rewards based on CDM

processes would offer an alternative approach for encouraging users to behave more transparently, if sufficient guarantees are offered that these new processes are both fair and efficient.

4.3.2 Future Role of CDM in implementing FUA

Although the military authorities are not expected to take part directly in CDM (except perhaps for some of their GAT operations), the trend toward a more flexible use of airspace and the ever more dynamic sharing (foreseen to take place between military OAT operation and other users) would need to be fed into the CDM system.

This can be done at the level of the CFMU where any early liberation of military reserved airspace should be advertised as soon as possible, so as to enable it to offer better options in real-time to the airlines, through a mix of CFMU-FMP interactions and of CDM-based propagation of fresh information to the users.

From an operational standpoint, it would be useful if everywhere in Europe direct links existed from the civil-military coordination position in ACCs, to adjacent ACCs, on the one hand, and to the CFMU, on the other, so that certain pieces of information, especially regarding the liberation of military airspace, would be distributed automatically and rapidly. This type of improvement in the distribution of information should not have any implication in terms of national security.

The development of CDM processes would dovetail nicely with the implementation of efficient coordination processes for level 3 (tactical) FUA. Once level 3 FUA becomes more widespread and more reactive, then CDM processes are the best way to materialise its potential operational benefits for airspace users.

Reciprocally, the emergence of the CDM approach creates a powerful incentive for improving the ways and means of the FUA at its most tactical level.

4.4 Regulatory Support for the Development of CDM

Three main issues are at stake in the deployment of CDM, that may require regulatory attention at the European level:

- Establishing an acceptable and uniform context for user cooperation in Europe;
- Protecting the confidentiality of information; and
- Establishing regulatory oversight of the CDM process in order to ensure fairness.

At the current, early stage of CDM development, it may be useful to introduce light-handed and pro-active regulatory support so as to attract the potential actors, especially commercial aircraft operators. Establishing early on a favourable regulatory environment could be a positive factor for buying-in airline participation and raising their level of awareness and confidence in the development of CFMU-based real-time CDM processes.

- (a) ***Establishing a cooperative context.*** It would be helpful if, both in framework legislation establishing an EU competence and in the development of Eurocontrol ATFM mandates under the revised Convention, the principle of cooperative capacity planning is accepted and recognised (Article 7.2 (d) of the revised Eurocontrol Convention contains provisions for the development of ATFM rules that seem potentially applicable to CDM).
- (b) ***Protecting confidentiality of information.*** The issue of protecting the use of proprietary information is already relevant and could become very important in the future, if the voluntary CDM scheme is made mandatory.

For example, an EU decision could make participation in CDM mandatory for all commercial operators at all congested airports in the EU. In that case, the European regulator of ATFM and CDM activities would need to ensure that CFMU processes work to protect the confidentiality of information and would require oversight procedures.

- (c) ***Oversight of “fairness.”*** Finally, it is important that, from the outset of operations, quality of service indicators be established and externally monitored with the objective of establishing the credibility of the CDM approach.

As stated previously, regarding the need to separate regulation and service provision in respect of ATFM, the definition and monitoring of performance indicators for CDM fairness and efficiency should be put in the hands of the new ATFM regulatory body.

More generally, it should be noted that the emergence of CDM activities will reinforce the perception of the CFMU as a provider of enhanced ATFM services, that would be independently regulated, and that would develop a more explicitly contractual relationship with its users.

CHAPTER 5: REMOVING DISINCENTIVES TO EFFICIENCY OF AIRSPACE DESIGN

5.1 Summary of Findings and Regulatory Implications

The current system of charging for ATM enroute services does not encourage Member States to accept changes in airspace design and organisation which might shorten distances or displace routes and traffic from one national jurisdiction to another. Whilst also based on historic physical design factors (that continue to play a strong role), circuitous navigation has remained a persistent feature of European ATM. Making aircraft fly indirectly is costly from environmental (additional fuel burn) as well economic and service perspectives. Indirect flying cannot add to safety unless, under specific circumstances, it relieves congestion. The public interest argues for removing disincentives to and creating incentives for efficiency. This requirement can be approached in three broad ways as summarised below.

5.1.1 Regulation to protect the rights of users to efficient transit

Acting under framework legislation that establishes a rebuttable presumption that users are entitled to Great Circle (*i.e.*, the shortest) routing in the upper airspace between TMAs of origin and destination points -- unless considerations of safety or national security dictate otherwise -- the Commission would initiate or support actions that make deviations (especially significant deviations) from Great Circle routing in the European air navigation system subject to review. With the critical support of Member States and Eurocontrol, the Commission would act to ensure that all unjustified deviations in EU airspace were eliminated.

5.1.2 Regulation to require functional airspace design criteria

Working on the supply side of the problem, the Commission should act to remove legal barriers to the organisation of blocks of airspace based on “functional” (*i.e.*, safety and efficiency) considerations. An internal political border within the European Union should no longer be a legally acceptable basis, much less a compelling constraint, for the sub-optimal design of airspace. Safety, followed by efficiency, criteria should take absolute precedence.

5.1.3 Regulation of pricing of enroute ATM services

This topic, in the first instance, is to be addressed in the other Commission Studies. From an airspace regulatory standpoint, however, regulations that bind or influence the pricing practices of providers must, at minimum, not work to distort or impede safety and efficiency of airspace design and organisation. Most desirably, there should be a general consensus uniting around the principle of creating incentives to produce “net gate-to-gate minimisation of time.” Thus, economic regulation should permit or encourage flexibility in pricing to reward/penalise savings or losses in time, rather than requiring a frozen set of unit rates based on distance.

5.2 Findings

Informal discussions with both regulators and providers have confirmed the Commission's concern⁶⁰ that at least some national organisations have been disposed to resist changes to the route network that shorten aircraft miles over their territory and reduce revenue under current charging formulas. Economic motivation to resist change is strongest with respect to cross-border traffic. Overflights, especially by large turbofan aircraft, have typically produced the highest rate of cash flow of all forms of operation.

Charging rules could of course be amended in a variety of ways to constrain (what the economist would term) national “protectionism.” Recommending such changes is, in the main, the province of the Market Organisation and Economic Regulation Studies. However, the question then remains: does the existing airspace design and regulation framework *per se* contribute directly or indirectly to the problem?

⁶⁰ See Terms of Reference (Required Areas for Investigation) for this Study.

Current EANPG planning processes, which have been carefully and professionally structured over the years, already begin with the policy presumption that routing alternatives should offer Great Circle distances for as many city pairs as possible.⁶¹ However, this efficiency presumption has lacked legal force or support. Administrations have not been required to justify formally their non-compliance with optimum design criteria or to identify conditions or support they might need in order to comply.

An important question is whether the sovereign responsibilities defined in the Chicago Convention (Article 1) establish national political borders as the fundamental context for airspace design. We believe that this assumption has become legally artificial and dated.

The Convention itself states:

*The delineation of airspace, wherein air traffic services are to be provided should be related to the nature of the route structure and the need for efficient service rather than to national boundaries.*⁶²

This ICAO recommendation seems particularly apt and compelling for Europe. The EC has long since established institutions reflecting shared or joint sovereignty on the ground and also affecting actions in territorial waters. The rules of international aviation must respond or adapt to such changes. Indeed, they have, for example, in the air transport regulation area.

The foregoing suggests that whilst Article 1 of the Convention may be argued as a political basis for retaining authority over national airspace, it cannot reasonably be relied on to resist provisions (otherwise founded in governing law) to require the safe and efficient design of a European airspace across national borders needed to create the single European sky.

5.3 Regulatory Implications

This Section proposes regulatory action by the Commission to reduce disincentives or create incentives to create the single European sky airspace structure in three broad areas.

5.3.1 Airspace regulatory action to protect European system users

As an element of the first Council Regulation being currently developed, enroute traffic in the upper airspace (between TMAs) would in future enjoy a right to great circle routing, unless considerations of safety (e.g., ATFM restrictions or inability to provide positive ATC) or security (e.g., military operations or exercises) create persuasive operational

⁶¹ Historically, all civil transport aircraft flew using ground beacons, and so made a series of straight-line segments in a typical flight. These navigational aids were scattered across the country. They needed to avoid military zones which were also developed in airspaces around the fixed route systems. Patterns of flying developed that increasingly provoked industry concern, especially as new avionics eliminated or reduced the need for beacons. In its 1989 Study of European ATC, WCP reported expert findings that circuitous flying was adding costs approaching \$2 billion annually to the European operations of airlines and their customers.

⁶² See Chicago Convention Annex 11, Section 2.8.

reasons for less direct routing.⁶³ The mere existence of historic routes would no longer be a justification *per se* for not providing alternatives to properly-equipped traffic. In cases where Member States themselves do not respond expeditiously to deal with the problem, the Commission should:

- At its own initiative, or in response to petitions from users or providers and/or upon tasking by the Council, obtain from Eurocontrol and/or the PRC an inventory and analysis of city pair routings that exceed great circle mileage by a presumptively unacceptable (> 10%) or undesirable (> 5%) level;
- At its discretion, and in all cases where Eurocontrol recommends further initiatives aimed at ameliorating the situation, direct the Member State(s) involved to take timely remedial steps or show cause in an appropriate proceeding why such steps must be delayed or not be undertaken.⁶⁴

5.3.2 Primacy of functional criteria for the design of airspace

Safety, efficiency, national security (military requirements) and fairness (*i.e.*, balanced access for all users including general aviation's need for off-route airspace) already exist as established or recognised priorities in international law (ICAO) or in national legislation. Adding such an assertion in European legislation could:

- Remove Member State borders as the *prima facie* basis for the demarcation of airspace for purposes of service provision -- especially for cross-border operations in the upper airspace;
- Consistent with the principle of subsidiarity, however, place accountability in the hands of those most directly affected to propose and develop solutions that meet European and international standards;
- Provide qualified providers scope to propose designs of airspace not restricted by internal political boundaries; and
- Help create a new form of provider delegation framework that leads to the creation of larger blocks of airspace, especially for enroute operations (see also Chapter 6 below).

⁶³ It is important to note that, depending on traffic demand and the procedures being applied in particular airspace, there may be a capacity as well as a safety case for requiring streams of organised traffic, *i.e.*, movement along defined routes, as opposed to distributed navigation (*e.g.*, Free Route or Free Flight procedures). Sector capacity is driven by the controller's ability to separate traffic, and if high demand increases the number of potential conflict situations, handling traffic over fixed routes and intersections may still permit more volume to flow. Thus, users might face a trade off between efficient in-flight movement and delay at the gate (because of reduced sector capacity). However, demand at fixed route crossing points (as discussed in detail in Chapter 2) is also a prime cause of congestion. Thus, as technology improves conflict detection tools and thereby controller productivity, the premise of working toward Great Circle routing gains further strength and support.

⁶⁴ Such an issue might be handled by a non-compliance review as outlined in Part IV, Chapter 4, Section 4.5.2.

5.3.3 Pricing reforms

Providers, who individually or jointly wish to offer services across a larger block of airspace, should price their services based on the costs of the specific operations area and not on the official charges of the specific political geography being overflown. They should also be able to earn a premium if they have been prepared to make timely investments in staff and facilities that enable them to offer on-time services. The theory of new regulation should be to recognise and honour a “service time” as well as a service distance criterion as a basis for pricing. The time criterion could be embedded in service-level contracts between providers and users. It could also be used in regulation to address the circuitous routing issue through two, rather distinct, variants:

- (a) **Voluntary circuitousness discounts.** Regulation should encourage providers to work flexibly with users and overall systems managers (e.g., the ATFM/CDM system) to offer users tactical service alternatives. For example, if a provider has capacity to offer services to non-habitual users who might save net gate-to-gate time by going circuitously (because the most direct route is congested), they should be free to offer a circuitousness discount (based on marginal cost/revenue calculations as applied to otherwise unused capacity).
- (b) **Mandatory circuitousness discounts.** As a long-term approach to a problem of persistent and unjustified inefficiency in local airspace design, provision might be made in law for disadvantaged users to demand compensation for losses due to extended flights and delays. While this path is fraught with economic as well as legal pitfalls, it might be pursued in a limited form to establish accountability for efficiency of airspace design. Operational inefficiencies in ATM service provision could, of course, also be penalised.⁶⁵

CHAPTER 6: RESTRUCTURING AIRSPACE TO ENABLE PROVIDER COMPETITION

6.1 Summary of Findings and Regulatory Implications

A significant range of stakeholders (users as well as providers) advocate reforms led by the European Commission that would enable the reorganisation of airspace (especially for enroute services) into larger transnational blocks. Whilst the economic and technical logic for this has been presented for decades, such change nevertheless represents a significant challenge. It must achieve acceptance from all key players involved -- i.e., not just users, providers and regulators, but also the professionals who operate the services in the airspace on a daily basis. Concretely, organisational innovation must embody realistic strategy to

⁶⁵ Penalties for bad performance may, however, be more problematical than bonuses for good performance. A senior official of a major European airline stressed to us the importance of positive incentives that reward efficient and timely investment and effective staff performance. He was much less enthusiastic about penalties, which he feared could induce a vicious circle situation in which the cash flows needed for modernisation get curtailed.

retain and motivate critical and scarce human resources upon whom safety and efficiency in the system depend.

The terms of reference of this Study have asked us to explore the possible long-term role of a European Regulator in introducing provider competition for restructured blocks of airspace. Rather than making a single recommendation, we outline three options (which could be implemented progressively). These include:

- (a) **Regional cooperation.** Pursuant to a possible Commission/Council policy statement or directive calling upon states to establish (or to permit establishment of) enroute ATM jurisdictions of a minimum size, providers in states possessing bordering airspace would be encouraged to agree distribution of sectors and integration of procedures leading to seamless service provision within a defined, jointly-operated jurisdiction.
- (b) **Joint franchising.** To obtain firm managerial accountability and best-practice performance, bordering states would jointly establish an airspace block and then seek bids from providers or provider consortia to offer services for a fixed period. Regulation should require that any provider properly licensed in the EC will be permitted to tender. Primary selection of the franchisee would be by a board established by states whose airspace was affected. However, regulation would also provide for Commission review to ensure EC public interest criteria are met.
- (c) **Joint delegation/Euro-franchising.** To optimise airspace design by starting from a "clean page," EU Member and Associated States would jointly submit their airspace above FL 285 for multilateral restructuring.⁶⁶ Following an open rulemaking procedure, proposals developed and coordinated by Eurocontrol for jurisdictional division of the upper airspace into an optimised number of service blocks would be reviewed by the Commission and its advisory Committee. Providers would then bid for franchises to operate the respective blocks. Selections would probably be best made by a select Committee of senior Member State technical and economic experts (European Selection Committee - ESC) supported by an airspace users' advisory panel, subject to Commission procedural review.

For further details of Options 1-3 as well as consideration of the pros and cons associated with them, see Section 6.3 below.

6.2 Findings

Compared with other regions of the world, Europe's airspace has been packaged inefficiently. In the lower airspace, for example where important airports are located near borders, the states directly affected can (and often do) try to address this problem through bilateral service delegation agreements that provide for consistency of procedures during phases of flight that protect safety and can promote efficiency. As an illustration, the Grand Duchy of Luxembourg controls approach airspace to its airport under delegation

⁶⁶ Logically, an effort would be made to include the airspace of all Eurocontrol/ECAC states.

from its neighbours, whilst its intermediate and upper airspaces are delegated to BelgoControl and the Maastricht UAC respectively.

Notwithstanding this and other positive examples, inefficiencies remain across Europe because of cross-boundary sectorisation issues.⁶⁷ These problems cannot be completely addressed by conventional bilateral ATM service delegation agreements. Governments and provider organisations in a number of states have, therefore, been exploring multi-state (plurilateral) cooperation arrangements. The Maastricht UAC is an historic example.

Airspace design standards are an instrument potentially affecting both competition and rationalisation in ATM services. From an international law perspective, a state can delegate rights to “establish and provide” air traffic management services either to a government (for possible further delegation) or to a specialised (including a privately-organised) body, whilst retaining full legal sovereignty.⁶⁸ We consider airspace design to be a core element in the “establishment” of ATM services and thus a function that can be delegated without raising a sovereignty issue under Article 1 of the Chicago Convention.

Whilst plurilateral agreement on how to regulate the services of a provider working across several national borders must be reached by governments or result from supranational decision-making processes, the context for establishing the actual service arrangements can be de-regulatory as well as regulatory. Providers can and should be given the freedom to organise and propose services on the basis of customer (and the public's) requirements for safety, efficiency and reliability.

Moreover, the principle of separation of regulation from service provision (as emphasised by the HLG and stated throughout this Study) also applies very germanely in this situation. It argues for implementing the reorganisation of airspace across borders through two distinct lines of action:

- (a) **Regulatory organisation steps.** States, pursuant to EU/Eurocontrol (in the case of non-EU partners) guidelines or rules, agree:
 - To the operation of combined airspaces; and
 - To safety, performance and economic oversight procedures and criteria and terms for franchising and selecting a provider or providers.
- (b) **Service concept development and implementation steps.** Separately, providers would be tasked to develop the actual proposals, ideally in an open competitive environment. Franchise(s) should be awarded to bidder(s) with the best concept and qualifications for meeting customer and public interest.

The above process would differ greatly from an all-inclusive negotiating effort which tried to answer all questions; *i.e.*, one that tried not only to define the size of the airspace but also to settle all the technical, operational and economic service details from top-down.

⁶⁷ See Chapter 2, Section 2.3.3 of this Study.

⁶⁸ See Chicago Convention, Annex 11 2.1 “Establishment of Authority.”

That institutional approach leads to sub-optimisation and is far more likely to drag on inconclusively. Each partner feels pressured to worry about balancing benefits on the input side of the new operation rather than optimising service outputs to users.

6.3 Regulatory Implications

The Market Organisation Study finds no single economic policy path on which to approach jurisdictional reconfiguration of Europe's airspace on market-driven or functional (as opposed to political) lines. However, there is strong interest in finding suitable ways to encourage competition *for* if not *in* the market.

Licensing a non-national ATM provider to control aircraft, not just at the edges of their borders, but over much of their territory will constitute significant political, psychological (and in some cases legal) innovation for all but a few Member States. How to maintain and enhance provider accountability for safety as well establishing clarity of competence for safety oversight are critical, indeed controlling, issues. Thus, it may be wise, as well as necessary, to approach the organisation of FABs on a step-by-step basis. For that reason, the balance of this Section is devoted to the summary elaboration of three optional methods for establishing FABs. An initial list of pros and cons (which could of course be expanded and deepened) is associated with each option.

6.3.1 Option 1: Regional cooperation

To establish an efficient operating continuum in the upper airspace, the Commission or the Council would call upon or direct Member and Associated States to establish ATM enroute service jurisdictions of minimum (horizontal) size based on functional (e.g., safety and efficiency) criteria rather than historic political geography. Whilst the Commission would mandate basic airspace standards (such as airspace classification and equipment rules), the definition of common ATC procedures, the setting of new jurisdictional boundaries and the distribution of sectors would be a matter for the states and the provider(s) participating in the establishment of a particular FAB to decide.

Pros

- (i) This option makes significant and appropriate use of the subsidiarity principle whilst constituting a major step toward the single European sky.
- (ii) This option is already quite ambitious; more than this should not be attempted, at least at first.
- (iii) This option constitutes “supportive” regulation; it builds on existing relationships of contiguous states; it has, therefore, the best chance to be negotiated efficiently and be implemented rapidly.
- (iv) As most likely to require retaining experienced, qualified staff working in familiar airspace, this option is technically sound and realistic.

- (v) This option enables and encourages leadership by those states that are ready. Thus it leads to natural “pilot” tests. These, if successful, would also provide European regulators with better and needed information, before considering further-reaching restructuring.

Cons

- (i) This option does not firmly express a European standard. Because effective reform depends on harmonisation of changes at the European level, it is probably inadequate.
- (ii) This option is soft on timing. Where states have been “moving at different speeds,” reforms should also put pressure on those who have been moving the slowest.
- (iii) Whilst a bottom-up concept from a political perspective, this option neither stimulates nor creates explicit scope for customer-driven provider initiative or cooperation.
- (iv) The positions of administrations and providers do not get adequately separated.

6.3.2 Option 2: Joint franchising

This option would include the basic regulatory assumptions of Option 1 but would add three elements:

- Service provision would be explicitly separated from regulation; *i.e.*, the regulators from participating states would be required to consider proposals originated by providers;
- Whilst one or a group of their own providers might be best qualified, states would be required to consider any provider qualified in the EC (non-discriminatory market access provision); and
- The Commission's concurrence with the outcome would be required.

Based on public interest standards to be established in law -- and considering advice of the PRC and Eurocontrol as well as user comments -- the Commission would conduct an *ex post facto* review of the terms of the franchise and the franchisee(s). It could disallow (but not substitute) a selection.

Pros

- (i) This process achieves needed separation between regulatory responsibility and service provision initiative.
- (ii) It provides for explicit conformance to EC standards, whilst encouraging local initiative and customer service orientation.

- (iii) Definition of the nature and range of public interest standards in law could provide important framework assurances to stakeholders as well as strengthening safety, efficiency and fairness standards.
- (iv) For example, given the need to ensure the availability of qualified professionals to maintain safety and provide service quality, tendering requirements could include staffing commitments (*e.g.*, staff retention and professional development guarantees) as well as investment, financing and overall business-planning documentation.

Cons

- (i) Even with Commission review, there is no guarantee this solution will solve the “patchwork” problem; bottleneck sectors could continue to operate and would dilute benefits of modernising others.
- (ii) Absent a general requirement to open airspace to refranchising, a number of states might hold back from participation, *e.g.*, citing legal commitments to existing providers or economic reasons (need to amortise current investments, *etc.*).
- (iii) Whilst it may not go far enough in the above areas, this option is highly invasive with respect to the practices of certain key Member States. Absent high level policy change in those states, it is politically unrealistic.

6.3.3 Option 3: Joint delegation/Euro-franchising

The assumptions of the first two options are in large measure retained. In addition, in order to be able to (i) design the single European sky from a “blank page” and thus (ii) obtain an optimum organisation of enroute airspace from a safety, efficiency and environmental perspective, Council and Parliament would adopt a regulation “sunsetting” all existing ACC jurisdictions above an agreed flight level as of a date certain.⁶⁹

On that date, the pertinent jurisdictions would receive a formal European charter or franchise; *i.e.*, they would be operated as “European” under a two-step delegation procedure:

- From the states to the European Selection Committee (ESC);⁷⁰ and
- From the ESC to selected providers.

The underlying sunset regulation (abolishing the historic system) could be simple and blunt. It could also be differentiated, *i.e.*, create a rebuttable presumption that existing franchises

⁶⁹ See Interim Report, Section 4.5.2, for a short description of “sunset” provisions. It should be noted that a franchise sunset law could also be adopted as a flanking measure to Option 2.

⁷⁰ This Committee would be best made up of selected senior Member State technical and economic experts supported by an airspace users' advisory panel. Its recommended selections would be subject to Commission procedural review. Thus, its primary task would be the administration and execution of the franchise selection process. The determination of the number and boundaries of the future franchises to be awarded could have been previously accomplished by a separate rule-making process.

should be abolished, unless, by the date certain they demonstrate full conformance to agreed European criteria.⁷¹

Thus, award or reconfirmation of franchises (at least for those jurisdictions primarily serving border-crossing traffic) would be decided at the European level. Because of the need to ensure full safety protection, as well as political and economic confidence in the process, we recommend an open rulemaking procedure to review number and configuration of proposed blocks and to agree franchising terms and criteria. The ESC would then:

- Issue calls for tender;
- Evaluate subsequent bids; and
- Recommend franchisees to the European Regulator.

In addition, this option suggests the need for the following provisions:

- Ability of a Member State to appeal an award;
- Recommendations to be reviewed, approved or rejected (but not substituted) by the Commission and its advisory committee;
- Withdrawal of national airspace from these block arrangements and substitution, for example, of military ATC, in emergency or national security situations; and
- Operational regulatory oversight of the selected providers by Member States as well as by the European Regulator.

Pros

- (i) Adoption of this option in law would be politically decisive, could be technically optimal and should be economically sound.
- (ii) It would give Europe a strong tool to modernise and adapt its airspace procedures for the use of new technologies, and to enforce high standards of safety, efficiency and fairness (including professional and social standards) on a uniform basis.
- (iii) Notwithstanding its firm character, the sunset law could inspire early, positive, voluntary effects. The law could be written to permit existing operations to “prequalify.”

Cons

- (i) This option requires major legislation and requires choosing between the alternatives of being rather crude or quite complex.

⁷¹ Functional criteria could be derived from agreed airspace development strategies (e.g., as developed by Eurocontrol).

- (ii) A law that effectively obliged Member States to delegate provider selection authority would have to be very carefully crafted to preserve their sovereignty under the Chicago Convention;
- (iii) This option is probably neither “technically optimal” nor “economically sound,” when huge transition costs associated with such radical restructuring are considered.
- (iv) Even in the long-term, a centralised system might not be that productive. Recent U.S. performance problems at minimum suggest caution.
- (v) This option is very long range; the “date certain” for sunset would probably have to be placed far into the future. Thus, this option should be considered, if at all, as a final phase rather than as a total alternative to either Options 1 or 2.
- (vi) Finally, the scope of structural change implied in this option suggests the desirability if not need for a redesign area larger than present EU airspace. Thus, it should be thought of as a post-enlargement plan; irrevocable commitments to it should not be made in the pre-2005 first package of single European sky reforms.

[See next page for Table 2]

TABLE 2 ATTRIBUTES OF OPTIONS THAT ESTABLISH FUNCTIONAL AIRSPACE BLOCKS (FABs)

THE OPTION REQUIRES	OPTION 1		OPTION 2		OPTION 3	
	<i>Yes/No</i>	<i>Authority</i>	<i>Yes/No</i>	<i>Authority</i>	<i>Yes/No</i>	<i>Authority</i>
Privatising the provider(s)	<i>No</i>		<i>No</i>		<i>No</i>	
Establishing separate regulator	<i>No</i>		<i>Yes</i>	States/ER	<i>Yes</i>	ER
Reorganising upper airspace into FABs	<i>Yes</i>	States	<i>Yes</i>	States	<i>Yes</i>	ESC
Establishing minimum safety and performance standards	<i>Yes</i>	States	<i>Yes</i>	ER/States	<i>Yes</i>	ER
Conducting provider selection process	<i>Yes</i>	States	<i>Yes</i>	States	<i>Yes</i>	ESC
Conducting competitive franchise selection	<i>No</i>		<i>Yes</i>	States	<i>Yes</i>	ESC
Conducting regulatory review of selection	<i>No</i>		<i>Yes</i>	ER	<i>Yes</i>	ER

For Yes answers, the Authority that makes the decision or provides oversight is indicated.

Note: ER = European Regulator, *i.e.*, the European Commission with Eurocontrol working cooperatively.
ESC = European Selection Committee.

CHAPTER 7: EQUIPPING THE EUROPEAN REGULATOR

The Commission has asked us “to identify which regulator is best equipped to respond to the challenge of growth, competition and the best use of European airspace.” In one sense, the HLG Report has pre-empted this task. The Report considers Commission regulatory leadership, but specifically including cooperative relations with Eurocontrol, to be indispensable. On the other hand, leadership, especially with respect to the challenges named above, requires careful attention to the roles of existing players and processes as well as elaboration of new organisation.

This Chapter examines the regulatory landscape and the broad regulatory challenges going forward. The aim is to refine the Commission's original question from one of “who” the Regulator should be to one of “how” the Regulator should be organised and resourced. The goal is to set out the simplest structures and processes that deliver on the HLG's key recommendations.

7.1 Summary of Findings and Regulatory Implications

This Chapter examines European regulatory organisation, roles and processes, and makes recommendations about the staffing and location of airspace regulatory tasks. The “European Regulator” here refers to the European Community (EC) and the Eurocontrol organisation working cooperatively and capitalising on each other's strengths.⁷²

Airspace functions must be defined (see Section 7.3 below) and competence for them allocated. Key tasks (and responsibility for them) could include:

- Policy and Standards: Regulator and states jointly;
- Airspace Rules: Regulator with states input;
- Route/Sector Proposals: States and ATSPs to the extent deemed appropriate by the state which approves the arrangements;
- Airspace Design, including Route Design: Regulator with states' input, and interfacing with the ATSPs/Eurocontrol service provision;
- Allocation and Compliance: States;
- Investigative Capabilities: Regulator.

The two main new structural ingredients of the European Community/Eurocontrol/states structure could be:

- A European Commission Executive Secretariat containing a core of qualified staff over the whole range of the Commission's responsibilities; and

⁷² The Eurocontrol organisation could provide regulatory functions, with the Eurocontrol Agency providing the technical and operational airspace planning/design functions through its expertise and processes. The proper separation between “regulation” and other activities in Eurocontrol is vital.

- An Airspace Policy Commission (APC) set up by Eurocontrol on the lines of the SRC -- and thus assuring Eurocontrol state participation by technical experts -- and supported by an Airspace Policy Unit (APU). The APU's functions and responsibilities would be set out in a Memorandum of Understanding with the EC, as discussed in Part IV of this Study.

The Executive Secretariat would develop and coordinate (for the EU Member States) policy, standards, and airspace rules, and would endorse airspace design. It would be responsible for the audit programme -- which would *inter alia* serve as the earliest phase of formal enforcement processes. It would work with the experts from Eurocontrol and the states as well as interfacing with stakeholder groups. Illustrative tasks would include:

- Management and coordination of EC legal processes;
- Audits of FUA implementation;
- Airspace categorisation;
- EC state consultation processes;
- Inter-state issues;
- Facilitating liberalisation; and
- Approval of upper airspace design.

The cooperative process with Eurocontrol would also ensure consistency with wider ECAC developments. Broadly speaking, the Eurocontrol organisation's tasks -- to be carried out at the direction of its governing bodies and in cooperation with the Commission (as agreed with the EC) -- would be of two types: airspace/common support services and regulatory tasks.

- (a) **Regulatory tasks.** These include consultation with states, CFMU performance audits, civil-military coordination & CMIC, oversight of AIS and meteorological services, and non-EC states and ECAC interfaces.
- (b) **Airspace/common support services.** These are supporting functions with a Eurocontrol dimension, *e.g.*, airspace and route network design with states, supported by their ATSPs, and airspace users (civil-military), *etc.* Essential work would include the development of proposals for airspace and route network, supported by appropriate modelling, and analysis of detailed technical matters -- R/T phraseology, and equipment carriage requirements.

The regulatory tasks would have to be strictly separated from the main service provision and planning tasks of Eurocontrol. Otherwise, the oversight role covering regulatory and allocation of scarce resources responsibilities would overlap service provision tasks. Indeed, an HLG recommendation is that these must be wholly separate.

7.2 Introduction

This Section examines European regulatory organisation, roles and processes. It is divided into three sections:

- Section 7.3 sets out simplified definitions of key terms for a European Regulator -- the EC and Eurocontrol working together. It then presents some background relevant to organisational issues.
- Section 7.4 discusses and attempts to answer some key questions about the Regulator's roles and responsibilities.
- The final Section examines in more detail the regulatory and related tasks that would be carried out by staff in the Commission and Eurocontrol.

7.3 Airspace Definitions and Key European Elements

7.3.1 Key definitions

Airspace policy and regulation can be a very difficult subject to analyse and discuss. One reason is that the phrase describes a combination of functions. The subtext in the words "airspace" and "policy" can mean very different things to the controller, pilot and civil servant. To try to prevent some of these problems, some working definitions of key terms for a European Regulator -- the EC and Eurocontrol working cooperatively -- are used here:

- *Policy and Standards.* The decision-making, objectives and processes of developing the elements below, involving formal consultation with users and ATC providers. This balancing of interests -- of national security, commercial users and recreational flying -- has political dimensions at the state level. Policy is then enforced by regulation. This could cover work to develop guidelines for the process of airspace design -- "European Standards" in a general sense.
- *Airspace Rules.* For example, categorising different types of airspace and the procedures and equipment fits required -- both on the ground and in the air. Thus, in controlled airspace, pilots need to be able to fly with reference to instruments alone, aircraft need transponders to tell ATC radars of the height flown *etc.*, and controllers need to have suitable communications/surveillance equipment and procedures.
- *Route/Sector Proposals.* Proposals for changes to routes and sectors, flight procedures for pilots, *etc.*
- *Airspace Design.* The application of policy and rules across a region, state or beyond, through the detailed planning of airspace, including route design. This ensures that all requirements are considered and that the solution meets users' needs as far as states judge practicable. "Design", as used here, is always associated with the authority to accept a design rather than the work in developing designs.

- *Allocation & Compliance.* The actual mechanics of allocation and monitoring compliance with rules, etc. by ATSPs.
- *Investigative Capabilities.* These are not currently in existence in any form. They could be based on the ICAO Safety Audit model. It would be a more difficult task because airspace rules and processes are not yet codified to the same degree as safety regulations -but the Eurocontrol "Airspace Strategy for the ECAC States" will certainly provide an important basis. Audit teams would be able to go and examine the cause of lack of compliance and the results would be reviewed by the Regulator.

All these elements are discussed in more detail later in this Chapter.

7.3.2 Solving the real European airspace problems

At the heart of airspace work is the classical economic task of allocation: there will not be enough airspace for all users' preferences to be accommodated; moreover, there is no commonality about fair allocation methodologies. Collective endorsement of decision-making on airspace will therefore only be achieved if all users believe that their requirements have been properly considered. Ideally, all user groups must believe that the solution is justified and practical, given their different pros and cons. This aspect must receive high priority in any new organisational and process arrangements at the European level.

The airspace planning focus at a European level, as distinct from individual states (including neighbours working together), has to be the European Airspace Network, *i.e.*, with state boundaries being irrelevant, and must be developed objectively to meet user needs as far as possible. The routes for commercial traffic will require associated airspace sectors, which in turn need equipment and controllers to handle the traffic flying the routes. The European Airspace Network and supporting infrastructure is an airspace design activity. To underpin this design, there need to be common standards and procedures for the classification and allocation of airspace, coupled with appropriate changes to the route structure.

7.3.3 Airspace Design

The actual process of airspace design involves routes, airspace structure and user consultations in the context of ATSPs' ability to deliver capacity. European ATSPs have already delegated their flow management function to the CFMU. Collaborative European Air Traffic Management Programme (EATMP) work offers major support to airspace policy, strategy and concept development, as well as planning and implementation activities with states, in particular European route network design (see Chapter 2 above).

- (a) **Design responsibility.** Could airspace design endorsement therefore be the responsibility of ATSPs or even Eurocontrol's service provision function? The answer is no. The reason is that the European Regulator must have responsibility for balancing policy objectives against the demands of the different users and the varying proposals of the service providers. The involvement of ATS users must

mean more than just the airlines' needs for routes. States are responsible for all their airspace: this includes decisions on which bits are controlled -- and by whom and under what rules -- and which bits are not. The nature of the route network then flows from such considerations, not just from the needs of ATSPs to serve commercial customers. In particular, European airspace work must properly preserve the rights of states to use their airspace in a way that is acceptable for national security purposes.

But would there be an impropriety in the Regulator designing the system? How, indeed, can the regulatory body approve a design that it has itself produced? The answer is that the Regulator is responsible for a pan-European airspace system structure, not just the route system. This must be developed in accordance with agreed design standards and rules. The development must take fully into account states and their ATSPs' proposals, focus on network effectiveness rather than the artificiality of national borders, satisfy all airspace user needs to the maximum possible extent - and of course be capable of being implemented safely. The Regulator's task is to assess and endorse designs bearing fully in mind the interests of all users. The Regulator must take fully into account the considerable in-depth technical expertise underpinning recommendations for airspace and route network design in line with the above parameters. (Note that in the UK, where there is an explicit public division of roles, *DAP* (the Regulator) certainly authorises that the proposed airspace design is acceptable; but *NATS* (the ATSP) has to have quality and safety management systems in place to assure its safety regulator (*SRG*) that the routes and pilot/controller procedures are safe.)

The Regulator's responsibility for airspace design would only be regulated at a European level in terms of compliance with EC Treaty rules and enabling legislation. Issues in this regard can be raised through the European courts.

- (b) **Design development** The European Regulator -- with considerable expert input from states and ATSPs -- would assess existing proposals, plans and user requirements, including national security needs. Then, using computer simulations and other techniques, it would identify those bottlenecks and inefficiencies that can be resolved by changes to the network. This work would require transparent processes and consultation arrangements. It would have to be open to challenge by the ATSPs and users -- there would no doubt be several technical iterations. This is the vital element for strengthening European airspace planning.

The process of European airspace design does require a very close working relationship between the European Regulator and Eurocontrol service provision activities/states and their ATSPs. The current Eurocontrol work on capacity planning would be the key service provision element interfacing with the European Regulator. Such capacity planning must include the tasks of aggregating demand, analysing bottlenecks and determining capacity targets for the local level to reflect network needs. This is essential in order to build the overall picture and to set performance objectives for the design.

Eurocontrol has established airspace-related expertise at the European level and already undertakes technical consultation with all interested parties (civil and military) to develop airspace and route network structure designs.

- (c) **European added value.** As indicated above, the European Regulator has more than a passive role. It could potentially be made more active and interventionist than the state regulators, by allowing it to set targets to be met and to require changes to be made. If Europe were to follow the UK principles, then much of the design work and computer simulations *etc.* above would be carried out by Eurocontrol in conjunction with states/ATSPs, as part of the design proposal submitted to the regulator for assessment, agreement and endorsement. Addressing bottlenecks -- which should be apparent from state, Eurocontrol Agency and PRC work -- would be a key part of this process.

There is obviously a need to prevent unnecessary duplication, as considerable cost and effort has to be expended in constructing route and sector proposals. Full cognisance must therefore be taken of the competence of the Eurocontrol Agency and ATSPs' work. Any reassessment by the Regulator's staff or states would need to be fully justified, at the very least to prevent the possibility of accusations by airspace users of nugatory activity.

(d) **Summarising airspace design:**

- (i) Neither ATSPs nor Eurocontrol's service provision function can be responsible for the design of the airspace, because of the need:
- to ensure and demonstrate fairness to all users;
 - to meet states' national security requirements; and
 - for the Regulator to approve design.
- (ii) The Regulator is independent and has the task of balancing the competing demands for airspace.
- (iii) Therefore, the Regulator, with recommendations based on Eurocontrol service provision/states'/ATSPs' inputs, has airspace design acceptance responsibility. Above all, competing demands and proposals must be balanced fairly.
- (iv) Within the European airspace structure, the route system, equipment, pilot/controller procedures, *etc.*, are only deemed safe when they are authorised by the safety regulator.

7.3.4 Breakdown of airspace functions at a European level

Given the discussion above, the breakdown of airspace functions at a European level might be as follows:

- Policy and Standards: Regulator and states jointly;
- Airspace Rules: Regulator with states' input;

- Route/Sector Proposals: States and ATSPs to the extent deemed appropriate by the state which approves the arrangements;
- Airspace Design, including Route Design: Regulator with states' input, and interfacing with the ATSPs/Eurocontrol service provision;
- Allocation & Compliance: States;
- Investigative Capabilities: Regulator.

These functions are illustrated in Figure 6 below.

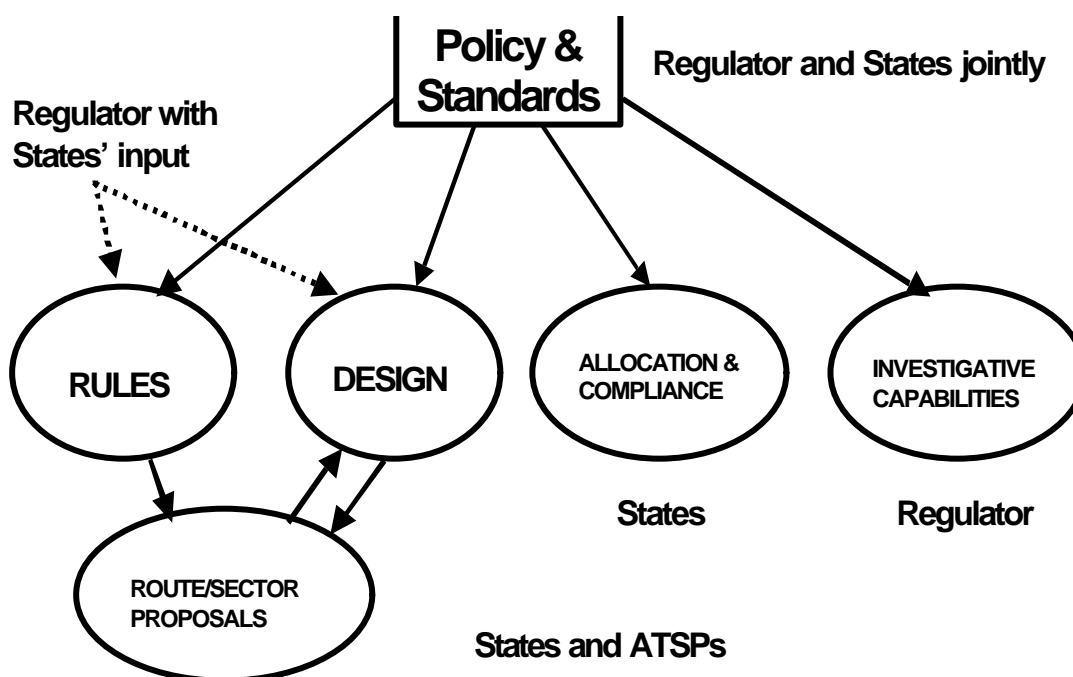


Figure 6: Airspace Functions at a European Level

The two-way arrows shown between route proposals and airspace design emphasise that this will be, in effect, a joint activity -- but the final arbiter must be the Regulator. This is of course only a top-level description of tasks.

7.4 Discussion of Organisational Roles and Responsibilities

This Section discusses and attempts to answer some key questions about the Regulator's roles and responsibilities. Each sub-section deals with a separate group of detailed questions, which are set out in *italics* at the beginning of the text. The detailed questions are then answered, following a discussion of key points.

7.4.1 Basic framework of analysis

These sorts of policy questions cannot be answered in a “vacuum.” There has to be some framework and assumptions upon which to build. The correctness of the answers very much depends on this framework. There are three elements to the framework here:

- The HLG recommendations are obviously an essential part of the framework, as the Project Team’s outputs must derive logically from the HLG’s work.
- The simplified definitions of key aspects of airspace policy and regulation introduced in the first Section are used.
- Subsidiarity has been taken as a guiding principle. It will lighten the burden of bureaucracy. Thus, decision-making should be carried out at the lowest level -- local, national, regional or European -- at which it is effective. One important message is that centralised policy making must not be allowed to damage good working relationships between states and airspace policy makers.

7.4.2 Adapting the framework

These elements are not in themselves sufficient. Issues of practical politics must be addressed. Given the variety of state ATS structures in Europe, the future arrangements will need to be a “loose fit”, *i.e.*, should ideally require minimal change to states’ internal structures. The way forward has to be politically acceptable to all the states and meet customers’ needs. The aim should therefore be to find rational and progressive arrangements that can subsequently be adapted and developed to produce further improvements. In particular, the status of privatised ATS bodies still has to be fully resolved at a European level. The precise status and responsibilities of ATSPs must therefore not be critical factors in the proposed arrangements.

7.4.3 Key process goals

In the context of the HLG’s desire to make a real difference to European ATS performance, it is vital to focus on and test potential European-level processes and outputs that will deliver the greatest “added value” to airspace users. Thus, do the processes and structures make sense in terms of tangible benefits to airspace users? Is there clarity about ATSP, state and European-level roles? Is there assurance that the ideas will work in practice?

7.4.4 Powers

What powers would the European airspace Regulator have? What decisions could it make and implement? When can it tell states or ATSPs not to do something or when they must do something? What are its sanctions? Does it make recommendations that can be appealed to a higher body? If the Regulator issues instructions (?), and these are not obeyed then what are the processes? What are the main areas where powers would exist?

- (a) **Necessity for powers.** Powers are vital to the organisational set-up. Without them, the Regulator could not ensure compliance, strategically manage the single

European sky, or ensure the efficient achievement of most of the HLG's other recommendations. Powers can be of many types: they could be legally based or more indirect (an example of the latter is being in a position to influence parliamentary/public/industry/customer opinion). Legal powers must derive from the EC or from Eurocontrol.

(b) **Types of powers required.** Taking the earlier definitions, the European Regulator would need powers as follows:

- *Policy and Standards.* These are to be developed jointly by the European Regulator and states. They are the results of these consultation and decision-making processes that require regulation -- and hence powers.
- *Airspace Rules.* These are European rules on airspace categorisation and equipment, and would need European powers.
- *Route/Sector Proposals.* This activity lies with states, acting individually or jointly, and the Eurocontrol Agency. The European Regulator has no operational role.
- *Airspace Design, including Route Design.* As already noted, this is the vital element for strengthening European airspace planning. Overall responsibility lies with the European Regulator. This task would require considerable expert input from Eurocontrol, states and ATSPs in assessing proposals, plans and user requirements (including national security needs) in order to identify those bottlenecks and inefficiencies that can be resolved by changes to the network. This technical work would need to have transparent processes and consultation arrangements, and would have to be open to challenge by the ATSPs and users.
- *Allocation and Compliance.* States would carry out these functions working within European rules.
- *Investigative Capabilities.* These would solely be the European Regulator's tasks. The European Regulator needs powers should the audit process reveal significant failures by states to implement European rules.

(c) **Conclusions on powers.** The answers to the detailed questions might be:

- The European Regulator would have powers on policy, airspace rules and airspace design; and be in a position to adopt and enforce action plans following audits.
- Airspace rules and European airspace designs would be the main decision making aspects, and would be binding on states.
- Sanctions would include publicity where states, ATS providers and users have not complied with the airspace rules -- but possibly also financial penalties in extreme cases.

7.4.5 Rule-making processes

How dynamic is the Regulator's capacity to produce rules? How are these signed off before enforcement? How are these processes made efficient? How is the necessary integrity of expertise ensured?

- (a) **General scope of authority.** The European Regulator has to have full capacity to produce rules. By implication, it must be able to carry this out in ways that meet European needs, as required by the HLG. It was suggested earlier that airspace rules would be the responsibility of the European Regulator, but with full input from states. This means that states would commit to providing expertise to help develop rules.
- (b) **Model processes.** One model for such processes would be ICAO plus mechanisms to prevent delays in decision making. Collaboration is the main vehicle by which the ICAO works. Technical work is generally split up between the interested countries, each being allocated complementary tasks. ICAO collaboration is usually done by mutual agreement through meetings of Panels and Working Groups, taking note of the experience and track record of the technical experts concerned. It is a team effort to make progress towards some sort of consensus. The puzzle is how to avoid lengthy and costly decision making processes when unanimous decisions are needed. The extra ingredient to ensure that no delay occurs in European decision making would be qualified majority voting (as already included for example in the Eurocontrol revised Convention).

It is important to note that ICAO Panels and Working Groups are led by chairmen and rapporteurs respectively. These individuals are chosen from states' experts (who are not supposed to act merely as "states' representatives") -- rather than from ICAO staff. The latter act as the secretariat but participate fully in the meetings. The process is generally collegiate, with nominally equal partners rather than one in which ICAO directs and orchestrates. The output has the authority of ICAO.

- (c) **Conclusions on rulemaking.** Thus the answers to the detailed questions would be:
- The European Regulator has full capacity to produce rules.
 - Rules would be generally "signed off" for enforcement by the Regulator in accordance with comitology procedures (and for consistency, through Eurocontrol for non-EU states).
 - These processes would be efficient because the European Regulator would provide an Executive Secretariat -- of which more later in this Chapter -- and Eurocontrol and states would provide technical experts.
 - The necessary technical expertise is ensured by fully involving Eurocontrol and states in decision making processes -- which means *inter alia* that they cannot subsequently evade responsibility for the consequences of decisions.

7.4.6 Investigations, analysis and complaints

Does the Regulator have investigative capabilities? Can its professional staff go and analyse the causes of bottlenecks? Given some top down ability, how far down can they go? Can the Regulator be proactive or should its posture be responsive? How would airline complaints about airspace issues be processed with these arrangements?

- (a) **The question of tools.** The HLG says that the European Regulator shall ensure compliance. To do this, it would be essential to have investigative and analytical capabilities -- the tools to do the job. The HLG also recommends that system optimisation should be managed at a European level: to do this it is necessary to have access to accurate and comparable information.
- (b) **Role of PRC.** There is obviously a very strong relationship here with the work of the PRC. Its main task is providing advice in order to ensure the effective management of the European ATM system through a strong, transparent and independent review and target setting system. There is much to be said for keeping the PRC independent from formal regulation, except for possible assignment of advisory responsibilities. Thus, it could audit regulators as well as service providers and respond to concerns of stakeholders.
- (c) **The issue of acceptance and “buy-in.”** State sensitivities would obviously be extremely important. A practical regulatory model that states could accept might be based on the ICAO Safety Oversight Audit Programme. This audit programme is designed so that states ensure the effective implementation of the safety-related SARPs contained in ICAO Annexes. It was implemented because of increased concern about the level of safety world-wide, particularly in respect of the implementation of regulations. Audit assessments were initially voluntary, confidential and state-funded. These were vital characteristics in ensuring states’ “buy in.” As the programme developed, the collective will has been developed to introduce mandatory, transparent, and ICAO-funded audits.⁷³
- (d) **Terms of the ICAO audit.** Some important ICAO audit principles are:
- Sovereignty of states;
 - Universality;
 - Transparency;
 - Objectivity;
 - Fairness; and

⁷³ A number of countries, including virtually all who have recently negotiated bilateral air services agreements with the United States, have adopted binding reciprocal provisions, in the form of Safety or Airworthiness Articles, that provide for suspension of the operating rights of airlines who do not meet ICAO safety standards. This has added teeth to the ICAO audit programme.

- Quality.

Audit programme staff are carefully made up from ICAO personnel, states and regional organisations, selected according to pre-specified criteria. The outputs can therefore be seen as the judgement of independent experts.

Audits are conducted at ICAO's initiative, but only with the consent of states. There are follow-up audits to review progress and ensure that new requirements have been adopted. Audits are carried out against documented ICAO SARPs and national standards, often using standard questionnaires. They examine the effectiveness of the systems and processes in use as well as the actual implementation record.

The final output includes findings, recommendations and corrective plans. The state has the opportunity to comment on draft material, thus removing any misunderstandings. Moreover, the state can also provide vital feedback to ICAO on its perception of the audit.

- (e) **Complaints.** As noted earlier, the aim would be to try to deal with these within the state concerned. There would first be an attempt to resolve matters informally. If this did not satisfy the complainant, then a formal process would be followed, documenting the arguments for the complaint and the state organisation's response. However, it should be noted that, as regards EC Member States, overall responsibility for compliance review would rest with the EC, with support from Eurocontrol.

States might also ask for review. This could then lead to an amendment of policy. It would be very optimistic to suppose that all policies would pass smoothly into practice, so this type of informed feedback loop would be essential.

- (f) **Conclusions on investigation, analysis and complaints.** If such a model were to be followed, then the answers to the detailed questions would be:

- The European Regulator would have an investigative capability, possibly modelled on the ICAO Safety Audit model. Whilst it could be a more difficult task -- because airspace rules and processes are not yet codified to the same degree as safety regulations -- the developing Eurocontrol "Airspace Strategy for the ECAC States" will certainly help.
- Audit teams would be staffed by experts and would be able to go and examine the cause of bottlenecks. Given the supra-national authority of the EC, it will not normally be necessary to obtain the prior agreement of the states concerned. However, acceptance of the state concerned will be an important element in obtaining effective cooperation. Audit processes would be invaluable early steps in enforcement processes (see below).
- The audit team would be able to investigate down the level of airspace sectors.

- The European Regulator would be proactive.
- There would be informal and formal processes for complaints.

7.4.7 Military

Should there be a formal military department within the Regulator? Does the HLG make it clear how the civil-military debate takes place? How is the larger European view ensured?

- (a) **Integration.** The HLG recommends that there should not be any separation between the civil and military parts of the European Regulator. It is important to stress that an integrated approach is to be adopted.
- (b) **Planning.** The HLG notes that military requirements in Europe need to be coherently defined for airspace planning. This implies that each state should adopt a consistent set of high level planning rules on military needs, which would then feed in to the European picture.
- (c) **Conclusions on military.** The answers to the detailed questions might be:
- There should not be a separate military department within the European Regulator. However, existing military bodies would of course support its work.
 - The HLG wants civil-military debate to take place in an integrated fashion.
 - The larger European view should be ensured by the European Regulator determining a set of military requirement planning rules for states to follow. Because of their security implications, these rules would have to be agreed by states.
 - Military, general and commercial aviation groups would be free to form a coordinated view via NATO, IAOPA, CANSO and IATA if they wished.

7.4.8 States and Europe

What are the state/European relationships? When would the state have to seek a European view/permission for taking a particular action? How are regional problems -- i.e., problems involving several states -- to be resolved?

The answers -- summarising some of the points in the earlier text -- are:

- States would have to accept the authority of the European Regulator in rules, design and audit/compliance processes.
- The state would have to seek a Regulator view if its internal decisions did not meet the agreed European airspace rule and design. It could question the appropriateness of European rules etc., either based on special technical or geographical factors within the state or because of cross-border problems. The European Regulator would decide on such issues following a compliance investigation.

- Regional issues would be dealt with by special audits and decisions by the European Regulator. The states concerned might well wish to try European Regulator mediation before following this formal process.

7.5 EC and Eurocontrol Structures

Organisational and process design are not straightforward logical consequences of goals and objectives. Some choices have to be made. Moreover, the output usually has to be “sold” to the parties authorising the creation of the design. Much work was done on this sort of “constitutional question” by the economist James Buchanan. One of his conclusions is that, whilst an organisation can operate by majority rules once set up, agreement on the mechanisms by which it operates must be as near unanimous as possible. Thus, there must be consent about checks and balances, protection for minority interests, procedures for amending decision-making processes, *etc.* If this is not the case, then the design will fail -- it will be torn apart by arguments between the participants.

Figure 7 below sets out an outline of a possible EC/Eurocontrol/states structure focusing on processes. This is a “Strawman” attempt to produce something that meets the HLG’s recommendations; that could work effectively; and which states could support. It might also be possible to evolve from this to a more agency-like structure in the longer term, if this were to be required and if it could get the endorsement of states. The main ingredients are:

- A committee of states to review, consult and advise the European Regulator;
- EC regulatory role with clear tasks;
- European Commission Executive Secretariat containing a core of qualified staff over the whole range of the Commission’s responsibilities discussed further in the next Section;
- Participation by states in both the EC and Eurocontrol’s work relating to European regulation;
- Eurocontrol setting up an Airspace Policy Commission on the lines of the SRC, with majority voting; and
- A facility whereby measures with national security aspects can be resolved.

[See next page for Figure 7]

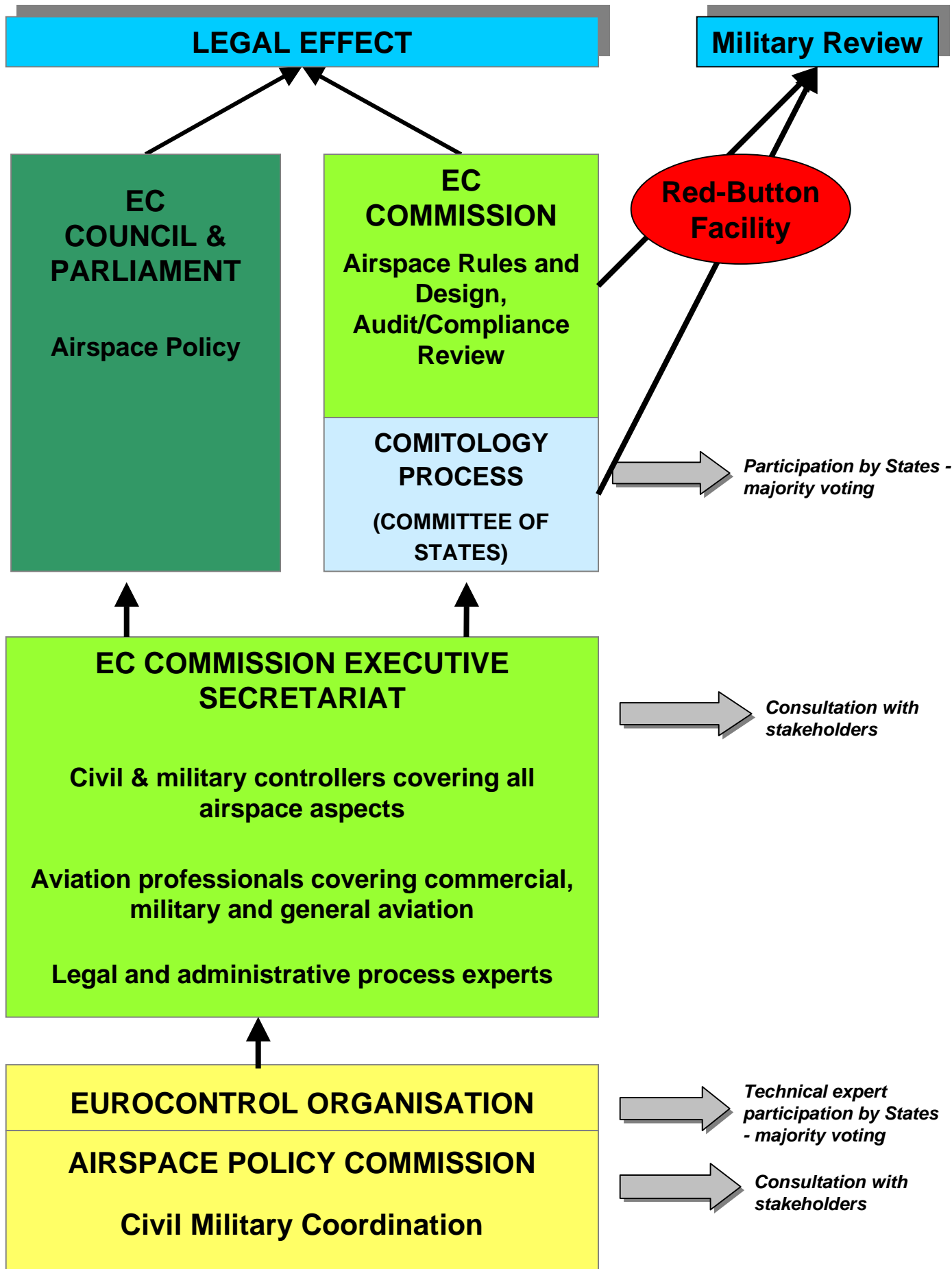


Figure 7: Outline of Possible EU/Eurocontrol/States Structure

7.5.1 **Observations to the structural ingredients set forth above**

- (a) **Basic aspects.** The first of the above bullets reflects the normal comitology arrangement within the EC; the second has been covered previously; and the last reflects the need to resolve the civil-military aspects of the HLG Report. The remaining bullets need some explanation.
- (b) **Executive Secretariat.** A compact and technically competent secretariat is created for the purposes of coordination, general oversight, and troubleshooting, and to provide leadership in policy development. This is in the spirit of “steering” as opposed to “rowing.” We, therefore, functionally describe this as an Executive Secretariat, implying having a core of staff skilled in bridging technical requirements and general policy concerns.⁷⁴ This would be a vehicle set up within the Commission. It would carry out policy development tasks and be the kernel of the audit programme (which would be a key early stage in enforcement processes). It would work with experts from Eurocontrol and the states. There would be participation through comitology processes to develop agreed policy, much on the lines of ICAO. The added ingredient would be majority voting -- to ensure quick decision-making. Thus, it would be possible to agree that a draft needed no further revisions or that an airspace design was sufficiently comprehensive. The aim would be to deliver good quality outputs in a reasonable time.
- (c) **HLG considerations.** Does the Secretariat deliver on the HLG’s recommendations? First, this meets the requirements of the HLG. In particular, the Regulator defines the high level rules; Eurocontrol’s contribution is built in to the structure; and both civil and military elements are covered. Note that the Secretariat would focus on largely new “European” tasks rather than take over states functions -- it adds value.
- (d) **Subsidiarity considerations.** The Secretariat concept also meets subsidiarity requirements. It is an essential element of an EU-wide drive to achieve the single Eurocontrol sky. Participation of the states in the development of policy is much preferable to merely a consultative approach (which is more appropriate for stakeholders). It uses the considerable expertise of states in active and efficient processes rather than asking them to be passive recipients of consultation material. Much of this work would be done -- as in ICAO -- efficiently and effectively by small specialist subgroups, rather than through plenary sessions involving all states. Most important, participation -- facilitated by skilled European Commission staff -- builds up a consensus, whereas consultation can frequently be a divisive process.
- (e) **Standing EC Guidelines.** This structure meets the most important tests that the EC has set to reduce bureaucracy:
- Any action taken must always balance the need to keep down financial or administrative burdens on the EC;

⁷⁴ It is stressed that the word “Secretariat” is used because it suggests a staff function rather than a political or state one. In the USA, the comparable phrase might be “Office of Airspace Policy and Regulation.” A phrase such as “Steering Group” would, in the UK, tend to imply that state representatives were involved.

- The form of action chosen should be as simple as possible, consistent with the need for legislation to be effective and enforceable; and
- Whenever appropriate, coordination and cooperation between Member States should be encouraged rather than EC action taken.

On a practical level, there is little point in effectively transferring professional work and staff from states to a centralised European unit if much of that work can be done cost effectively within states. Significant benefits -- in terms of synergies or efficiency gains -- would need to be demonstrated to justify a central solution beyond the Secretariat. The Secretariat is focused on the "European Dimension."

7.5.2 Eurocontrol Airspace Policy Commission (APC)

Eurocontrol has a new role in the structure through an Airspace Policy Commission (APC). This could be broadly established on lines similar to the present SRC. It would rely heavily on participation by Eurocontrol and states' technical experts. Its decisions would be made through majority voting.

The nature of the APC's tasks is discussed in the next sub-section. One vital point is that, whatever it does, the APC's work would have to be organisationally separate from Eurocontrol's main ATC service focus. Otherwise, the APC's regulatory and allocation of scarce resources responsibilities would not be separated from its service provision tasks. The HLG has recommended that these functions must be wholly separate.

It needs to be emphasised that Eurocontrol has had little mandate, and hence little experience, in discharging airspace regulatory functions. However, as noted earlier, there are capabilities in closely related fields, such as air navigation. Thus, airspace tasks would generally cover new functions rather than just being a re-structuring of existing work.

7.5.3 Location of regulatory and related tasks

The previous paragraphs focused on determining a structure for European regulatory processes. It is next necessary to examine in more detail the regulatory and related tasks that would be carried out by staff working in the European Commission and Eurocontrol. Figure 8 below illustrates the sort of decisions that have to be made. Tasks' characteristics are shown by stars in a triangle representing the nature of the work. The position of each star represents the degree that it fits in with the criteria set out at the vertices. Thus, a star next to a vertex would be simply described by the criterion at that vertex, whilst another in the "middle" would have elements of all three criteria. The left of the triangle corresponds to the European Commission and the right to the Eurocontrol organisation. The European Commission is focused on high level policy-making and ATM regulation in the broadest sense. Eurocontrol is more technically competent and operationally experienced, and has a wider European remit. Some Eurocontrol tasks are regulatory, while others, such as CFMU, are service provision-related -- corresponding to the top and bottom of the right hand side of the triangle.

[See next page for Figure 8]

Regulatory and related staff tasks

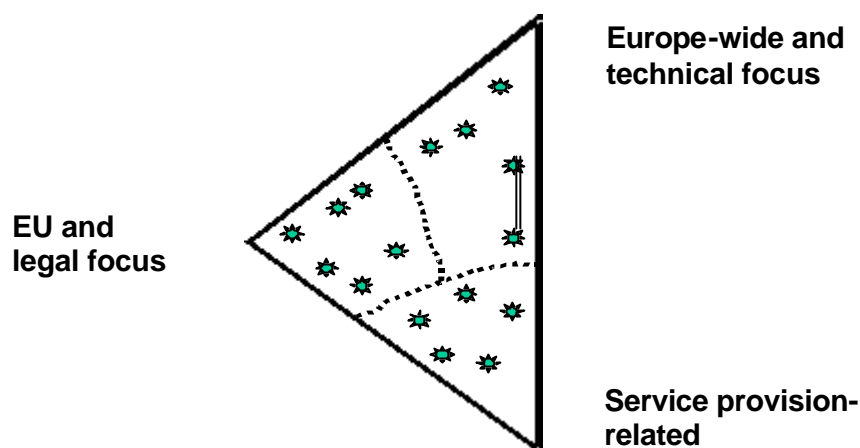


Figure 8: Regulatory and Related Staff Tasks

Management questions. The objective is to divide up tasks in ways that make sense. This is easy for some tasks, but others could quite feasibly be done in either organisation. The decisions have to be based on practicalities and linkages with other tasks. The dividing lines shown in the triangle have, to some degree, to be arbitrary. In particular cases, there may be reasons why separate tasks should be carried out in the same organisation. Thus, Figure 8 shows two linked tasks that appear to be some “distance” apart, but which in practice should be kept together -- for example, this might be because they necessarily use the same database information.

[See next page for Figure 9]

EUROPEAN COMMISSION

EUROCONTROL

Regulatory Tasks

Services

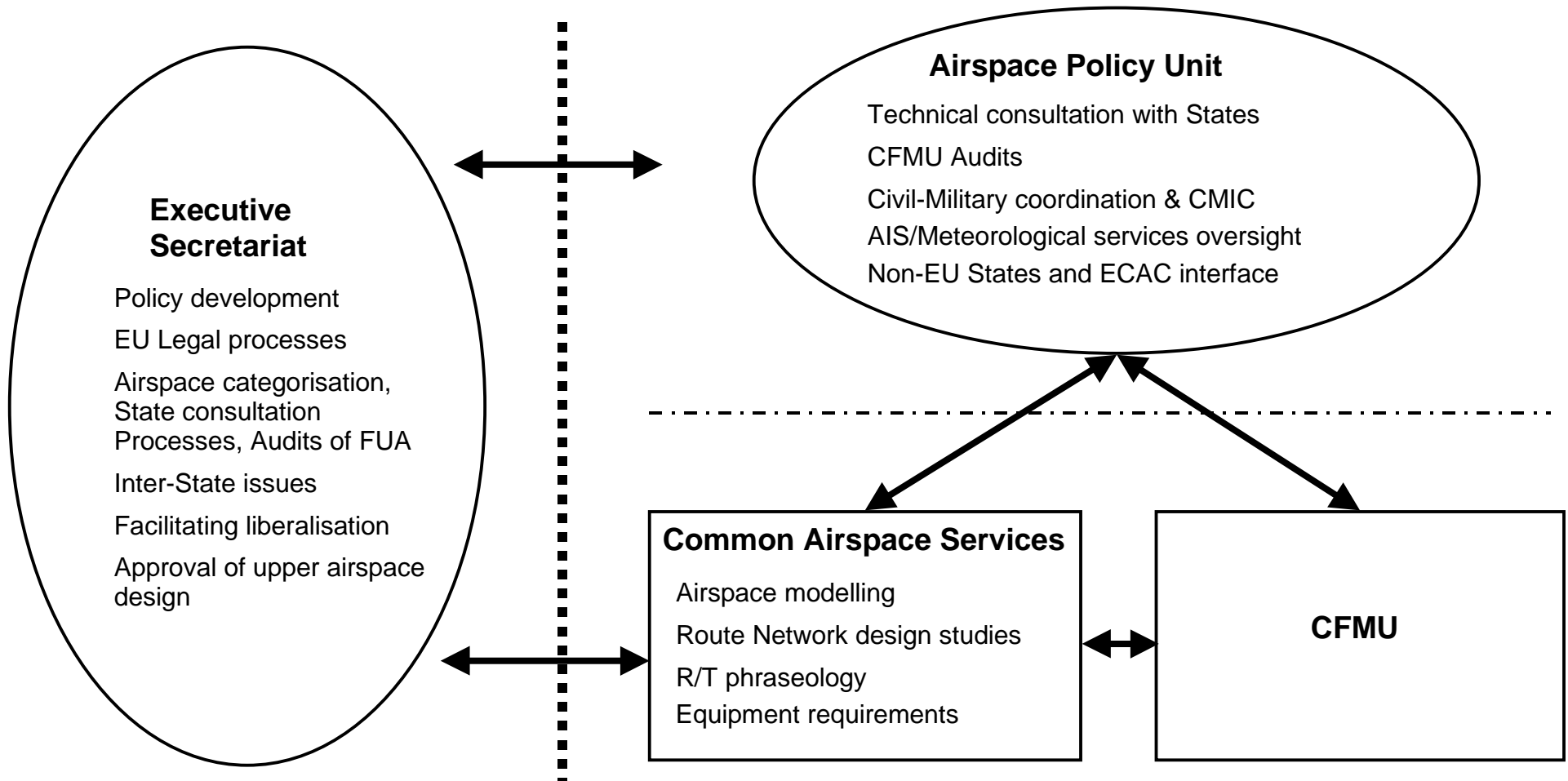


Figure 9: European Commission & Eurocontrol Airspace Staff/Tasks

Does not show reporting lines, processes or linkages to States/ECAC

Figure 9 illustrates a possible division of airspace-related tasks -- a “Strawman” -- between the European Commission and Eurocontrol. This follows the general scheme sketched above, but it is by no means the only “feasible” breakdown of tasks. Note that this diagram focuses on staff functions in the different bodies, not on reporting lines or linkages to states.

7.5.4 Eurocontrol Airspace Policy Unit (APU)

The “APU” is the group of airspace regulatory staff in the Eurocontrol organisation. It operates on a similar basis to the SRU and PRU. It has to include those Eurocontrol tasks that might cause difficulties were they to be too closely associated with Eurocontrol’s service provision activities. It reports to the APC, a technically expert body that ensures appropriate oversight by Eurocontrol states.

- (a) **Consultative functions.** The APU has a technical consultation role across Eurocontrol states, because that is a crucial element of airspace policy work. Eurocontrol already does a lot of this as part of its support to ECAC on airspace categorisation. Technical consultations would be on such policy matters as the categorisation of airspace, where it is not for service providers to take the lead.
- (b) **Oversight functions.** CFMU audits are included here. This aspect cannot be in the service provision part of Eurocontrol. It might be located in the European Commission Executive Secretariat, but, as the work required is more technical analysis than policy, this could be done more efficiently in the Eurocontrol Unit. This would simultaneously exercise oversight over ATFM operational compliance outside the EU Member States.
- (c) **Civil-military coordination.** These procedures are technical rather than policy orientated. This would build upon or relate to CMIC, which is already a Eurocontrol organisation body (reporting to the Council, not into EATMP). CMIC’s tasks are to provide advice on issues affecting the interfaces between military and civil ATM. Its tasks are largely concerned with airspace issues. The new Military Harmonisation Group (MilHAG) being established under CMIC might be collocated with the APU.
- (d) **Interface with non-EC Eurocontrol states.** The work of the APU could of course provide regulatory functions to non-EC as well as EC members through appropriate Eurocontrol management mechanisms.

7.5.5 Eurocontrol – Airspace/Common support services

The “Eurocontrol Airspace/Common support services” grouping covers work required in support of airspace regulatory tasks, but which would necessarily interface with the service provision activities. For example:

- Much of the work in airspace modelling (using computer software that the Agency already has in place) is “objective” fact-based and professional work. It does not

involve the negotiations, enforcement and “balancing” associated with airspace policy work.

- Airspace and route network design would build on the existing activities and (using bottleneck analysis and capacity targets) develop airspace and route network design recommendations to accommodate future ATM plans and initiatives consistent with agreed policies. This would not cover approval of network/route/sectors, *etc.* -- a regulatory task.
- Finally, R/T phraseology and equipment requirements are examples of largely technical rather than policy matters. All the elements in this grouping are important to support regulatory requirements for ground and airborne equipment provision. This clearly impacts on Eurocontrol's service provision work and states' ATSPs.

7.5.6 APU/CFMU relationship

Figure 9 shows a linkage to the CFMU, which would be the source of much of the data used by the airspace policy and regulatory staff in the European Commission and Eurocontrol. Organisationally, the CFMU operates in parallel to (and in close interaction with) Common Services. Currently, it is separately managed within Eurocontrol -- it is not part of the EATMP sub-organisation. For further discussion of the CFMU, see Chapter 3 above. The salient point for this analysis is that the APU could provide a logical organisational location for CFMU oversight.

PART IV A FRAMEWORK FOR FUTURE EUROPEAN AIRSPACE REGULATION

CHAPTER 1: INTRODUCTION

This Part of the Study draws on the analysis contained in Parts II and III in order to develop a comprehensive regulatory framework for airspace management and design. Chapters 2 to 6 lay the groundwork for this framework by reviewing the regulatory issues that must be dealt with. These include:

- The legal basis for and limitations to Community action;
- The legal processes to be engaged in;
- The institutional network for airspace regulation in Europe;
- Enforcement and compliance procedures;
- Regulatory processes; and
- The regulation of ATFM.

Chapter 7 seeks to integrate the analyses in the preceding Chapters with those in Part III of the Study. It provides an outline for Community regulation, in particular in relation to those areas identified in Part III as requiring European-level regulation in order to achieve the single European sky.

CHAPTER 2: LEGAL ENVIRONMENT FOR EC LEGISLATION

In this Chapter, we examine those elements of the Community legal system that form the parameters within which regulation of airspace management and design will take place. These elements include:

- The legal basis for action;
- Fundamental Community law principles;
- The question of national sovereignty; and
- The coordination of civil-military concerns.

2.1 The Legal Basis for EC Jurisdiction over Airspace Matters

According to Article 3(f) EC Treaty, the EC shall develop a common transport policy. The most appropriate legal basis for EC action to establish a policy in the area of airspace management and design is Article 80(2) EC Treaty. This article provides that *“the Council may, acting by a qualified majority, decide whether, to what extent and by what procedure appropriate provisions may be laid down for sea and air transport. The procedural provisions of Article 71 shall apply.”*

Article 80(2), therefore, offers a broad legal basis for the implementation of Treaty objectives in the area of air transport. It has already been used for Community action in this area, most recently as a legal basis for the Commission’s proposal for a Council Regulation establishing EASA.⁷⁵ Generally, it allows Community measures to:

- Implement the free movement guarantees under the Treaty;
- Harmonise airspace classifications and standards; and
- Set down minimum standards in relation to a European airspace.

2.2 Proportionality and Subsidiarity

When enacting legislation, the Community must comply with fundamental principles of Community law, including proportionality and subsidiarity. Proportionality requires that actions taken to achieve a particular aim correspond with the importance of the aim and are necessary for its achievement. Subsidiarity requires that Community action is taken only where the desired objectives cannot be achieved effectively through action at national level and, therefore, can by reason of the scale or effects of the proposed action, be better achieved by the Community.⁷⁶ The subsidiarity principle is incorporated into the Treaty at Article 5.

In order to comply fully with the principle of subsidiarity when regulating this complex area, the Community should confine itself, wherever possible, to setting minimum standards to be complied with and should allow as much room as possible for the Member States to implement those standards.

⁷⁵ It was also used as a legal basis for Council Directive 93/65/EEC of 19 July 1993 on the definition and use of compatible technical specifications for the procurement of air-traffic-management equipment and systems, O.J. No. L 187 of 29 July 1993, pp. 52 sseq., which serves for the implementation of Eurocontrol Standards.

⁷⁶ See Protocol (No. 30) on the application of the principles of subsidiarity and proportionality of 1997 annexed to the Treaty Establishing the European Community (adopted within the framework of the Amsterdam accord), Para. 5, which establishes guidelines for the application of subsidiarity in Community legislation. According to these guidelines, Community action is justified where “(i) the issue under consideration has transnational aspects which cannot be satisfactorily regulated by action by Member States; (ii) actions by Member States alone or lack of Community action would conflict with the requirements of the Treaty (such as the need to correct distortion of competition or avoid disguised restrictions on trade or strengthen economic and social cohesion) or would otherwise significantly damage Member States’ interests; (iii) action at Community level would produce clear benefits by reason of its scale or effects compared with action at the level of Member States.”

2.3 State Sovereignty as a Limit to EC Airspace Jurisdiction

It has been argued that states have no right to transfer matters regarding the air space above their territories to a supranational organisation such as the EC (or another state). According to this view, Article 1 of the Chicago Convention, which recognizes the complete and exclusive sovereignty as belonging to the contracting state, would be deemed to be mandatory (see also Article 82 of the Convention). Thus, any transfer of sovereign rights to another state or institution would seem to be excluded by the Convention.

However, Article 1 did not establish the sovereignty of states over their air space. Article 1 and Annex 11 merely recognised the pre-existing concept of sovereignty. Consequently, those provisions acknowledged the right of the parties to their sovereignty, but did not create an obligation for the parties to keep it. In other words, Article 1 is of a declaratory rather than a constitutive nature.

It is generally accepted that sovereignty over air space can be seen as derivative of sovereignty over the territory of a state.⁷⁷ Territorial sovereignty is essentially a concept of ownership; the territory is (part of) the state's property. Therefore, as with any other property right, the state is free to transfer the sovereignty over its air space in part or whole to another state or a supranational organisation.⁷⁸ By (partially) delegating sovereign rights, the ceding state allows another state or a supranational organisation to exercise certain actions on/over its territory.⁷⁹

However, the question of state responsibility in case of non-compliance with ICAO and other international public law rules arises. In general, only an entity with international legal personality (*i.e.*, the state or supranational organisation) whose organs carried out the actions that breached international law can be held liable for those actions. This is the case even if the actions occurred in the territory of another state.⁸⁰ The EC, a subject of international public law, can attract state responsibility for non-compliance with international rules on airspace management and design to the extent that it is bound by such rules. This applies in particular to rules of customary international law and to Eurocontrol rules once the EC has joined Eurocontrol.

As regards rules established within the ICAO or ECAC frameworks which have not developed into general customary international law (the majority of such rules), the EC (itself only an observer at ICAO) is not bound by them. Therefore, from an international public law perspective, EC Member States that are members of ICAO must ensure, through action within the Council, that the EC respects ICAO rules. If the EC fails to do so, Member States could be held responsible under international rules of state responsibility.

⁷⁷ Vitzthum, in Vitzthum, *Völkerrecht*, Berlin 1997, Part V, Para. 33, p. 419.

⁷⁸ Vitzthum, in Vitzthum, *Völkerrecht*, Berlin 1997, Part V, Para. 2, p. 402.

⁷⁹ Vitzthum, in Vitzthum, *Völkerrecht*, Berlin 1997, Part V, Para. 4, p. 403.

⁸⁰ Ipsen, in Ipsen, *Völkerrecht*, Munich 1999, § 40 Para. 38.

2.4 Civil-Military Coordination

As presented in Parts II and III, civil-military coordination is a key element in the implementation of the single European sky. However, military concerns are traditionally within the sovereign domain of the Member States. Nevertheless, the regulatory framework can ensure that military concerns are respected through:

- Integration of the military in the decision-making processes for airspace management and design regulation;
- Coordination of military airspace design and planning through the development of joint military standards;
- Coordination of civil and military air traffic management (e.g., implementation of FUA);
- Establishment of a “red button facility” to deal with specific national security issues;
- Establishment of a safeguard clause to deal with cases of national security emergencies.

These elements are explained in more detail below.

2.4.1 Integration of the military in EC regulatory processes

An essential element in obtaining full and effective civil-military coordination is the inclusion of the military in all stages of airspace management and design regulation in Europe. This will entail the involvement of military experts and advisors when regulatory proposals are being proposed, examined and drawn-up under the Community’s airspace competence. To ensure military participation at the EC level, military interests must be represented through the committee that will be established to advise and supervise the Commission’s action in accordance with comitology procedures.

As a practical matter, the military should also be included in the staff of the EC Commission’s Executive Secretariat (see Part III, Chapter 7, Section 7.5.1 above). Moreover, through Eurocontrol’s CMIC, the military will participate in all matters, including those where Eurocontrol is involved in the EC’s regulatory activities. Through this inclusive process, the needs of the military should be taken into account when the Commission develops proposals and Member States formulate their views on those proposals, so as to prevent any conflict between civil and military interests.

2.4.2 Development of joint military standards

The EC should aim to harmonise, or support the harmonisation of, standards and rules applicable to military design and use of airspace. This could include, for example, standards applicable to the location and design of training areas and the equipment of military aircraft. (see Section 2.4.4 for regulatory options in this respect.)

2.4.3 Coordination of civil and military airspace and air traffic management

The EC should promote the full coordination of civil and military airspace and air traffic management. This aim can be achieved in two ways:

- Full and effective application of the FUA concept;⁸¹ and
- Coordination of civil and military air traffic control organisations throughout Europe in terms of personnel and equipment to ensure coordination at the operational level.

2.4.4 EC competence for military aspects of airspace regulation

It is far from clear whether and to what extent the EC's air transport competence under Article 80(2) of the EC Treaty would extend to military aspects of airspace regulation. There appear to be good arguments that the implementation of the concept of FUA would fall under this provision. FUA is a prerequisite to achieving a single European sky to be managed as a common resource and treated as a continuum. Also, FUA is an integrated solution to the overall planning of European airspace. Therefore, its military aspects cannot be separated from its civil aspects.

As a pre-condition for the functioning of FUA, and because civil and military aspects are closely linked, the coordination of civil and military ATC systems arguably also falls under Article 80(2). However, it is more difficult to bring the harmonisation of military planning standards under the provisions of the EC Treaty. On the other hand, such harmonisation would come clearly within the scope of the CFSP.

Principally, there appear to be three options to remedy concerns regarding the EC's jurisdiction over military airspace design and use:

- (a) ***Deal with military aspects of airspace regulation outside the EC.*** Military aspects could be dealt with outside the EC framework. They could, for example, be addressed within Eurocontrol or ECAC. Although this might appear to constitute a safe way to avoid disputes over the EC's competence as regards military airspace design and use, it has two major disadvantages: first, civil and military airspace regulation would remain separate within Europe; and second, the EC's effective regulatory instruments could not be used.
- (b) ***Joint action under the CFSP enabling the Council to adopt legislation for military aspects of airspace.*** Similar to the approach that has been developed with respect to embargoes under Article 113 (now 133) of the EC Treaty⁸² and that has now been codified in Article 301 of the EC Treaty, Member States and the EC could adopt a

⁸¹ See Part III, Chapter 2, Section 2.4.1.

⁸² Member States and the EC have developed a two-step process involving an international agreement under the European Political Cooperation mechanisms as a first step and adoption of embargo legislation under Art 113 Para. 4 EC Treaty as a second step (see e.g., Cremer, in: Calliess/Ruffert, EUV/EGV, Neuwied 1999, Art. 301/1).

two-step process where military or security interests are involved in airspace planning. This would involve:

- As a first step, the adoption of a Joint Action under Article 14 or a Common Position under Article 15 of the EU Treaty; and
- As a second step, implementation of the Joint Action or Common Position within the EC by a Council regulation under Article 80(2) of the EC Treaty.

This would appear to be a relatively safe way to adopt such legislation. However, it has the disadvantage of requiring double action under both the EU and the EC Treaties and would normally only be possible with the unanimous consent of Member States.

- (c) ***Regulation by the EC with a “Red-Button-Facility” to safeguard national security interests.*** Under this option, the EC would be vested with the power to regulate airspace (including its possible military aspects) as a common resource. However, in order to protect possible military concerns of Member States, a “red button facility” could be established to deal with situations where such regulation has an impact on national security. This would allow a Member State that believes a proposed EC measure raises serious issues of national security to opt out of or stop the Community regulatory process and have the measure considered under the CFSP provisions rather than within the EC framework. To our knowledge, such a procedure has not yet been tested. However, it would ensure that the EC -- be it the Council or the Commission -- could not develop airspace policy that affected national security interests independent of Member States’ views. From an institutional perspective, it would ensure that the CFSP mechanisms could be invoked by the will of the Member States under appropriately defined circumstances.

From a regulatory perspective, the third option appears to be the most efficient means of dealing with national security considerations. It would help to achieve a high degree of civil-military coordination within a single institution. We would therefore recommend that the EC carefully consider implementation of this solution. However, we recognise that it raises substantial jurisdictional and political difficulties. In the event that it is not possible to implement this option, we would consider the first option (*i.e.*, dealing with civil-military coordination within the Eurocontrol or ECAC frameworks) to be the next most effective option. It must be noted that Eurocontrol is currently reviewing and strengthening its civil-military integration.

2.4.5 **Safeguard clause in cases of national security emergencies (national security exception)**

If a situation arises which is serious enough to be classified as a national security emergency, a safeguard clause should be applicable to allow a particular affected Member State to refrain from adhering to an airspace rule that has already been adopted by the EC.

CHAPTER 3: AN INSTITUTIONAL NETWORK FOR AIRSPACE REGULATION IN EUROPE

In this Chapter, we explore legal relationships between various actors involved in European airspace regulation. The EC and its regulatory processes as well as the relationship with Eurocontrol form the centre of the proposed regulatory network. Its key aspect is the allocation of tasks and responsibilities between the EC, Member States and Eurocontrol. In addition, the relationship between the EC and ICAO and ECAC is examined.

3.1 Member States

Member States are key players in the framework for European airspace regulation. Their participation in the regulatory process is essential, from first proposals for regulation through to implementation of the regulatory measures at national level.

Member States retain jurisdiction over airspace matters within their own territory subject to the following limitation: as part of the European network, they cede responsibility for the promulgation of rules and processes to the European Community. Once the Community sets down these rules, the Member States are bound by them and must ensure compliance with those rules at national level. Failure to do so can result in the imposition of penalties.⁸³

The supremacy of EC law over national law has been a recognised principle of Community law since it was laid down in *Internationale Handelsgesellschaft*⁸⁴ in 1970. It was most recently reaffirmed in a 1997 Resolution by the European Parliament on the relationships between international law, Community law and the constitutional law of the Member States.⁸⁵ In any event, it should be remembered that the principle of subsidiarity must be complied with each time that the Community takes action.

3.2 European Commission and Executive Secretariat

Community action within the regulatory framework will be taken on a number of levels, namely: broad enabling measures taken by the European Council (following consultation with the Parliament); and subsequent medium-level implementing action by the European Commission (see Chapter 4, Section 4.1 below). Thus, the bulk of regulation, in particular the details of regulation, will be performed by the Commission. In order to carry out this function, it is proposed to set up an Executive Secretariat within the Commission (see Part III, Chapter 7, Section 7.5.1). This Secretariat would be part of the Commission and would therefore act within the remit of the Commission's competence and would be subject to the same procedural rules and limitations as the Commission. The principal advantage of the Executive Secretariat would be that it could aptly respond to the fairly demanding requirements of highly specialised and technically complex issues. This in turn would

⁸³ See below subsection 4.5.2.

⁸⁴ Case 11/70, [1970] ECR 1125 - *Internationale Handelsgesellschaft*.

⁸⁵ Resolution of the European Parliament on the relationships between international law, Community law and the constitutional law of the Member States, O.J. No. C 325 of 27 October 1997, p. 26.

increase the confidence of all stakeholders in the ability of the EC regulatory process to address the concerns arising from the drive to create a single European sky.

3.3 Eurocontrol and the EC

The respective tasks of Eurocontrol and the EC as a European airspace regulator are discussed in Part III, Chapter 7, above. Based also on the findings of the HLG Report and taking into account the respective strengths of both organisations, four factors seem essential for allocating and optimising competencies between them:

- The EC's stronger regulatory and enforcement powers;
- Eurocontrol's strength of technical expertise;
- Eurocontrol's wider geographical reach; and
- The overall need, in the interest of fairness and efficiency, to avoid duplication of regulatory processes.

3.3.1 Fitting the EC to the Eurocontrol framework

To be able to participate fully within Eurocontrol (to the extent that Member States vest it with jurisdiction over airspace matters), the EC must accede to the revised Convention. Consequently both the EC and its Member States would be members of Eurocontrol. Similar to the situation in other organisations such as the WTO, a number of issues resulting from dual membership must be resolved. These include, in particular:

- voting and representation of the EC and its Member States in Eurocontrol bodies; and
- contributions and representations in financial audit bodies.

An Accession Protocol should clearly define how the EC Member States and the EC share their rights and obligations within Eurocontrol. The EC, representing its Member States, would become Eurocontrol's single most important member and would be able to exercise decisive influence on Eurocontrol's majority-based voting mechanism under the revised Convention.⁸⁶ The EC would, therefore, have particular responsibility for, and power over, Eurocontrol processes.

3.3.2 Establishing the institutional link

To the extent that the Eurocontrol Agency -- both the APU proposed above⁸⁷ and the service provision units -- will be asked by the EC for regulatory activities specifically for the EC

⁸⁶ Many of the decisions taken within Eurocontrol's political bodies will require, under the revised Convention, a qualified (three quarter) majority of both the votes and the weighted votes cast (see Article 8 of the revised Convention). The EC will represent 15 out of 30 Eurocontrol Members and 70 out of 93 (75,26 %) of the weighted votes. With Switzerland and Norway, the number of votes will increase to 17 and 75 (80,65 %) respectively. Cf. Eurocontrol doc. PC/00/9/13 (ITEM 5) of 30 October 2000.

⁸⁷ See above Part III, Chapter 7, Section 7.5.4.

rather than for all Eurocontrol members, this will need to be based on separate authority according to Article 2.2 or 2.3 of the revised Convention (such as a memorandum of understanding):⁸⁸

- (a) **Memorandum of Understanding on airspace policy development and support.** The principles governing regulatory activities by Eurocontrol within the EC's regulatory framework should be enshrined in a Memorandum of Understanding on airspace policy development and support between the two organisations. The Memorandum of Understanding can either be adopted as a schedule to the Accession Protocol or preferably on a stand-alone basis. In either case, sufficient flexibility must be ensured, so that the parties can amend the Memorandum of Understanding without undergoing a new, formal ratification/approval process.
- (b) **Elements of a Memorandum of Understanding.** The Memorandum of Understanding should clearly spell out which functions Eurocontrol will be asked to fulfil within the EC airspace policy framework.⁸⁹
- **On-going tasks.** The tasks of Eurocontrol (including those of the institutions and bodies set up within its framework) will include, in particular, a number of technical tasks such as airspace and route network design, associated ATM procedures and definition of equipment requirements, etc. It will also, as part of its regulatory functions, conduct technical consultations with states, act as a forum for civil-military coordination, and provide the interface between the EC and non-EC states and ECAC.⁹⁰ Finally, the Memorandum of Understanding should define the roles of Eurocontrol's PRC and PRU in EC monitoring. Both these roles are explored in more detail below.
 - **Ad-hoc Mandates.** In addition to these ongoing tasks, the Memorandum of Understanding should establish processes for specific regulatory support mandates given to Eurocontrol on an *ad hoc* basis (e.g., assistance by Eurocontrol in EC non-compliance review proceedings).
 - **Financing.** To the extent that Eurocontrol carries out EC-specific (regulatory) support activities separate from and going beyond Eurocontrol's functions under the revised Convention, the Memorandum of Understanding should establish a mechanism for financing such activities so as to make sure that such activities are not financed by using general Eurocontrol funds (which include contributions from non-EC states).
 - **Consultation mechanism.** The Memorandum of Understanding should provide for the participation of Eurocontrol in a committee to be established within the

⁸⁸ Arguably, Article 2.3 of the present Eurocontrol Convention could also be sufficient to initiate the MoU preparation process within Eurocontrol, at the joint initiative of interested member states, in the event that the revised Convention does not enter into force.

⁸⁹ See Part III, Chapter 7, Section 7.5.

⁹⁰ For details see above Part III, Chapter 7, Section 7.5.3, Figure 9.

EC single European sky framework (see Section 7.1.1(b) below for details of this committee) and for the formation of joint task forces.

- *Basic Assumptions.* Finally, the Memorandum of Understanding should state the assumptions on which Eurocontrol's and the EC's joint regulatory activities are based. These include, in particular:
 - First, Eurocontrol must ensure, in accordance with the requirements of the revised Convention, the separation of regulatory and service functions.
 - Second, the EC, while reserving for itself the right to go further and faster than Eurocontrol, must act in accordance with applicable Eurocontrol rules. While this is an obvious consequence of its membership of Eurocontrol and flows directly from the revised Convention and the Accession Protocol to be established, the Memorandum of Understanding should restate this as a basis for the EC/Eurocontrol relationship.

3.4 ICAO/ECAC and the EC

ICAO and ECAC provide the international framework through which their respective members have developed airspace policy on an international level. They have both played an essential role in the harmonisation of, among other things, airspace management and design rules including rules on equipment, ATFM procedures, and ATS procedures. They have also played an important role in international and European route design.⁹¹ Both organisations will continue to be involved in airspace policy development beyond the date of the establishment of an EC airspace management and design policy competence.

Therefore, and in accordance with Article 307(2) of the EC Treaty, a reliable special institutional relationship between the EC and these organisations should be established.⁹² This relationship should ensure the maximum of coordination between the EC and ICAO/ECAC. However, it does not need to be formalised to the degree of formal EC membership within ICAO/ECAC.

For the same reason, a mechanism might be established within the EC which ensures that Member States and the Commission together formulate a common position on European interest issues in ICAO and ECAC.

⁹¹ See above Part II, Section 2.1.6.

⁹² Article 307 requires that Member States take all appropriate steps to eliminate incompatibilities between the EC Treaty and agreements concluded between EC Member States and third countries before the establishment of the EC in areas falling within the EC's competence. As regards participation of the EC in international agreements in force before the entry-into-force of the EC Treaty or, for acceding states, before their accession, see *Geiger*, EUV/EGV, Munich 2000, Article 307/5; *Schmalenbach*, in: Calliess/Ruffert, EUV/EGV, Neuwied 1999, Article 307/12. Article 307 EC Treaty will also have to be applied to agreements concluded after the date of the EC's establishment or of accession where the EC has obtained competence in an area after this date (see *Schmalenbach*, in: Calliess/Ruffert, EUV/EGV, Neuwied 1999, Article 307/4).

Member States, through EC Council legislation, should also stipulate that the EC act in accordance with relevant ICAO and ECAC rules. The Chicago Convention and, in particular, its Annex 11 provide legal context for airspace planning. Guidance can also be found in other material such as the ICAO ATS Planning Manual.⁹³

CHAPTER 4: REGULATORY PROCESSES

Our examination of the regulatory processes applicable to airspace management and design is centred on the stages through which implementing measures by the Commission will have to pass. First, however, we consider the allocation of regulatory tasks between the Community institutions and the legal instruments that are available to them when enacting regulatory measures. This Chapter draws heavily on the analysis contained in the *Interim Report*.

4.1 Allocation of Decision-Making Powers to Regulatory Bodies within the EC

The most appropriate framework for airspace regulation at the European level is a multi-tier structure. This will allow for adequate participation of representative and political bodies in the overall framework design, while leaving substantial regulatory tasks to the (non-political) Commission. The proposed framework is to be founded on broad enabling legislation enacted by the Council and will pass through the appropriate legislative process, *i.e.*, involving the European Parliament and the Economic and Social Committee. This legislation will set down high level rules and standards in the area.

The Commission will be tasked with the implementation of those high level rules and standards. The enabling legislation will, therefore, also establish and delimit the Commission's authority to enact, or adopt, such implementing measures. The Commission will also be responsible for the enforcement of the implementing measures.

4.2 Choice of Legal Instruments in Rule-Making

When enacting EC legislation, the institutions have the option of using a number of legal instruments. The principal instruments are regulations and directives.

Regulations are directly binding upon Member States, users, service providers or other addressees, without the need for any further implementing act by the Member States. Directives, on the other hand, are binding upon the Member States but need to be implemented by them in order to become national law, thereby becoming binding on users, service providers and other indirect addressees.

⁹³ As has been said above in Section 2.3, Member States are obliged under international law to ensure that the EC acts in accordance with their international obligations if they entrust the EC with the exercise of (part of) their rights in the area of airspace. Because the EC, according to Article 80(2) EC Treaty, will only have competence in the area of air traffic to the extent that it will be given such competence by Member States, Member States, acting through the Council, can require the EC to act in accordance with relevant international rules adopted within the ICAO and ECAC framework, and thereby limit the EC's jurisdiction in the area.

The EC Treaty also gives the EC power to adopt decisions on a case-by-case basis. These decisions are binding upon those to whom they are addressed. It can also issue recommendations and opinions, both of which are non-binding.

In the field of rule-making, regulations are traditionally favoured when the Community wishes to lay down rules that will be immediately binding on everyone concerned by the measure and when it is essential that the rules are interpreted uniformly across all Member States. Directives are traditionally used when the Community wishes to lay down broader rules that are not so time sensitive.

Although, generally, directives are a more flexible tool for regulation, they can also be very detailed and leave little or no scope for differing formulations of the rules by the Member States. The ultimate question the EC institutions will have to ask themselves is whether direct applicability without the need for transformation is required to achieve the highest degree of regulatory efficiency. Irrespective of whether the EC chooses directives or regulations as its legal instrument(s) for airspace regulation, there should be enough flexibility for Member States to adapt airspace management and design to national particularities.

In most cases, regulations will be most appropriate because they avoid the duplicative and complex rule-making processes which can be encountered when using directives.⁹⁴

4.3 Integrated “Package” Approach

As described in Part I, Chapter 1, Section 1.3, we advocate an integrated “package” approach to regulation in the area of airspace management and design, possibly under the umbrella of single European sky framework legislation (see Chapter 7, Section 7.1.1 below). The initial high-level Council legislation will set out the framework for the regulatory system and provide the principles to be adhered to within that framework. The Commission will then enact its medium-level legislation to implement those principles and to give effect to the Council's framework. Given that airspace management and design comprises many components, and that regulation will be an on-going, adaptive process, the Commission will need to enact multiple measures at different stages in the regulatory process.

The “package” approach aims to ensure that all of these regulatory measures are consistent with each other and with the initial Council legislation. This will mean that the Commission must ensure the legal bases used for its regulatory measures are consistent and that each measure refers to and complies with the initial high level regulatory principles. Only by taking such an approach can the regulatory framework be considered by all stakeholders as robust and capable of dealing coherently with the issues which arise from European level airspace management and design.

⁹⁴ When using directives, the adoption of international rules, standards and recommendations by international bodies such as Eurocontrol and ICAO would be followed by EC implementation through directives, which would in turn need to be transposed into national law by the domestic legislator.

4.4 Rule-Making and other Regulatory Action by the Commission

Under the authority of enabling legislation adopted by the Council and Parliament, the Commission would have the power to adopt general medium-level rules and issue decisions addressed to Member States, ATS providers and users as appropriate.

By medium-level rules, we refer to standards and principles which are not of a high-level political nature that would have to be decided by the EC's political bodies, the Council and the Parliament. Medium-level rules are of a more technical and operational nature and require frequent adaptation within a framework of general high-level standards and principles.

(a) **Medium-level regulatory process.** As a result of adoption of the Council's enabling legislation, the Commission will be tasked with carrying out medium-level implementing regulation. This will be done with the active participation of Member States, Eurocontrol, and stakeholders, and will follow the steps outlined below.

- The first step in the regulatory process is initiation of a proposal. This can be done by the Commission itself or on the basis of calls for action by the Member States and stakeholders. To ensure that the Commission remains up-to-date with the current situation throughout Europe, regular consultation with the Member States and stakeholder groups must take place. In line with Section 2.4 above, the military will be involved in the initiation and consultation stage of the process.
- The Commission will then draft proposals for regulatory measures (regulations, directives) to deal with the concerns identified during the first stage. As outlined above, the Commission can make use of either regulations or directives in this respect.
- In preparing proposals, the Commission will call upon the expertise of Eurocontrol and Member States as appropriate for technical analysis and assistance. An open, transparent commenting and review process actively involving stakeholders and interested parties should also be conducted. When developing regulatory measures, the Commission must comply with the comitology procedures, as set down in Council Decision 1999/468/EC. These procedures ensure that the views and concerns of Member States are fully taken into account.
- Following adoption of the Commission's measures, the Member States will be required to ensure the implementation of those measures at national level. In so far as those rules are directly applicable to service providers and operators, these entities will be bound by the rules without the need for Member State implementing action.
- Monitoring and review of the Commission measures (including compliance with those measures) will be carried out at both Member State and Commission level.

Appropriate enforcement procedures, including peer review and appeals, should be provided for.

(b) **Decisions in approval, arbitration and compliance review processes.** In addition to the above, the Commission should also be empowered by the enabling legislation to enact decisions and make recommendations as follows:

- **Approval of Airspace Design Proposals.** In particular, the Commission must have authority to make case-by-case (dis)approval decisions on major European airspace design matters (e.g., ARN revisions) to the extent that airspace over the territories of EC Member States and, to the extent feasible, associated states is concerned. Proposals regarding airspace design will be made by Member States and/or ATSPs, as appropriate. Eurocontrol will make airspace and route network design procedures and equipment recommendations for the European airspace as a whole. The decision-making process should be one of default, *i.e.*, in the absence of a negative decision by the Commission or its acceptance on condition of proposed (technically supported) alterations within a specified time period (six weeks) following receipt, the proposal would be deemed accepted as submitted. If the Commission disapproves a design, it should address a reasoned decision to the proposers concerned and require them to change their proposal. Commission disapproval should only be possible if a route design has a negative impact on pan-European traffic flows. Local and regional aspects should not come within the Commission's disapproval jurisdiction; however, persistent problems at these levels (including sector design issues) that cause European network problems could be investigated by the Commission.

Thus, the Commission should also be empowered to require a change to approved airspace design proposals *ex post facto* if, through its own review processes or upon a complaint by an interested party under the review and monitoring processes described in Section 4.5 below, it comes across a situation where a bottleneck creates delays in traffic flow or where airspace design is otherwise inconsistent with the creation of a continuum.

- **Arbitration and Compliance Review Processes.** The Commission should be able to make decisions as part of the arbitration and compliance review processes. These will be dealt with below in Section 4.5.

4.5 Review and Enforcement

Review and enforcement of Community measures, in particular implementing measures by the Commission, is vital to the success of the regulatory framework. This Section examines the elements that must be included in such procedures.

4.5.1 Monitoring, review and reporting

The EC should establish a mechanism for systematic monitoring, review and reporting of the implementation of the single European sky's airspace elements. The Commission

should be required to periodically publish status and progress reports. The EC's monitoring, review and reporting mechanism should facilitate the identification of airspace problems which require regulatory or enforcement action.

- (a) **Minimum content of report to be specified by EC legislation.** EC legislation should specify the minimum content to be included in the Commission's airspace reports. These could include the following elements:
- ASM/ATS/ATFM performance review, including an analysis of air traffic delays, their causes, and remedies (identifying the five worst bottleneck problems);
 - Status of civil-military coordination;
 - Progress reports on the implementation of uniform European airspace regulation and Commission activities; and
 - Identification of long-term and short-term priorities in airspace regulation;
- (b) **Reporting requirements of Member States and ATS providers.** Member States and ATS providers should be required to report relevant data, including information on: enforcement action taken at the national level; the status of negotiations on the cross-border delegation of ATS service provision; the implementation of EC regulatory acts; and technical data necessary for the analysis of delays and their causes. Airlines, unions and other interested parties should be invited to participate in the fact-gathering process.
- (c) **Support by Eurocontrol.** In carrying out its monitoring, review and reporting tasks, the Commission should be supported by the Eurocontrol Agency and appropriate other Eurocontrol bodies, including the PRC and PRU, building upon the work already carried out by the Agency and these bodies.

4.5.2 Review of compliance by Member States and ATS providers

The EC should establish effective compliance review mechanisms. While compliance of ATS providers will generally be reviewed by national regulators under the supervision (and with a default competence) of the EC, Member States should be subject to review by the EC. We therefore propose the establishment of a formal process at the EC level to review Member State compliance. This process would also act as default mechanism in very limited circumstances to review ATS provider compliance. As regards enforcement against Member States, the Commission can use the EC Treaty's infringement procedure, if its compliance review did not result in re-establishing Member State compliance.

- (a) **ATS providers: primacy of national compliance review and enforcement.** EC legislation should leave compliance review primarily to national authorities. However, EC legislation should ensure that the EC has the enforcement capability to deal with cases of European significance and to supervise the conduct of compliance review and enforcement at the national level.

Therefore, similar to the enforcement regime envisaged by the Commission for EC competition law in its proposal for reform of Regulation No. 17/62, Member State regulators -- ministries of transport or civil aviation authorities -- should, at their own initiative or upon application by interested parties, review compliance of ATS providers with EC airspace rules and take appropriate enforcement action, if necessary, under domestic law. EC legislation should establish a link between domestic compliance review and enforcement and review processes at the European level:

- *Notification to the Commission.* Depending on the scope of the issue, Member States should inform the Commission upon initiating a compliance review and following a request from the Commission, about the progress of the investigation.
- *Initiation by the Commission.* The Commission should be authorised to ask a Member State to initiate a compliance review and enforcement process.
- *Continuation of compliance review by the Commission.* The Commission should be able to remove a case from the national regulator and continue it through its own processes if it has reason to believe that:
 - Commission involvement is necessary to ensure uniform application of EC airspace rules throughout Europe or to clarify the meaning of an EC airspace rule, or
 - the case is of a pan-European dimension, and that, following a Commission request, the national regulator has failed to initiate a review or such review does not produce satisfactory results.

(b) ***Community review of Member State compliance.*** In addition to compliance review and enforcement at the national level, EC airspace legislation should establish rules for Commission review of Member State compliance. This might, under the exceptional circumstances described above, also be used where the Commission takes up a case of ATS provider compliance.⁹⁵ The compliance review system

⁹⁵ These compliance review processes should apply to any ATS provider irrespective of its legal status. It should be noted that the European Court of Justice, in the context of the application of competition rules to Eurocontrol, held that the EC Treaty's competition rules do not apply to Eurocontrol because the exercise of powers relating to the control and supervision of airspace are "typically those of a public authority" rather than "of an economic nature" (see ECJ, Case C-364/92, 1994 ECR I-43, Para. 30). However, these considerations are not based on a general presumption that the European Commission cannot investigate behaviour of public bodies unless they engage in economic behaviour for reasons of sovereign immunity. Rather, the EC Treaty's rules on competition as well as implementing legislation such as Regulation No. 17 only apply to "undertakings." Other Community rules such as, in the area of air traffic, Council Regulation No. 2408/92 of 23 July 1992 on access for Community carriers to intra-Community air routes (O.J. No. L 240 of 24 August 1992, pp. 8 sseq.) provide for Commission review of State action (see Article 8 and 9). On this basis, the Commission for example overturned noise abatement measures adopted at the Swedish airport Karlstad (Commission Decision of 22 July 1998, O.J. No. L 233 of 20 August 1998, pp. 25 seq. - Access to Karlstad Airport).

should be designed with a view to ensure that due process requirements are met and that the review can be conducted in a timely manner. The compliance regime should also ensure transparency of the process.

- (c) ***Infringement process to enforce Member State compliance.*** If non-compliance by a Member State persists despite a compliance review according to the process described above, the Commission can use the EC Treaty's infringement procedures under Articles 226 and 228. The EC Treaty provides for a four-step process: first, after giving the Member State concerned the opportunity to submit its observations, the Commission issues a reasoned opinion on the matter. Second, if the Member State concerned does not comply with the Commission's opinion within the period laid down by the Commission, the Commission can bring the matter before the European Court of Justice. Third, if the Commission considers that the Member State has not taken the remedial measures required by the Court, if any, it issues (after giving the Member State concerned the opportunity to submit its observations) a reasoned opinion specifying the points of non-compliance. Fourth, if the Member State fails to implement these points, the Commission can bring the matter before the Court and specify the amount of a fine it considers appropriate. If the Court finds that non-compliance persists, it can impose a fine.

4.5.3 **Industry-specific inquiries**

EC legislation should give the Commission the power to initiate inquiries into certain industry-specific issues, e.g., cross-border delegation of ATS functions. Such sectoral inquiries would go beyond the standard review and would, where appropriate, provide the basis for Commission action to propose or set down uniform rules. EC airspace legislation should invest the Commission with the necessary investigative powers to carry out such an industry-specific inquiry. The Commission should be mandated to consult with Eurocontrol and to draw upon its expertise when conducting the investigation. This should include a right to delegate specific investigatory or analytical tasks to Eurocontrol. Both the initiation and the results of an industry-specific inquiry should be made public.

4.5.4 **Arbitration of conflicts over airspace matters with cross-border impact**

EC legislation should provide that the EC's compliance process for ATS provider compliance and the EC's independent compliance review process as regards Member States can be used wherever a conflict exists between providers and Member States, between providers and between Member States regarding any issue of airspace management and design with a cross-border impact. This would include, in particular, conflicts about issues relating to cross-border delegation of air traffic management functions. However, EC legislation should encourage providers and Member States to settle any conflict by government action with the support of Eurocontrol as a mediator, where appropriate.

CHAPTER 5: AIR TRAFFIC FLOW MANAGEMENT

Improvement of ATFM requires the implementation of a number of reforms, in particular regarding the rules applicable to the players involved in ATFM, systematic oversight over the operation of the CFMU, and the enforcement process. This requires action by both Eurocontrol and the EC. This Chapter builds upon earlier work performed by WCP.⁹⁶

5.1 Regulation of ATFM

ATFM is a service provided by Eurocontrol's CFMU and states; it requires the application of uniform rules throughout the Eurocontrol area so as to ensure high quality and consistency of data for flight planning and of measures adopted for flow management.

Therefore, ideally, rule-making in this field should be left to the decision-making bodies within the Eurocontrol organisation with the support of regulatory units which, for this purpose, should be separated from its service provision functions in ATFM.⁹⁷ At the same time, the EC should strengthen air traffic flow management by endorsing ATFM rules in EC legislation and thereby provide a sound basis for the operation of the CFMU and the enforcement of ATFM rules and, where appropriate, ATFM instructions.

As has been pointed out above, the EC can, acting within the Eurocontrol political bodies as the single most important member of Eurocontrol assembling all of its Member States votes, effectively develop and define ATFM policies.

5.1.1 Eurocontrol instruments for ATFM rule-making

The revised Convention provides a framework for rule-making for ATFM which includes instruments to adopt both high level principles ("Principles") and operational rules ("General Conditions"). They are supplemented by informal rules currently issued by the Agency (CFMU) in "Handbooks:"

- (a) ***Principles on ATFM to be adopted within the exclusive competence of the General Assembly.*** According to Article 6.1. (c) 1997 Eurocontrol Convention, the General Assembly shall "establish the principles applied for the operation of the common European [ATFM] system." While the General Assembly generally may delegate the power to take decisions in matters falling within its general competence under Article 6.3. (b), it may not do so with respect to the adoption of ATFM principles. As follows from the wording of Article 6.1., the 1997 Eurocontrol Convention considers this competence to go beyond ("in addition") its general competence. The adoption of ATFM principles requires, under Article 8.1., a doubly qualified majority of three quarters of the Member States voting and three quarters of the weighted votes determined according to the weighting procedures under Article 11 (which are identical to the current procedures). As with other decisions of the

⁹⁶ "Independent Study for the Improvement of ATFM" submitted by Philippe Jaquard (IGACEM) with the support of Sofréavia and WCP (11 September 2000). See in particular Annex 2 to the *Jaquard Report*.

⁹⁷ See Article 2.4 of the revised Convention.

General Assembly, ATFM principles are binding on the member states and the Agency (Article 8.4. 1997 Eurocontrol Convention).

- (b) **General Conditions for ATFM to be adopted by the Council.** Under Article 7.2.(d) 1997 Eurocontrol Convention, the Council shall, within the realm of its supervisory powers as conferred to it with respect to the Agency,

“determine, after having consulted representative organisations of airspace users and airports recognised by the Council, the general conditions for the operation of the common European [ATFM] system [...], taking due account of the prerogatives exercised by the states in regard to management of their airspace. These general conditions shall specify, inter alia, the rules applicable as well as the procedures for recording non-compliance with these rules.”

General conditions are adopted by the Council if a doubly qualified majority of member states equivalent to the majority required for the approval of the ATFM principles by the General Assembly agrees. Although primarily addressed to the Agency, they are (as with other decisions of the Council) binding on both member states and the Agency (Article 8.4. 1997 Eurocontrol Convention). Moreover, member states shall, according to Article 19 (1997 Eurocontrol Convention), “incorporate into their national legislation provisions which ensure the observance of the general conditions” for ATFM by ATS providers, AOs, and ACs.

- (c) **Informal rules.** Eurocontrol, in particular through the Agency and CFMU, issues a number of informal rules which are currently collected in its BASIC CFMU HANDBOOK. Such rules are part of international soft law rather than having binding legal quality.⁹⁸ Within the future structure of Eurocontrol, it should be ensured that these informal rules -- if not transferred to the level of General Conditions -- be developed and adopted by regulatory units of Eurocontrol, with the assistance of the CFMU where appropriate, rather than by the ATFM service provider CFMU.

5.1.2 A role for EC rule-making in ATFM

The EC, through its regulatory instruments, must ensure that airport slot allocation and ATFM are consistent with each other. Also, it should ensure that ATFM General Conditions are directly applicable to ATS providers, aircraft operators, and aircraft commanders:

- (a) **Ensuring the direct effect of General Conditions.** The wording of Article 19 puts a question mark to the effect of General Conditions upon ATS providers, aircraft

⁹⁸ Some of these principles, through practice and acceptance by Member States, if accepted as legally binding (*opinio juris*), may evolve into legally binding standards. The transformation of soft law into customary rules is supported, in particular, if there is evidence that the same principles are confirmed by precedents of State practice within other international organisations such as ICAO and by domestic state practice. The “first planned - first served” rule might serve as an example for a soft law principle that, arguably, has developed over time into a mandatory standard for ATFM.

operators and aircraft commanders. Although a strong argument can be made that they have direct effect, it would be preferable to clarify their legal status within the EC through appropriate legislation. EC legislation should, in accordance with Article 19(4) of the revised Convention and through the processes required by the EC Treaty,⁹⁹ require that ATS providers, aircraft operators and aircraft commanders observe the processes and requirements stipulated in the General Conditions on ATFM.

- (b) ***Ensuring consistency of ATFM/flight planning and airport slots.*** The EC should also ensure that ATFM/flight planning and airport slots are consistent so as to implement gate-to-gate solutions in ATFM. Therefore, within its proposed airport slot regulation, the EC should require airports to define and distribute airport slots, taking into account capacity at airports and in airspace and to communicate airport slots to the CFMU. At Eurocontrol, this needs to be supplemented by action which ensures that flight plans are checked against airport slots and are rejected if inconsistent.

5.2 Performance Review

There is currently no systematic review function within Eurocontrol which conducts effective reviews for the CFMU's performance. Because of the CFMU's pan-European approach we recommend that Eurocontrol conducts CFMU audits. For this purpose, however, there should be a body which is clearly separate from the operations of CFMU and is vested with a clear mandate to conduct CFMU audits. The APC and the APU described above¹⁰⁰ and the PRC and PRU might fulfil this review function. Also, Eurocontrol's political bodies should establish performance standards which provide a benchmark for evaluating the CFMU's operation. The EC and Eurocontrol should agree on an independent review of the CFMU within the Eurocontrol framework. This agreement should be set out in the Memorandum of Understanding proposed above.¹⁰¹

⁹⁹ The EC currently implements Eurocontrol rules and joint aviation requirements by reference in Annexes to Council Directive 93/65/EEC of 19 July 1993 on the definition and use of compatible technical specifications for the procurement of air-traffic-management equipment and systems (O.J. No. L 187 of 29 July 1993, pp. 52 sseq.) and Council Regulation 3922/91/EEC on the harmonisation of technical requirements and administrative procedures in the field of civil aviation (O.J. No. L 373 of 31 December 1991, pp. 4 sseq.). The references can be modified by Commission legislation. Because Eurocontrol rules and JARs are only published in English, it has been argued, by some Member States, that the implementation of Eurocontrol standards by reference only is not sufficient to ensure the binding nature of such standards (see Commission report of 1 October 1999 on the application of Council Directive 93/65/EEC, COM[1999]454 final, p. 8; *Schriek*, in Frohnmeyer/Mueckenhausen, EG-Verkehrsrecht, 2000, Para. 112/34 sseq.; *Stiehl*, in Frohnmeyer/Mueckenhausen, *op.cit.*, Para. 111/56 sseq.). Community rules generally require the publication of binding and generally applicable legal acts in all relevant official languages (see Council Regulation [EEC] No. 1 of 15 April 1958, O.J. No. L 17 of 6 October 1958, pp. 395 sseq.).

¹⁰⁰ See above Part III, Chapter 7, Section 7.5.

¹⁰¹ See above Chapter 3, Section 3.3.2.

5.3 Eurocontrol

The efficient and safe functioning of ATFM depends on the players' adherence to ATFM rules and instructions. However, ATS providers, aircraft operators, and aircraft commanders at times exploit the weaknesses and flexibility of the system. In a number of instances, ATS providers provide low estimates of sector capacity resulting in an increased number of regulated airspace sectors. Examples of aircraft operators misuses include ghost flight plans, simultaneous flight planning, delay compensation through false EOBTs, and missing flight plans.

Therefore, Eurocontrol and EC regulation must ensure effective mechanisms for the enforcement of the ATFM system. However, even under the revised Convention, Eurocontrol's power to issue directly applicable and binding regulatory measures and its enforcement powers remain weak and unclear. Hence, the EC should vest Eurocontrol's CFMU with clear tasks and appropriate powers.

5.3.1 Enforcement under the revised Convention

- (a) ***Eurocontrol's Power to issue ATFM instructions.*** According to Article 19.1 of the revised Convention, Eurocontrol

“shall determine, in accordance with the general conditions [for ATFM], the necessary regulatory measures, and shall communicate them to aircraft operators and to the appropriate air traffic services. The Contracting Parties shall ensure that aircraft operators, aircraft commanders and the appropriate air traffic services comply therewith, unless prevented by compelling reasons of safety.”

Within the general context of ATM, Eurocontrol's CFMU can therefore address ATFM measures directly to both ATS providers and aircraft operators. The wording of Article 19.1 however, is not wholly conclusive as to whether these measures have direct effect upon providers and operators and provide a mandatory basis for ATC and flight planning. The terms used in the first sentence of Article 19.1 (“determine” and “communicate them to aircraft operators and appropriate air traffic services”) indicate both the ATFM instructions' direct effect and their binding nature. However, the reference in the second sentence to the states' role in ensuring compliance with ATFM instructions raises doubts about the nature of such measures.

Also, although Article 19.1 asks states to ensure that aircraft commanders comply with ATFM measures, Eurocontrol may not give such instructions directly to pilots. Any authority to interact directly with the AC during the actual operation of a flight rests with the competent (local) domestic ATC provider. The actual management of flight operations as the essential operative part of ATM having ultimate “real-world-effect” therefore remains the prerogative of the states.

- (b) ***Eurocontrol's limited enforcement mandate.*** Eurocontrol will only have a very limited enforcement mandate under the revised Convention. While Eurocontrol will

have a mandate to record cases of non-compliance, enforcement actions will remain the province of states:

- *Enforcement vis-à-vis ATS providers.* Enforcement vis-à-vis ATS providers remains the sole responsibility of states. Eurocontrol cannot enforce compliance by domestic ATS providers with General Conditions and ATFM instructions. Compliance control and enforcement with respect to ATS providers remains in the exclusive domestic jurisdiction (Article 19.2.).
- *Enforcement vis-à-vis aircraft operators and aircraft commanders.* Eurocontrol can request that proceedings be instituted in the event of non-compliance by aircraft operators and aircraft commanders with the general conditions¹⁰² and regulatory measures taken by Eurocontrol under its ATFM competencies. Such proceedings may take two different forms:
 - proceedings instituted by the member state where non-compliance was recorded; and
 - proceedings instituted by Eurocontrol itself in a domestic court with the agreement of the member state where the proceedings are to be instituted.
- *Recording of violations by Eurocontrol.* Under Article 20 of the revised Convention, Eurocontrol's authority to appoint officers to record infringements of the air navigation regulations will be extended to violations of ATFM regulations and instructions. Such reports shall have the same effect in national courts as similar reports of national officers. The Council, within its power to issue General Conditions for ATFM under Article 7.2. (d) of the 1997 Eurocontrol Convention, shall specify the procedures for recording non-compliance.

5.3.2 Improving ATFM enforcement

In sum, even under the revised Convention, it is not totally clear whether ATFM instructions are directly applicable to ATS providers and aircraft operators and would provide a mandatory basis for flight planning. Moreover, the revised Convention essentially leaves enforcement to states. Therefore, to strengthen ATFM in Europe, the EC must vest Eurocontrol's CFMU with a clear ATFM mandate and thereby clarify the legal status of ATFM instructions; it must also provide a framework for the enforcement of ATFM rules and measures.

- (a) ***Vesting Eurocontrol with a clear mandate in ATFM.*** To remedy uncertainties concerning the interpretation of Article 19.1 of the revised Convention and to ensure uniform application throughout the Community, EC legislation should require Member States that have accepted the revised Convention to ensure through their appropriate domestic legislative processes that any regulatory measures which the

¹⁰² See, however, Article 19.4. 1997 Eurocontrol Convention requiring national legislation for general conditions to be applicable on the domestic level.

CFMU communicates to ATS providers and aircraft operators regarding ATFM have direct and binding effect upon them. ATS providers and aircraft operators must be required, through national law, to observe regulatory measures in the area of ATFM unless prevented by compelling reasons of safety. Aircraft commanders should be required to prepare a flight in such a way that compliance with ATFM instructions can be achieved.

By asking Member States to ensure the direct and binding effect of ATFM instructions issued by Eurocontrol, the EC defers the task of adopting relevant rules to Member States. In some Member States, ratification of the revised Convention might be sufficient to ensure Eurocontrol's supranational nature in ATFM; in others this might necessitate separate legislation. Some national legal systems might require state legislators to provide for court review of ATFM instructions at the request of a user. This approach reflects the dual membership of both the Member States and the EC in Eurocontrol. Rather than delegating the power to adopt ATFM instructions to Eurocontrol, the EC, under this approach, would limit itself to the adoption of a uniform interpretation of Article 19.1 of the revised Convention while the actual delegation would be based -- at least predominantly -- on the accession of its Member States to Eurocontrol. Thereby, the EC will arguably avoid any argument that it acted *ultra vires* by delegating decision-making authority to a non-EC body.¹⁰³

(b) ***Compliance review and enforcement.*** Given the Eurocontrol system's shortcomings in this area, the EC and its Member States will have to ensure enforcement of the ATFM system. Eurocontrol can play a role in enforcement by assisting Member States and the EC with enforcement proceedings and providing a mechanism for peer review through a non-compliance procedure.

(i) ***Eurocontrol non-compliance procedure.*** Similar to the process proposed for procedures to investigate cases of non-compliance in other areas,¹⁰⁴ a non-compliance procedure should be established for cases of non-compliance with the ATFM system. Such a process would provide a forum for self-regulation of the industry and fall short of being an enforcement process in the meaning of Article 19 of the revised Convention. Because this procedure should, taking into account the specific tasks of the ATFM system throughout the whole Eurocontrol area, operate on a pan-European approach and because it should also examine CFMU actions, it should be established at Eurocontrol rather than at EC level.

¹⁰³ It should be noted that the delegation of Community decision-making authority to non EC Treaty bodies can be problematic (see, in particular, ECJ, Case 9/56, *Meroni I*, [1958] ECR 1, 36; see also ECJ, Advisory Opinion 1/76, *Stillegungsfonds für die Binnenschifffahrt*, [1977] ECR 741, Para.. 17 sseq.). Delegation is limited to non-political measures of purely executionary character. Measures delegated to another body must be subject to court review equivalent to the one applicable to measures adopted by the delegating institution itself.

¹⁰⁴ See above Chapter 4, Section 4.5.2.

A non-compliance procedure for ATFM should be open to complaints from all players involved (including the EC and Eurocontrol members) and should apply to CFMU, ATS providers, aircraft operators and aircraft commanders. Complaints should be treated by an independent non-compliance committee whose members should be representatives of all ATFM players. It might be instituted and operated under the auspices of Eurocontrol's PRC, or the APC proposed above,¹⁰⁵ and should be able to draw upon Eurocontrol's PRU's, or the APU,¹⁰⁶ expertise and staff. As a safeguard against abuse, the non-compliance process should be limited to repeated violations of regulations and instructions that reflect systems non-compliance. The non-compliance committee should issue findings and recommendations on a case-by-case basis and regular reports addressed to the Council and the General Assembly.

(ii) *EC enforcement framework.* EC legislation should complement any Eurocontrol non-compliance process by true enforcement processes to be conducted primarily at Member State level and at EC level where appropriate:

- *Enforcement at national level.* EC legislation should request Member States to ensure that appropriate enforcement action in cases of serious or repeated violations of ATFM regulations and instructions which reflect systems non-compliance, can be taken through their domestic processes. EC legislation should leave the design of such processes to the Member States. It should, however, require that ATS providers, aircraft operators, aircraft commanders, and, as regards compliance by aircraft operators and aircraft commanders, also Eurocontrol can bring such cases. The Commission should be able to ask the national regulator to initiate a review as well. EC legislation should also provide for notification requirements equivalent to those proposed for enforcement in general airspace matters against ATS providers and for a mechanism that enables the Commission to transfer a case to the Commission level under the exceptional circumstances laid down above.¹⁰⁷
- *Enforcement at EC level.* If a case is exceptionally transferred to the EC level, the review would be conducted by the Commission using the same process¹⁰⁸ as that which applies to general airspace measures.¹⁰⁹

¹⁰⁵ See above Part III, Chapter 7, Section 7.5.2.

¹⁰⁶ See above Part III, Chapter 7, Section 7.5.4.

¹⁰⁷ See above Chapter 4, Section 4.5.2.

¹⁰⁸ Please note that when examining compliance with ATFM instructions issued by Eurocontrol's CFMU, the Commission should also review the ATFM instruction itself. Because Commission decisions are subject to review by the European Court of Justice or the Court of First Instance respectively, this secures court review, albeit indirect, of ATFM instructions. The European Court of Justice, in *Meroni I* (Case 9/56, *Meroni I*, [1958] ECR 1, 36), required for a delegation of decision-making powers by any EC institution to a non-EC body that a mechanism for court review is established. Although the model presented in this study defers the delegation of decision-making power in ATFM to Eurocontrol to the Member States through their national processes, the EC cannot take enforcement action in cases in which the measure to be enforced is illegal. Therefore, the Commission must examine, and the European courts must be able to review, compliance by Eurocontrol when enforcing ATFM instructions.

¹⁰⁹ See above Chapter 4, Section 4.5.2.

CHAPTER 6: COLLABORATIVE DECISION-MAKING

In the near term at least, the proposed Collaborative Decision Making (CDM) procedures for the pre-tactical and tactical phases of flight will primarily be used in ATFM. It could, therefore, be dealt with by the Eurocontrol organisation, along with other ATFM regulation.

The most important concern for CDM procedures is that they adequately protect the confidentiality of information submitted by users and avoid the possibility of abuse of that information by others who may receive access to it. This is a particular risk where information submitted in order to comply with CDM requirements can be used by competitors to anticipate future business action or to block competition. Therefore, stringent confidentiality procedures and strict limitations on the passing-on of information submitted for CDM purposes should be developed by the Eurocontrol General Assembly (under the revised Convention). They could be made binding upon all participants by contractual arrangements which they would need to sign before being allowed into the CDM partnership.

CHAPTER 7: OUTLINE OF EC AIRSPACE REGULATION

Uniform airspace regulation within the EC is likely to require a phased approach. The first phase will ensure that the institutional setting is in place and that immediate action can be taken by the Commission to improve the airspace management and design situation in Europe. The second phase will build upon the first and should develop EC airspace regulation further with a view to creating a truly pan-European airspace.

7.1 First-Phase Airspace Regulation

Within a first phase of airspace regulation, the Community should adopt the instruments explained in more detail below. (Please note, however, that while we refer to regulations -- which in our view are the most appropriate legal instruments to implement key aspects of the single European sky in an efficient, uniform, and timely manner -- the EC may decide to use directives if it feels these are more appropriate.)

- Framework regulation to be adopted by the Council and the Parliament on the establishment of a single European sky using the integrated “package” approach (“Umbrella Regulation”).
- Framework regulation to be adopted by the Council and the Parliament on the implementation of elements of the single European sky relating to the management and design of airspace (“Enabling Regulation”).
- Commission regulations for the implementation of technical and operational aspects.

- Memorandum of Understanding between Eurocontrol and the EC on their respective tasks.
- Accession Protocol to Eurocontrol.

As has been pointed out above, a number of regulatory issues will best be dealt with by the Eurocontrol organisation. This includes, in particular, the regulation of ATFM and, within the context of ATFM, CDM. For details of changes in the field of ATFM, we refer to Part III, Chapter 3 above. Within this Section, we will focus on action to be taken by the EC.

7.1.1 Umbrella Regulation on the establishment of a single European sky

As has been highlighted by the HLG Report,¹¹⁰ the establishment of a single European sky will require EC legislation in a number of areas among which airspace regulation, the economic regulation of air navigation services, and the regulation of equipment and processes will be of foremost importance.

More detailed legislation in these areas is likely to be adopted in separate instruments which should, however, be consistent with each other and with the Umbrella Regulation (see Chapter 4, Section 4.3 above). The Umbrella Regulation would provide the framework for connecting regulatory activities within the different fields with a view to ensuring consistency. For this purpose, it would establish principles and procedures for future regulation as an integrated “package.”

- (a) **Airspace principles.** Within the area of airspace regulation, the Umbrella Regulation should establish principles that the EC and Member States will have to respect when adopting further legislation on the matter. Some of these principles would also apply to ATS providers. Important principles for future airspace regulation by the EC would include the following:
- *Airspace as a continuum.* Treatment of the airspace as a continuum including a definition of what continuum is supposed to mean, *i.e.*, uniform airspace design beyond national borders, uniform airspace management, uniform safety standards, and seamless air traffic management.¹¹¹ This would require European airspace design irrespective of national borders, thereby necessitating cross-border delegation where appropriate.
 - *Safety and efficiency.* Airspace management and design must be safe and efficient.
 - *Fairness requirements.* The Umbrella Regulation should require the Community to act in accordance with the principle of fairness when regulating airspace management and design with a view to producing results which are equitable and non-discriminatory vis-à-vis all users and ATS providers.

¹¹⁰ HLG Report, Para. 44.

¹¹¹ See Part III, Chapter 2, Section 2.2 above.

- *Flexible use of airspace.* FUA should be made a foremost goal for future regulation. Therefore, the Umbrella Regulation should require that EC legislative measures ensure that FUA can and will be implemented by the Member States.¹¹²
 - *Strengthening ATFM.* Turning ATFM into an enforceable tool for optimising the use of airspace capacity will be an important element of airspace policy. Therefore, the Umbrella Regulation should require that the EC, in cooperation with Eurocontrol and other appropriate international organisations, further develops ATFM regulation and supports regulation by such international organisations by adopting the necessary EC legislative measures.
 - *Direct routing.* Direct routing should be applied as a standard where possible. Therefore, the Umbrella Regulation should require both national and EC legislative and regulatory acts to be designed so as to ensure that neither political (historic route design limitations) nor economic (charges) factors prevent the application of direct routing. The regulation could also require ATS providers to accept requests for direct routing subject to national security, safety, and ATFM requirements.¹¹³
 - *Adherence to internationally agreed standards.* The Umbrella Regulation should require the EC to adhere to internationally agreed standards. These should be defined as standards agreed within international agreements or international organisations which deal with air transport matters and to which the EC itself or all of its Member States or both are members.
- (b) ***Common single European sky procedures.*** As regards procedures and institutional settings, the Umbrella Regulation should provide for the following elements:
- *Framework for comitology and civil-military coordination.* To ensure a uniform institutional framework for comitology processes within all regulatory areas relating to the single European sky, the regulation should establish a Committee for the Implementation of the Single European Sky (CISES). By ensuring that the same body of persons represents Member States within all regulatory areas, a high level of consistency can be achieved. The CISES will work closely with Eurocontrol; it would therefore be logical for the EC to give Eurocontrol a role as observer within CISES. The committee would also operate as the forum within which, at the EC level, civil-military coordination could take place. To ensure consistency with any civil-military coordination that takes place within the framework of Eurocontrol, the EC should encourage Member States to appoint their military representatives on the CMIC as members of CISES.
 - *Red-button-facility.* While the EC will arguably assume full airspace competence under Article 80(2), it is important that a mechanism is put in place

¹¹² See Chapter 2, Section 2.4 above for questions of EC jurisdiction and alternative options.

¹¹³ This can be seen as a first step towards establishing a FRA. See above Part III, Chapter 2, Section 2.4.5.

which allows national security concerns to take precedence over EC single European sky legislation. Therefore, where a Member State opposes a legislative act or a measure out of serious national security concerns it should be able to stop the EC regulatory process and have the measure considered under the CFSP provisions. The CISES would provide the appropriate forum for the exercise of the “red-button-facility.”¹¹⁴

- *Review, monitoring and compliance review.* The Umbrella Regulation should require:
 - future EC legislation on specific aspects of the single European sky to provide for appropriate review, monitoring, and compliance review tools;
 - a regular review of the status of the implementation of the single European sky. The Commission should be required to report to the Council and the Parliament on the results of this review and recommend further action necessary to accomplish the single European sky. Such reports should be submitted periodically.
 - *Formulation of common positions within international organisations of which the EC is not a member.* Member States should be required, in accordance with Article 307 of the EC Treaty, to act in accordance with common positions to be formulated within the EC.
- (c) ***Safeguard clause for national emergency situations.*** The Umbrella Regulation should contain a safeguard clause which ensures that any legislative act or measure adopted within the area of application of the regulation would not apply in a particular Member State in cases of a national emergency.

7.1.2 **Enabling Regulation on the implementation of elements of the single European sky relating to the management and design of airspace**

The Enabling Regulation will provide a framework for Commission action in the area of airspace management and design. It could contain a provision establishing an Upper Flight Information Region (UIR) Europe and a number of enabling clauses. It will also address issues of ATFM regulation and provide for an enforcement framework.

- (a) ***Establishment of a UIR Europe.*** The Enabling Regulation should establish a UIR Europe which would constitute the pan-European airspace as a continuum with a single set of rules and procedures. While initially indicating that the level above which there should be a single UIR -- which might be set at FL 285¹¹⁵ -- the Regulation should enable the Commission to adapt this level by way of regulation.

¹¹⁴ See above Chapter 2, Section 2.4 for a discussion of issues of EC competence over military aspects of airspace design and use and of options available to the EC.

¹¹⁵ See above Part III, Chapter 2, Section 2.3.1.

The UIR Europe should initially be established as a Random Area Navigation (Random RNAV) area.¹¹⁶

(b) **Enabling clauses.** The Regulation should enable the Commission to adopt:

- airspace classification for the upper airspace and lay down uniform rules for classification of the regional and local airspace;¹¹⁷
- common principles and criteria for sector design including the design of cross-border sectors and routes;¹¹⁸
- standards for segregated airspace;¹¹⁹ and
- standards for the application of FUA;¹²⁰

The Enabling Regulation should specify the areas for which the Commission would have the power to adopt legislation. This would delimit the Commission's powers and might be more acceptable to Member States than a general enabling clause for the Commission to adopt appropriate airspace legislation. An enumeration of legislative tasks would also provide for a legislative work programme for the Commission to be established.

(c) **ATFM.** In the area of ATFM, the Enabling Regulation should:

- enable the Commission to adopt ATFM rules and thereby ensure the direct effect of Eurocontrol's General Conditions for ATFM within the EC;¹²¹
- require Member States to ensure that ATS providers and aircraft operators observe ATFM instructions issued by the CFMU and that aircraft commanders prepare a flight so as to ensure compliance with ATFM instructions.¹²²

Consistency between ATFM and airport slots would best be ensured by the EC in its proposed airport slot regulation which should require airports *inter alia* to communicate airport slots to the CFMU and by appropriate action within Eurocontrol.

(d) **Review.** The Enabling Regulation should contain provisions on the review and enforcement processes as described in more detail above, *i.e.*:

- Monitoring, review and reporting;¹²³ and

¹¹⁶ See above Part III, Chapter 2, Section 2.4.5.

¹¹⁷ See above Part III, Chapter 2, Section 2.3.3.

¹¹⁸ See above Part III, Chapter 2, Section 2.3.4 and Section 2.3.5

¹¹⁹ See above Part III, Chapter 2, Section 2.3.6. See above Chapter 2, Section 2.4. for a discussion of issues of EC competence over military aspects of airspace design and use and of options available to the EC.

¹²⁰ See above Part III, Chapter 2, Section 2.4.1. See above Chapter 2; Section 2.4 for a discussion of issues of EC competence over military aspects of airspace design and use and of options available to the EC.

¹²¹ See above Chapter 5, Section 5.1.2.

¹²² See above Chapter 5, Section 5.1.2.

- Industry-specific inquiries.¹²⁴
- (e) **Compliance review and enforcement.** Formal compliance review (including ATFM) of states, ATS providers, aircraft operators, and aircraft commanders and informal non-compliance proceedings (with the exception of ATFM) of ATS providers. It should be made clear that, as regards action other than state action, enforcement is primarily a responsibility of Member States; however, the regulation should establish a link between national processes and the EC.¹²⁵ This should include a provision to the effect that these procedures can also be used in the case of a dispute between ATS providers, between Member States and between ATS providers and Member States regarding cross-border airspace issues which the disputing parties have not been able to settle with the support of Eurocontrol.¹²⁶
- (f) **Comitology.** The Enabling Regulation would require the Commission to act in accordance with accepted EC comitology processes with the participation of Member States through CISES. When the Commission adopts airspace legislation under the enabling clause or in the field of ATFM or takes enforcement decisions, it should generally follow the advisory procedure.¹²⁷

7.1.3 Commission legislation

According to its powers under the Enabling Regulation, the Commission should (following appropriate open, rulemaking procedures) adopt legislation in the following areas:

- (a) **Airspace classification.** The Commission should adopt a regulation that classifies the upper airspace such that all flights and their intent is known to ATC and establishes uniform rules regarding the classification of the lower airspace such as rules on the ATS to be rendered in a certain class of airspace, the degree of freedom of VFR flights, and the establishment, modification and cancellation of airspace.¹²⁸
- (b) **Sector and route design.** The Commission should adopt common principles for the design of ATC sectors. They should include provisions for the development of an algorithm for the determination of sector capacities and provisions for cross-border sectorisation and delegation.¹²⁹ Also, the Commission should adopt binding criteria for the development of the European ATS route network, including criteria for the interface between the upper and lower airspaces.
- (c) **Standards for segregated airspace.** The Commission should adopt standards for segregated airspace. This should include criteria for the determination of horizontal

¹²³ See above Chapter 4, Section 4.5.1.

¹²⁴ See above Chapter 4, Section 4.5.3.

¹²⁵ See above Chapter 4, Section 4.5.2.

¹²⁶ See above Chapter 4, Section 4.5.4. A non-compliance procedure as regards compliance with ATFM rules should be established within Eurocontrol, see above Chapter 5, Section 5.3.2.b(i).

¹²⁷ See Article 3 of Council Decision of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission, O.J. No. L 184 of 17 July 1999, pp. 23 sseq.

¹²⁸ For details see above Part III, Chapter 2, Section 2.3.3.

¹²⁹ For details see above Part III, Chapter 2, Section 2.3.5.

and vertical extensions of military airspace, the location of such airspace, and the subdivision of military airspace into functional elements to be activated according to demand.¹³⁰

- (d) ***Flexible Use of Airspace (FUA).*** The Commission should adopt rules and procedures regarding the implementation of FUA within the Member States. This would also require minimum standards for civil-military coordination and management. Commission legislation within this area would also be subject to the “red-button-facility” described above.¹³¹

Where appropriate, some or all of these elements can be combined within one regulation. As stated above, the Commission should draw upon the expertise of Eurocontrol and Member States when developing technical and operational standards in these areas. Also, in adopting these rules, the Commission might consider referring to international standards adopted by Eurocontrol, ECAC or the ICAO where such standards exist and are appropriate, and if the Commission thinks that concerns regarding the legal force of instruments not published in all the EC’s official language do not prevail.

7.1.4 Instruments governing the EC/Eurocontrol relationship

Within the first phase of regulation, the EC should also seek to clarify its relationship with Eurocontrol through the adoption of two instruments. It should ensure that the instruments operate on a stand-alone basis.

- (a) ***Memorandum of Understanding.*** The Memorandum of Understanding should state the principles and procedures which would apply to the relationship between Eurocontrol and the EC. The Memorandum should make clear in particular which tasks the two organisations will respectively fulfil and should establish processes for ad-hoc mandates to be given to Eurocontrol and for consultation and cooperation between the two institutions. Sufficient flexibility should be ensured so that the parties can amend the Memorandum of Understanding without undergoing a new formal ratification/approval process.
- (b) ***Accession Protocol.*** The Accession Protocol should address, in particular, voting and representation of the EC and its Member States in Eurocontrol bodies and financial issues.

7.2 Later Phases of Regulation

A number of issues could be dealt with at a later stage of regulation as the creation of the single European sky proceeds. Some of them will require amendments to the Enabling Regulation or the adoption of further regulations by the Council and the Parliament. Some

¹³⁰ For details see above Part III, Chapter 2, Section 2.3.6.

¹³¹ For details see above Part III, Chapter 2, Section 2.4.2. See above Chapter 2, Section 2.4. for a discussion of issues of EC competence over military aspects of airspace design and use and of options available to the EC.

of these issues are technical in nature, while others would significantly change the airspace structure within Europe:

- (a) **FIR Europe.** The establishment of a single FIR Europe covering both the upper and the lower airspace might be considered.¹³²
- (b) **Reduction of the number of airspace classes.** Eurocontrol and ECAC are currently developing a new “Traffic Environment Model” that would reduce the number of airspace classes. Once the details have been worked out, the Commission, within the powers conferred on it under the Enabling Regulation, should implement these classes.¹³³
- (c) **Coordination of civil and military ATC.** This is an important improvement in air traffic management that would significantly facilitate the implementation of the FUA concept.¹³⁴
- (d) **Free Route Airspace.** The EC should support the development of the FRA concept and, if successful, adopt this as an EC standard.¹³⁵
- (e) **Creating blocks of airspace.** The EC will want to consider the creation of FABs. This might be done in various phases ranging from regional cooperation (which will already be supported by the first phase of regulation) to joint franchising and joint delegation of the upper airspace to the EC (which would then franchise blocks to ATS providers). Joint delegation of the upper airspace and franchising by the EC would require a phasing-out of current franchises or delegations of airspace (management) to ATS providers using sunset provisions, as indicated in more detail above.¹³⁶

¹³² See above Part III, Chapter 2, Section 2.3.2.

¹³³ See above Part III, Chapter 2, Section 2.3.3.

¹³⁴ See above Part III, Chapter 2, Section 2.4.2.

¹³⁵ See above Part III, Chapter 2, Section 2.4.5.

¹³⁶ See above Part III, Chapter 6.

PART V

CONCLUSIONS: KEY MESSAGES AND CHALLENGES

CHAPTER 1: KEY MESSAGES OF THE STUDY

The results of our Study of the Regulation of Airspace Management and Design can be grouped or understood under four broad and interrelated themes or messages:

- **European Functionality.** As made clear by the findings of the HLG, airspace designs determined by national land borders no longer serve the interests of airspace users or individual states, much less those of the European Community. The goals of safety, national security, efficiency and fairness to all classes of users require a package of reforms to redesign airspace on the basis of a practical and timely European functional concept.
- **Positive Regulation.** Careful analysis shows that pursuing the goal of the single European sky will not place Europe in any conflict with the basic laws and policies of international aviation. We find that the contrary is the case: moving toward the single European sky will serve to implement accepted goals of international aviation. ICAO already explicitly recommends that airspace designs should not be based on political geography but rather on the needs of traffic. The Chicago Convention is, moreover, a living document and commits no one to frozen notions of national sovereignty. Rather it challenges, if not requires, the Commission, Eurocontrol and authorities of the member states to regulate affirmatively, as recommended by the HLG, in order to lift European ATM performance to new levels.
- **Institutional Change.** Effective regulation must be established at the European level. This requires change not only for the Commission but equally for Eurocontrol. On the basis of the proposals made in the Study, Eurocontrol would benefit from the Commission's enforcement powers, while the Commission would benefit from Eurocontrol's technical expertise and Europe-wide reach. This results in a positive challenge for both institutions since each of their strengths are mutually complementary.
- **Demand-Driven Regulation.** The European aviation community supports and, in fact, demands change. Thus, one fundamental point is absolutely clear: the single European sky initiative is not based on top-down perceptions of "technocrats" divorced from the practicalities of delivering ATS services to airspace users. Rather, it responds to the growing concerns of users, providers, airports, key professionals and other members of the aviation community.

CHAPTER 2: PRINCIPAL CHALLENGES FOR THE NEW FRAMEWORK

Some of the single European sky issues enjoy strong consensus and primarily require placing a decision-making structure over substantially agreed policies and well-defined

policy development processes. Other issues, however, require further policy and institutional innovation. These concern, in particular, civil-military operations and coordination; the creation of new upper airspace jurisdictions; and the establishment of new forms of regulatory oversight:

- **Military Participation.** Segregated airspace, FUA, direct routings, these are all issues whose development and implementation require greatly enhanced participation by Europe's military as well as a commitment to consider airspace management and design in European terms.
- **Functional Airspace Blocks (FABs).** In providing in the future for enroute services in the upper airspace, providers, states and European institutions can choose from a number of options. As discussed in Part III, Chapter 6, none of the options requires privatisation or any other specific ownership form of the service provider organisation. However, depending on the option/path chosen, states will have to make decisions as to provider selection criteria; the ability of qualified provider organisations to compete for franchises; or for the establishment of effective oversight authority.
- **Operational European Regulator.** ATFM services, the participation and compliance of ATFM users, and the establishment and monitoring of more uniform standards of capacity provision, require an operational European regulator. As was discussed in Part III, Chapter 7, we propose to set up within the Eurocontrol organisation an Airspace Policy Unit (APU). Thus Eurocontrol will provide for, among other things, coordinated oversight over European ASM and ATFM functions; expert advice to the Commission on airspace policy matters and on the quality of regulatory implementation; investigative assistance when requested; and recommendations for non-compliance procedures and enforcement actions as appropriate. Within the European Commission, there would be an Executive Secretariat containing a core of qualified staff covering the full range of the Commission's responsibilities. The two structures would work together as the European regulator.

The approach chosen in this Study and the proposals made herein for a regulatory framework for the single European sky take into account the challenges and sensitivities. As has been demonstrated in this Study, particularly in the discussion in Part IV, notwithstanding these challenges it is possible to develop a regulatory framework for airspace management and design that is practical without being (politically) prohibitive.

ANNEX 1

GLOSSARY OF TERMS

GLOSSARY OF ABBREVIATIONS

GLOSSARY OF TERMS

Area Control Centre (ACC)

A unit established to provide air traffic control services to controlled flights in control areas under its jurisdiction.

Air Navigation Services

This term includes air traffic services (ATS), aeronautical telecommunication services (COM), meteorological services for air navigation (MET), search and rescue (SAR) and aeronautical information services (AIS). These services are provided to air traffic during all phases of operations (approach, aerodrome and en-route). With implementation of CNA ATM systems, ATS and COM will be replaced by respective ATM and CNS which are broader in scope.¹

Air Traffic

All aircraft in flight or operating in the manoeuvring area of an aerodrome.

Air Traffic Flow Management (ATFM)

A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilised to the maximum extent possible, and that traffic volume is compatible with the capacities declared by the appropriate ATS authority.¹

Air Traffic Management (ATM)

A systems approach with the objectives of enabling aircraft operators to meet their planned times of departure and arrival and adhere to their preferred flight profiles with minimum constraints, without compromising agreed levels of safety. It comprises ground elements and airborne elements which, when functionally integrated, form a total ATM system. The airborne part consists of the elements necessary to allow functional integration with ground part. The ground part comprises air traffic services (ATS), air traffic flow management (ATFM) and airspace management (ASM), where ATS is the primary component.¹

Air Traffic Control Service (ATC)

A service provided for the purpose of:

- a) preventing collisions:
 - between aircraft, and
 - in the manoeuvring area between aircraft and obstructions; and
- b) expediting and maintaining an orderly flow of air traffic.

Air Traffic Service (ATS)

A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

¹ EU-Single Sky Unit Handout
Remarks: Those terms not marked are current ICAO terms

Air Traffic Services Airspace

Airspace of defined dimensions, alphabetically designated, within which specific types of flights may operate and for which air traffic services and rules of operation are specified.¹

Airspace Class A

IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

Airspace Class B

IFR and VFR flights are permitted, all flights are provided with air traffic control service and separated from each other.

Airspace Class C

IFR and VFR Flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.

Airspace Class D

IFR and VFR Flights are permitted and all flights are provided with air traffic control service. IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights. VFR flights receive traffic information in respect of all other flights.

Airspace Class E

IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as practical. Class E shall not be used for control zones.

Airspace Class F

IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested.²

Airspace Class G

IFR and VFR flights are permitted and receive flight information service if requested.

Air Traffic Services Unit

A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Airspace Continuum

A coherent block of airspace designed on uniform principles and criteria.³

Airspace Design

An overall policy and an appropriate, efficient and effective process for structuring, division and categorisation of airspace as well as planning of routes and airspace.³

¹ States shall select those airspace classes appropriate to their needs.

² Where air traffic advisory service is implemented, this is considered normally as a temporary measure only until such time as it can be replaced by air traffic control.

³ DFS explanation for study purposes.

Airspace Management (ASM)

A planning function with the primary objective of a maximum utilisation of available airspace by dynamic time-sharing and, at times, the segregation of airspace among various categories of users based on short term needs. In future systems, airspace management will also have a strategic function associated with infrastructure planning. *The main design entities of ASM are the airspace structure, the route network, airspace sectorisation, civil-military protocols and common procedures. These "static" design entities, together with the CNS infrastructure, ATFM and ATS function, constitute a "dynamic" network which responds to the demands of all aviation users.*¹

Airspace Management Cell (AMC)

A joint civil-military cell responsible for the day to day management and temporary allocation of the airspace within its jurisdiction for a specific time period, by means of a standard message format.²

Airspace Structure

A division of airspace designed to accommodate the safe of aircraft during a specific phase of flight. Airspace structures encompass Controlled/Uncontrolled, ATS Route, Airspace, Danger Area (D), Restricted Area (R), Prohibited Area (P), Temporary Segregated Area (TSA), Cross-Border Area (CBA) etc.³

Airway

A control area or portion thereof established in the form of a corridor.

Altitude

The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Area Navigation (RNAV) Basic Area Navigation (BRNAV)

A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

ATS Route

A specified route designed for channelling the flow of air traffic as necessary for the provision of air traffic services.

ATS Route Network (ARN)

A network of specified routes designed for channelling the flow of air traffic as necessary for the provision of air traffic services.⁴

Approach Control Office (APP)

¹ EU-Single Sky Unit Handout.

² EUROCONTROL ASM Handbook.

³ EUROCONTROL Airspace strategy for ECAC Annex 3.

⁴ DFS explanation for study purposes.

A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Approach Control Service

Air traffic control service for arriving or departing controlled flights.

Conditional Routes (CDR) ¹

Conditional Routes complement the permanent ATS route network. The purpose of CDRs is to allow flights to be planned on and to use ATS routes, or portions thereof, that are not always available. CDRs are established through potential areas of temporary segregation identified under the generic term Temporary Segregated Areas (TSAs). The conditions for the use of CDRs will be daily published in national "Airspace Use Plan (AUP) and international distributed "Conditional Route Availability Message" (CRAM) by EUROCONTROL - CFMU.

CDR Category 1 (CDR 1) ¹

- Permanent plannable
- Available for most of the time
- Flights will be planned in the same way as planned for permanent ATS routes
- Any re-routing around associated TSAs will be made on ATC instructions only
- For the calculation of fuel consumption, alternate routes are published in the "Remarks" column
- Weekend Routes: Outside weekend times available only when especially noted

CDR Category 2 (CDR 2) ¹

- CDRs are part of pre-defined routing scenarios which respond to specific capability imbalances
- Flights will be planned **only** in accordance with conditions daily published in the CRAM
- Possible re-routing on ATC instructions only

CDR Category 3 (CDR 3) ¹

- Not plannable
- Usable on ATC instructions as short notice only

Danger Area (D)

An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Flight Information Region / Upper Flight Information Region (FIR / UIR)

An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight Level (FL)

¹ EUROCONTROL ASM Handbook

A surface of constant atmospheric pressure which is related to specific pressure datum 1013,2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

General Air Traffic (GAT)

Civil and military air traffic operating in accordance with ICAO rules and regulations, as opposed to Operational Air traffic (OAT).¹

IFR

The symbol used to designate the instrument flight rules.

IFR Flight

A flight conducted in accordance with instrument flight rules.

Local Airspace

All airspace below regional airspace.²

Modular Sector Configuration

Configuration of sector schemes to be applied in current operation in order to respond to varying traffic flows (daily/seasonal).²

Operating Airspace Continuum

An airspace continuum within which uniform airspace management procedures and safety standards combined with seamless ATS provisions are applied.²

Operational Air Traffic (OAT)

Military air traffic which due to its nature does not comply with the ICAO rules and regulations. ¹

Pan European Airspace

An airspace where horizontal trans European air traffic (overflights) are predominant.²

Prohibited Area (P)

An airspace of defined dimensions, above land or territorial waters of a State, within which the flight of aircraft are prohibited.

Regional Airspace

An airspace determined to accommodate intra-European short and medium haul air traffic and established between pan European and local airspace.²

Restricted Area (R)

¹ EU-Single Sky Unit Handout.

² DFS explanation for study purposes.

An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Temporary Restricted Area (TRA)

An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified times and conditions.

Temporary Segregated Area (TSA)

An airspace of defined dimensions within which activities require the reservation of airspace for the exclusive use of specific users during a determined period of time.¹

VFR

The symbol used to designate the visual flight rules.

VFR Flight

A flight conducted in accordance with visual flight rules.

¹ EUROCONTROL Airspace Strategy for ECAC, Annex 3.

GLOSSARY OF ABBREVIATIONS

A (State)	Austria
AAR	Air to Air Refuelling
ACC	Area Control Centre
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AMC	Airspace Management Cell
AO	Aircraft Operator
APC	Airspace Policy Commission
APP	Approach Control Offices
APU	Airspace Policy Unit
ARN	ATS Route Network
ASD	Airspace Design
ASM	Airspace Management
ATCC	Air Traffic Control Centre
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Services
ATSP	Air Traffic Services Provider
B (State)	Belgium
BAH	Booz, Allen & Hamilton (Contractor)
B-RNAV	Basic Area Navigation
BRU	Brussels (Airport Code)
CAA	Civil Aviation Authority
CANSO	Civil Air Navigation Services Organisation
CBA	Cross Border Area
CCICA	Chicago Convention on International Civil Aviation
CENA	Centre d'Etudes/Expérimentation de la Navigation Aérienne
CFSP	Common Foreign and Security Policy (EU)
CDG	Paris Charles de Gaulle (Airport Code)
CDM	Collaborative Decision Making
CDR	Conditional Route(s)
CEAC	(NATO) Committee for European Airspace Co-ordination
CFMU	Central Flow Management Unit
CGN	Cologne (Airport Code)
CH (State)	Switzerland
CISES	Committee for the Implementation of the Single European Sky
CMIC	Civil Military Interface Standing Committee
CNS	Communication, Navigation and Surveillance
CTOT	CFMU Take Off Time
CTR	Control Zone
D (State)	Germany

D	Danger Area
DAP	Directorate of Airspace Policy (UK-CAA)
DFS	DFS Deutsche Flugsicherung GmbH
DK (State)	Denmark
DUS	Düsseldorf (Airport Code)
EAG	European ATFM Group
EANPG	European Air Navigation Planning Group
EASA	European Aviation Safety Agency
EATCHIP	European Air Traffic Control Harmonisation and Improvement Programme
EATMP	EUROCONTROL Air Traffic Management Programme
EC	European Community
ECAC	European Civil Aviation Conference
EOBT	Expected Off Block Time
ER	European Regulator
ESC	European Selection Committee
EU	European Union
F (State)	France
FAA	Federal Aviation Administration
FAB	Functional Airspace Block(s)
FDPS	Flight Data Processing System
FIN (State)	Finland
FIR	Flight Information Region
FL	Flight Level
FMD	Flow Management Division
FMP	Flow Management Position
FPL	Flight Plan
FRA	Free Route Airspace
FRAC	Free Route Airspace Concept
FUA	Flexible Use of Airspace
GAT	General Air Traffic
GB	United Kingdom
GR(State)	Greece
HLG	High Level Group
I (State)	Italy
IAOPA	International Aircraft Owners and Pilots' Association
IATA	International Air Transport Association
ICAO	International Civil Aviation Authority
IFPS	integrated Initial Flight Plan Processing System
IFR	Instrument Flight Rules
IGACEM	Inspection Générale de l'Aviation Civil et de la Météorologie
IRL	Ireland
LUX	Luxembourg (Airport Code)
MAS	Maastricht (Airport Code)

MATSE	Meeting of the European Ministers of Transport
MTCD	Medium Term Conflict Detection
N (State)	Norway
NATO	North Atlantic Treaty Organisation
NATS	National Air Traffic Services (UK)
NL	The Netherlands
NM	Nautical Mile(s)
NTM	Nattenheim VOR
OAT	Operational Air Traffic
P (State)	Portugal
P	Prohibited Area
PRC	Performance Review Commission
PRU	Performance Review Unit
R	Restricted Area
R&D	Research and Development
RNAV	Area Navigation
RVSM	Reduced Vertical Separation Minimum
S (State)	Sweden
SARP	Standards and Recommended Practices
SP (State)	Spain
SRC	Safety Review Commission
SRG	Safety Regulation Group (UK)
SRS	Standard Routing Scheme
TMA	Terminal Control Area
TRA	Temporary Restricted Area
TSA	Temporary Segregated Area
UAC	Upper area Control Centre
UIR	Upper Flight Information Region
UK (State)	United Kingdom
UTA	Upper Control Area
VFR	Visual Flight Rules
VOR	Very High Frequency Omni-directional Radio
Range	
WCP	Wilmer, Cutler and Pickering (Contractor)

ANNEX 2

Catalogue of Criteria of the Federal Ministry of Transport, Building and Housing for the Establishment of Airspaces

- Airspace Concept Germany -

(Version 1.0)

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1. Introduction

A civil-military airspace working group was formed within the framework of the Committee on Airspace Issues constituted on the level of the Federal Ministry of Transport, Building and Housing and the Federal Ministry of Defence. It consists of representatives of DFS, the Bundeswehr Air Traffic Services Office and the Air Force Office (Flight Operations Section) and was commissioned with the elaboration of a general catalogue of criteria for the establishment and modification of airspaces in Germany.

At the same time, the German Aero Club (DAeC) elaborated a position paper on the structure and utilization of airspace in the Federal Republic of Germany, which was presented to DFS as well as to representatives of other user groups at the end of 1997. It contains, among others, proposals regarding additional airspace design elements and a further flexibilisation of airspace utilization.

On the basis of the results elaborated by the civil-military airspace working group as well as the position paper of the DAeC, this catalogue of criteria was developed for further coordination with the representatives of civil user groups (AOPA, DAeC and German Airline Pilots Association (VC)).

The aim of this catalogue is to determine generally applicable criteria for the establishment, modification and cancellation of airspaces, especially in the vicinity of IFR aerodromes, considering the interests of the various user groups as far as possible. On this basis, airspace measures can be implemented in a transparent and comprehensible way.

The general criteria for airspace development still require individual coordination of each concrete airspace project with the various user groups. Provided the general criteria are fulfilled, this individual coordination will no longer focus on the measure itself but on the lateral and vertical dimensions of the new or modified airspace as well as on possible required letters of agreement.

Airspace measures often entail a restriction of VFR traffic, so such an airspace should generally be as small as possible but as large as necessary.

The following sections, especially regarding the use of airspace classes for certain purposes, refer to the current state of national framework provisions. Possible future changes have to be considered in the catalogue of criteria.

2. Legal Minimum Requirements on the Airspace Structure to Allow IFR Flight Operations at Aerodromes

2.1. General

According to Annex 4 to Art. 10, para. 2 of the German Aviation Regulation, IFR flight operations are only permitted in airspaces A to F. For this, only airspace classes C, D, E and F are established in Germany.

According to Art. 22 a of the German Aviation Regulation, aerodrome control and defined instrument approach procedures are generally required for commercial IFR flights with aircraft whose maximum take-off mass exceeds 14,000 kg. For this purpose, the necessary controlled airspace has to be established, i. e. a control zone (airspace D) and an additional airspace E.

For commercial flights with aircraft whose maximum take-off mass is below 14,000 kg or for non-commercial flights, an airspace F may be established to protect the IFR traffic.

The establishment of airspaces D (control zone), E (lower limit 1000 ft / 1700 ft GND) and F is thus directly connected to the implementation of IFR flight operations at international/regional airports, airfields (cf. Art. 27 d para. 4 of the German Aviation Act) and military aerodromes.

In view of this background, DFS will inform the airspace users about new aerodrome projects by suitable means (such as aerodrome development chart) and at an early stage.

2.2 Airspace D (CTR)

An airspace D (CTR) is established at an aerodrome if the requirements according to Art. 22 a of the German Aviation Regulation are fulfilled. The vertical dimensions are always from GND to an upper limit (given above MSL) within a range of 1500 ft to 2500 ft GND. The lateral boundaries of the control zones are to be defined in such way that a minimum buffer of 500 ft between all IFR approaches and departures and the lower limit of the surrounding airspace C or E (if existing) is ensured. For airspace planning, a climb and descent rate of 300 ft/NM is used, just as for all other airspace classes.

2.3 Airspace E

Airspace E as a standard element of controlled airspace in Germany has been established nation-wide from 2500 ft GND to FL 100 (Alpine region: FL 130). In the vicinity of control zones, the airspace boundary is lowered to 1000 ft or 1700 ft GND to ensure that all IFR flight profiles (standard procedures and radar vectoring) are within controlled airspace (including 500 ft buffer). This measure also helps to avoid inordinately large control zones.

2.4 Airspace F

This airspace enables IFR approaches and departures at uncontrolled aerodromes. As it is exclusively activated for IFR approaches and departures (HX application), it is only active for a short period of time. The lower limit of an airspace F is GND or 1500 ft GND, the upper and lateral boundaries vary according to the lower boundary of the surrounding airspace E. In this connection, the same planning principles apply as for the establishment of a control zone (climb/descent rate of 300 ft/NM plus 500 ft buffer to the lower limit of the airspace E).

For the planning and establishment of an airspace F, the following evaluation criteria additionally apply to consider military requirements (sovereign functions):

Evaluation Criteria for Planning/Establishment of Airspace F

PART IA. GENERAL

1. *For military flight operations of the mission type "tactical air transport" (PROP/HEL) as well as for helicopter operations by the army at flight visibilities below 5 km, an airspace F at civil aerodromes is a factor of uncertainty regarding flight planning because, when it is activated, deviations from the planned flight route cannot be excluded. In this way, operations may be obstructed. To exclude this factor of uncertainty, airspace F is usually avoided during flight planning which, in turn, may lead to bottlenecks. These, however, increase the risk of aircraft proximities and might thus risk air safety. It is therefore generally necessary to provide a sufficiently large airspace in order to fly around an airspace F. Such a regulation is also in the interest of a largely even distribution of aircraft noise for the population.*
2. Since 1993, it has been possible to establish airspace F. It is expected that the number of applications for airspace F will increase in the near future, so airspace G will increasingly be restricted.
To maintain a minimum quantity of airspace G for military low flying and other military VFR operations without operational restrictions, evaluation guidelines for the intended establishment of airspace F are required.

B. PLANNING PARAMETERS

1. *The route system for night low-flying operations, coordinated with the "Länder", the Federal Ministry of Transport, Building and Housing, and DFS Deutsche Flugsicherung GmbH will remain unchanged. The utilization of this system is granted priority over an activation of airspace F.*
2. *The possibility to fly around airspace F for military low flying operations, especially PROP/HEL, at visibilities below 5 km must be guaranteed under consideration of adjacent airspaces (airspace classifications, ED-Rs, etc.),*

national boundaries, topographic structures as well as density of population and development.

Between two airspaces F or F and D (control zone), a minimum spacing of 10 NM (2 x width of the routes for night low-flying) between the core areas (lower boundary above MSL) generally has to be applied. If there are more than two airspaces F or D (control zone) in direct vicinity, a larger spacing may be necessary depending on local conditions.

The above-mentioned minimum spacing may be disregarded provided that, if VMC is no longer assured, military helicopters only have to fly around one airspace F, (priority regulation). Uniform procedure regulations shall be determined uniformly for the German territory.

- 3. Airspace F may only be established within or in direct vicinity of areas with mainly military flight operations if unrestricted military use of these areas is ensured. The corresponding procedures are to be determined in local regulations (e.g. letters of agreement).*
- 4. Each request to establish an airspace F is regarded and evaluated as an individual case under consideration of the complete airspace structure.*
- 5. To provide a basis for planning and an overview, inquiries and plans to establish an airspace F are presented cartographically as required but at least once a year (DFS chart). The civil-military airspace working group processes and evaluates the requests. DFS then forwards the evaluation to the competent aviation authority and the Federal Ministry of Transport, Building and Housing.*

Airspace Elements in the Vicinity of IFR Aerodromes to Increase Air Safety

3.1. General

The sole protection of IFR traffic by an airspace of class E and the corresponding regulations (Art. 12 and 13 of the German Aviation Regulation) is not always sufficient in the vicinity of major airports with a large traffic volume. In individual cases, it is therefore necessary to take further airspace or control measures. While in the past, only airspace C was used, which entails restrictions for VFR traffic, two additional airspace elements have been available since 1998 to increase safety in the approach and departure area of aerodromes: Airspace D (not CTR) and Transponder Mandatory Zone (TMZ).

With the use of the airspace elements C, D (not CTR) and TMZ, a modular airspace structure on the basis of defined criteria is to be established, which increases air safety in the vicinity of IFR aerodromes and, at the same time, does not restrict the freedom of movement of the VFR traffic to a higher degree than necessary.

3.2. Airspace C

In the previous airspace structure, airspace C was the standard element to increase the safety of IFR approaches and departures outside the control zone. Airspace C extends vertically from the upper limit of the control zone outside with altitude steps up to FL 60 or FL 100. The lateral dimensions depend on the operationally used flight paths. With this measure, the majority of the IFR flights is to be protected. An airspace comprising 100 % of all IFR approaches and departures would be inordinately large.

In addition to the regulations valid for airspace C (Annex 4 and 5 of the German Aviation Regulation), pilots require a special CVFR rating in order to comply with the clearances necessary in this airspace for separation purposes. VFR flights of General Aviation are thus further restricted in this airspace.

3.3. Airspace D (not CTR)

The airspace module D (not CTR) was initially introduced at Stuttgart airport on 26 March 1998 within the framework of trial operations. Due to the generally positive experience gained, this airspace element is used as an additional module. While at Stuttgart airport, airspace D (not CTR) basically only fills the gap between airspace C with the upper limit in FL 60 and the area-wide airspace C starting in FL 100, this airspace may also be a sole protection element above the control zone. For the determination of its dimensions, the same principles as for airspace C apply.

The main differences from the regulations for airspace C are that there are no separation requirements between IFR and VFR flights (only information service) and that no CVFR rating is required.

3.4. Transponder Mandatory Zone (TMZ)

The purpose of the TMZ is to increase air safety for IFR approaches and departures by establishing an airspace with a mandatory transponder setting (e.g. A/C 0021) for all VFR flights. This does not affect military transponder regulations (e.g. A/C 0033). The advantages of this regulation are that, on the one hand, the controller receives better information on the radar screen about the VFR flight (precise position and altitude information) and, on the other hand, TCAS-equipped aircraft receive an alert or even a recommendation for avoidance action in case of a conflict. This second factor is even more important since in some areas, there is no uninterrupted radar coverage and the controller is thus unable to provide precise traffic information. The disadvantage of a TMZ compared with airspace C and D is that the controller does not receive any information about the intention of the VFR flight.

For each aerodrome, the TMZ is to be dimensioned laterally and vertically in such way as to ensure that IFR flights are generally protected where they actually take

place. It has to be guaranteed that the airspace remains manageable and the chart presentation is comprehensible so that the existing airspace structure does not become unnecessary complicated (no “patchwork” TMZ). Planning and introduction of a TMZ is conducted according to the principles applying to airspace C and D (not CTR).

The competent air navigation services unit may grant exceptions to the general regulations of the TMZ by telephone or radio telephony. Additionally, concrete regulations (operational directives) for the aerodromes directly concerned of such a measure may be agreed with the competent air navigation services unit. As long as no suitable transponders are available (e.g. lightweight transponders for gliders), exceptions and operational directives will be very liberal.

3.5 Criteria to Establish/Reorganise Airspaces in the Vicinity of IFR Aerodromes to Increase Air Safety

For the planning or modification of the airspace structure in the vicinity of IFR aerodromes, the following four decision-making criteria shall be used:

- 1) Air safety-relevant incidents
- 2) IFR traffic volume
 - a) Threshold values for IFR take-offs and landings
 - b) Traffic development
- 3) Traffic mix
 - a) Proportion of jet operations
 - b) Number of VFR flight movements
 - c) IFR training flights
 - d) Proportion of aircraft with a maximum take-off mass above 14,000 kg
- 4) Traffic concentration
 - a) Number and situation of aerodromes in the vicinity
 - b) Runway constellation
 - c) Flight procedures/traffic flows
 - d) Areas of intensive airspace utilization

These criteria are weighted according to their importance in the order given above. Section 3.5.5 describes the application of these criteria.

3.5.1 Air Safety-Relevant Incidents

Although the major goal should be to introduce airspace structures as a preventive measure to avoid aircraft proximities, a local concentration of air safety-relevant incidents resulting from the existing airspace structure requires an immediate change of the airspace structure in this area in order to increase air safety.

All cases known to the air navigation services are to be considered. The cases dealt with by the Air Proximity Evaluation Group (APEG) are indicated separately.

DFS-known incidents:

DFS evaluates all incidents reported by the regions/units. Within the framework of this catalogue of criteria, only conclusions as to necessary airspace measures (C, D (not CTR), TMZ) are to be drawn, so all incidents fulfilling the marginal conditions listed below are not considered.

- Incidents between IFR/IFR, VFR/VFR or IFR/WX balloon;

- Incidents within existing airspaces C and D (e.g. airspace violations);
- Incidents above FL 100 (airspace C);
- Incidents already followed by a concrete airspace measure;
- Incidents in the vicinity of military aerodromes;
- Incidents far outside existing IFR airports (en-route area).

The remaining number of incidents is a significant indicator for an airspace measure to be taken.

Although the very first incident may basically result in a collision, the collision probability increases as the number of air safety-relevant incidents grows.

Therefore, the definition of a concrete number of air safety-relevant incidents as a criterion for an urgently required airspace measure is basically very problematic; the special meaning of this criterion, however, is unquestioned.

Incidents recurring over a longer period of time (e.g. several years) or a high concentration of incidents within a short period of time point to a critical air safety situation which requires an overall situational analysis aiming at an airspace measure.

3.5.2 Criterion "IFR Traffic Volume"

As the number of IFR take-offs and landings at an aerodrome increases, the necessity to protect the departing and landing IFR traffic by means of special airspace measures becomes more important. Safe IFR/VFR mixed operations in an airspace of category E according to the principle of "see and avoid" becomes increasingly difficult as the traffic volume grows.

Based on the number of IFR take-offs and landings per year, all IFR aerodromes can be divided into six categories covering the complete spectrum of possible airspace measures (from 'no measure' up to 'airspace C connected to FL 100'). The airspace changes of category C introduced in the past provide a rough orientation.

Apart from the absolute traffic figures per year, month or day, the traffic development (trend) also has to be included into the evaluation. Strong increases or decreases over the previous years, together with forecast traffic increases or decreases may therefore be a decisive indicator for a forthcoming airspace measure.

The following table defines six categories, depending on the annual number of IFR take-offs and landings. These categories are allocated to possible airspace measures/modules. The given figures should be regarded as guidelines; traffic developments (increases and decreases) have to be considered.

PART II APP ROXTEGOR Y	Number of IFR take-offs/ landings per year	Proposed airspace measure
1	< 10,000	No measure exceeding airspace D (CTR), E or F
2	approx. 10,000 – 30,000	Transponder Mandatory Zone (TMZ)
3	approx. 30,000 – 50,000	Airspace D (not CTR) up to FL 60 + TMZ from FL 60 up to FL 100, if necessary
4	approx. 50,000 – 100,000	Airspace C up to FL 60 + Airspace D (not CTR) or TMZ from FL 60 up to FL 100
5	approx. 100,000 – 150,000	Airspace C up to FL 60 + Airspace D (not CTR) from FL 60 up to FL 100
6	> 150,000	Airspace C up to FL 100

Table 1: Aerodrome categorisation on the basis of IFR traffic figures

3.5.3 Criterion "Traffic Mix"

The aim of the criterion "traffic mix" is to gain qualitative data on problems in connection with the traffic mix (e.g. IFR/VFR, different speeds, etc.) for each airspace in the vicinity of an IFR aerodrome, taking into account the following parameters:

- Proportion of jet operations (reduced possibilities of avoidance action),
 - Number of VFR flight movements,
 - IFR training flights,
 - Proportion of aircraft with a maximum take-off mass above

14,000 kg.

3.5.4 Criterion "Traffic Concentration"

The aim of the criterion "traffic concentration" is to conduct targeted analyses as to mainly used flight paths and areas of IFR and VFR flights on the basis of the following parameters:

- Number and situation of aerodromes in the vicinity,
- Runway constellation,

- Flight procedures/traffic flows,
- Areas of intensive airspace utilization.

3.5.5 Application of the Criteria

Prior to each new airspace measure, the criteria “air safety-relevant incidents” and “IFR traffic volume” generally have to be regarded due to their impact and because they can be quantified to initiate an overall situational analysis.

The factors “traffic mix” and “traffic concentration” are supplementary criteria which should contribute to the decision-making process regarding an impending airspace measure by means of qualitative data. They are therefore part of an overall analysis to be conducted but are not considered individually to initiate an airspace modification.

The necessary overall analysis is conducted within the civil-military airspace working group. The results are passed on to the Federal Ministry of Transport, Building and Housing and to representatives of the user groups.

On the basis of the above-mentioned criteria and the resulting dynamic changes (e.g. change of traffic figures, significant increase in air safety-relevant incidents, etc.), the airspace structure must be permanently evaluated. Therefore, the airspace elements initially introduced under consideration of the catalogue of criteria can basically be changed in the future. Current figures regarding IFR take-offs and landings as well as air safety-relevant incidents are listed in the annex and updated annually.

4. Flexibilisation of Airspaces

4.1 General

The current airspace structure is composed of different airspace elements which ensure safe IFR/VFR mixed operations, especially due to the targeted utilization of airspace classes C, D, E and F. However, these airspace classes are only needed where IFR traffic actually takes place. This, in turn, means that areas without IFR traffic for a foreseeable period of time can be used in a more flexible way. In this context, it is absolutely necessary to have simple and easily applicable regulations to maintain air safety even if the airspace structure is made as flexible as possible.

4.2 Flexibilisation Elements of Airspace Utilization

There are three variants for airspace flexibilisation in Germany.

a) HX regulation

A large number of airspaces D (CTR), E with the lower limit at 1000 ft/1700 ft GND as well as all airspaces F are currently marked “HX”, which means that VFR traffic may generally use them according to the regulations of airspace G outside the hours when IFR traffic takes place. The HX regulation is the same for all three airspace classes and is explained in AIP-VFR.

b) Glider regulations in airspaces C or D (not CTR)

For the airspace C / D (not CTR) of Stuttgart, glider flying sectors were published some time ago which are presented on the ICAO chart, in which glider flying with a general authorisation may take place under certain conditions. A similar regulation is currently published for the western area of the Hannover airspace C ("Loccum sector").

The basic idea behind both regulations is that, depending on the runway in use, certain parts of the airspace are not used for handling IFR traffic and can therefore be made available to glider operations (local or en-route).

c) Operational regulations for airfields and gliding sites

For airfields or gliding sites within or below airspaces C or D, there are often local, not published operational regulations between the aerodrome and the air navigation services unit concerned to facilitate local VFR traffic. This is also possible in connection with Transponder Mandatory Zones (TMZ).

4.3. Extended Application of Flexibilisation Elements in Airspace Utilization

"HX" might also be applied for portions of airspaces C and D (not CTR). Especially in the outer vicinity of airports with only one runway or with parallel runways, the necessity of an outer portion of airspace may be redundant, depending on the runway in use. This is due to the fact that airspaces C and D (not CTR) are generally dimensioned on the basis of the IFR approach paths ("vector airspace"). Departures are usually not a problem in the border areas of such airspaces.

Before taking a possible measure, however, the activation/deactivation of portions of airspaces C or D (not CTR) generally have to be thoroughly evaluated, depending on the runway in use. The additional controller workload in connection with activation and deactivation tasks have to be considered just as a possible non-compliance of the rules by individual VFR pilots and the resulting impairment of air safety. For airspaces in the vicinity of airports with a very high traffic volume such as Frankfurt or Munich, such regulations will therefore generally not be applicable.

If a temporary utilization of portions of airspaces C or D (not CTR) by VFR traffic in general (HX) or only by gliders, in connection with simplified rules (general authorisation) is considered, it has to be ensured that the airspace is available to the air navigation services without restrictions and at short notice, if necessary (e.g. due to a change of the runway in use or an increased traffic volume). For this reason, a message upon entry or exit as well as listening watch on the published frequency (e.g. FIS) are absolutely necessary (cf. NfL I – 150/98 "Air Traffic Control Clearances for Glider Flights in Airspace C Hannover").

On the basis of these principles, concrete regulations may be elaborated for the individual airports. Before a possible flexibilisation, each individual case has to be considered separately, taking into account local air navigation services procedures.

5. Establishment of Airspaces

According to Art. 10 para. 2 of the German Aviation Regulation, the Federal Ministry of Transport, Building and Housing determines all controlled and uncontrolled airspaces. On the basis of the Rules of Procedure of the Federal Government, coordination between this Ministry and the Ministry of Defence is required.

As for the introduction and coordination framework, it generally has to be distinguished between the airspace measures listed in section 2 (D (CTR), E and F) and those given in section 3 (C, D (not CTR), TMZ).

As explained in section 2.1, the establishment of airspaces D (CTR), E and F is directly connected to the beginning of IFR flight operations at international or regional airports, airfields or military aerodromes and thus subject to aerodrome-policy directives. It is therefore usually not possible to introduce airspace measures in spring each year (simultaneously to the publication of the ICAO chart 1:500,000), as it is generally intended by the Federal Ministry of Transport, DFS and the airspace users.

The introduction/modification of airspaces C, D (not CTR) and TMZ are measures to increase air safety which, due to their partially relatively large dimensions, have strong effects on VFR flight operations. Such modifications of the airspace structure generally become effective at the beginning of the VFR season in spring each year, simultaneously to the publication of the ICAO chart. Early coordination of the airspace modification with all user groups is absolutely necessary. The general coordination process for such an airspace measure is as follows:

1. Beginning of each year:

Analysis of all IFR aerodromes with regard to possible modifications of the airspace structure on the basis of defined criteria (especially IFR traffic figures).

2. Spring of each year:

Announcement of possible airspace measures resulting from item 1 to be introduced in spring of the following year by the Federal Ministry of Transport, Building and Housing.

3. Summer/autumn of each year:

Presentation of concrete drafts of airspaces by the Federal Ministry of Transport, Building and Housing and DFS. Negotiation (dimensioning issues) with all user groups (Military -, Commercial -, General Aviation).

4. Beginning of each following year:

Initiation of all necessary publication measures.

5. Spring of each following year:

Entry into effect of the airspace measure simultaneously to the publication of the ICAO chart 1:500,000.

Deviations from this basic time scheme should only be made if immediate action is required in individual cases (implementation of immediate measures).

Independent of the listed criteria, changes of the lateral or vertical dimensions of the existing airspaces may become necessary due to different operational requirements or suggestions of the airspace users. In such cases, too, the measure has to be announced as early as possible and negotiated with other users concerned.

A 1 EXAMINATION OF THE AIRSPACE STRUCTURE FOR 1999

A 1.1 Air Safety-Relevant Incidents

In the following, all air safety-relevant incidents to be considered for a possible airspace measure (cf. 3.5.2) are listed for the period from 01.01.1998 to 08.07.1998. It is indicated whether an incident occurred in or above FL 60.

*APEG classification**
(if available)

Central Region:

Frankfurt:	5		1xA, 1xC
1.1.1 Friedrichshafen:		10	
2xB, 7xC			
Saarbrücken:	5	(3 cases in FL 60)	1xA, 4xC

Region North:

Hannover (in/above FL 60):	2		1xA, 1xB
Hamburg (in/above FL 60):	4		3xC
Bremen	4	(3 cases in/above FL 60)	3xC, 1xB

Region East:

1.2 Erfurt:	3	(2 cases above FL 60)	
1xB, 2xC			
Leipzig (in/above FL 60):	2		1xC
Dresden (in/above FL 60):	1		1xC

Region South:

München:	1		1xC
Augsburg:	5	(two cases in FL 60)	2xB, 3xC
Nürnberg (in/above FL 60):	5		4xC

Region West:

1.3	Düsseldorf	1	
	1xC		
1.4	Münster-Osnabrück:	17	3xA, 3xB, 11xC
	Paderborn:	6	(1 case above FL 60) 1xB, 4xC
1.5	Dortmund:	1	
	1xB		

*: "A": Serious risk of collision "B": Safety of the aircraft may have been compromised "C": No risk

A 1.2 IFR Take-Offs and Landings in 1996 and 1997 as well as Forecast for 1998

In the following, all IFR aerodromes are allocated to table 1 of section 3.5.2 according to the number of IFR take-offs and landings for the year 1997.

The concrete traffic figures (including the monthly figures) for the years 1996, 1997 and 1998 are also attached.

PART III CATEGORY	PART IV NUMBER OF IFR TAKE- OFFS/LANDINGS 1997	Aerodromes concerned	Proposed airspace measure
1	< 10,000	All regional airports not mentioned in the following	No measure exceeding airspace D (CTR), E or F
2	approx. 10,000 – 30,000	Friedrichshafen, Erfurt, M'Gladbach, Saarbrücken, Augsburg, Paderborn	Transponder Mandatory Zone (TMZ)
3	approx. 30,000 – 50,000	Dortmund, Münster, Dresden, Bremen, Leipzig	Airspace D (not CTR) up to FL 60 + TMZ from FL 60 up to FL 100, if necessary
4	approx. 50,000 – 100,000	Nürnberg, Hannover	Airspace C up to FL 60 + Airspace D (not CTR) or TMZ from FL 60 up to FL 100

5	approx. 100,000 – 150,000	Stuttgart, Hamburg	Airspace C up to FL 60 + airspace D (not CTR) from FL 60 up to FL 100
6	> 150,000	Frankfurt, München, Berlin, Düsseldorf/Köln-Bonn	Airspace C up to FL 100

Aerodrome categorisation based on the IFR traffic figures of 1997

Note:

The aerodromes of Dortmund (28,052 / +24.4%) and Münster (28,959 / +3.8 %) are listed in category 3 as a result of traffic increases.

A 1.3 Traffic Mix

(if required)

A 1.4 Traffic Concentration (IFREQUIRED)

A 1.5 Airspace Measures for 1999

Proposed Airspace Measures (Introduction in spring 1999)

1. Stuttgart:

Termination of the official trial operations / introduction of a permanent airspace D (not CTR)

2. Hamburg:

Establishment of an airspace D (not CTR) above the airspace C up to FL 100

3. Münster-Osnabrück*:

Establishment of an airspace D (not CTR) up to FL 60
(one year trial operations) / cancellation of the TMZ

4. Bremen, Leipzig, Dresden:

**PART V RECLASSIFICATION OF THE EXISTING AIRSPACE
CLASSIFICATION FROM "C" TO "D" (ONE YEAR TRIAL
OPERATIONS)**

5. Frankfurt:

PART VI ADAPTATION OF THE EXISTING AIRSPACE C

6. München:

PART VII ADAPTATION OF THE EXISTING AIRSPACE C

7. Friedrichshafen*:

Introduction of a TMZ *

* To prevent endangering air safety (Art. 29 of the German Aviation Act), the Federal Ministry of Transport introduced a TMZ at the airports of Münster-Osnabrück (until the establishment of an airspace D (not CTR)) and Friedrichshafen as an immediate measure with effect from 10 September 1998.

ANNEX 3

TECHNICAL ANNEX CONCERNING THE STUDY ON THE REGULATION OF AIRSPACE MANAGEMENT AND DESIGN

The scope of study

The scope of the study will cover both general and 7 specific areas of investigation.

General

- Identification of international rules of the air (predominantly, ICAO) applicable for visual and instrument flight. Examination of how States apply these international rules nationally. Identify if States have a rule making authority for airspace matters and how they operate.
- The responsibilities for airspace regulation, design and management involve both a European and national level. These activities and relationships will need to be optimised taking into account the Gate-to-Gate environment of ATM. In addition, the responsibility for the technical design, the performance and the safety of the European ATM route network will need to be considered in an appropriate regulated environment which responds to the needs of airspace users. Furthermore, the linkages between all airspace activities and sectorisation tasks is very strong and subject to ongoing technical developments. Thus there needs to be clarity and consistency between the different regulators (European and National) and a clear separation from the service provider functions which design and implement the capacity increases to meet performance targets. Consequently, the interface between these two functions will need to be clearly identified and focused on their respective roles. Processes to ensure compliance with public interest objectives or specified essential requirements of the airspace regulator will need to be defined.
- Defence and national security requirements play an important role in the management of European airspace. Military airspace needs, along with both civil and general aviation requirements, may need to be integrated within a single body which ensures that maximum use is made of a scarce airspace resource. The criteria for the exclusive use of airspace by state authorities will need to be identified in relation to congestion and “bottlenecks” in the European ATM network and taking account of both joint civil/military requirements. In addition, the application of the flexible use of airspace concept will need to be subject to common rules.

Specific Measures

Taking into account the plans developed by the ATM communities, particularly the ATM2000+ Strategy, the ECAC Airspace Strategy and various concepts of operation under development, there is a need to ensure that the European Airspace regulatory framework is responsive to the needs of all aviation users and supports the rapid introduction of new concepts and capacity enhancing measures. Specific elements which require detailed investigation are:

- Within the current institutional framework and taking account of the need for future developments, identify which regulator is best equipped to respond to the airspace challenge of growth, competition and best use of European airspace.
- States have different airspace structures and classifications and there is a need to ensure that common airspace classifications are rationalised, unambiguously defined, harmonised and implemented uniformly across Europe. Achieving uniform application and enforcement of airspace structures and classifications will provide the foundation for all subsequent regulatory activities.
- Planned technological development will allow a transition to a new “traffic environment model” in which knowledge of position and intention is known. Aircraft access to each category of the environment model by both civil and military users will need to be governed by commonly agreed rules and procedures.
- Determine whether the existing powers of Eurocontrol’s Central Flow Management Unit (CFMU) are adequate and what steps need to be taken to deal with irregularities in flight planning processes. Indicate what rules may be appropriate taking into account the need for integration between airport, airline and ATFM planning of the CFMU.
- As Flow Management techniques evolve there will be a requirement to improve sectorisation activity to align with traffic flows and to adopt to airspace changes. Joint civil and military airspace planners/managers will need to respond both strategically and tactically to these events through a collaborative decision making process. The organisational framework to achieve these objectives will need to be defined and the well adapted authority (European and national) will need to be invested with appropriate powers to ensure dynamic and adaptive airspace changes that satisfy capacity planning processes and agreed targets.
- There is a need to ensure that a common legal framework exists and that it supports the delegation of ATM service across national boundaries. In addition the implementation of more flexible airspace and route structures together with the application of direct routing may impact the revenue streams of service providers. Mechanisms will be required to address these issues and to ensure arbitration between different and, possibly, competing economic interests.
- In the longer term as market liberalisation takes effect, there may be opportunities to allocate airspace to service providers in new arrangement which meets the needs of the developing market for cost effective Air Traffic Control services. A high level view of these arrangements should be considered as part of the options for a new airspace authority. If necessary, other mechanisms to achieve more competition within the core aspects of ATM shall be outlined and assessed for feasibility.

ANNEX 4

QUESTIONNAIRE TO STATES

Introduction

As stated in the attached letter from the European Commission (DG/TREN), we are conducting a Study on the Regulation of Airspace Management and Design. We are seeking the input of EU Member States and would appreciate a response, within 2 weeks if possible, to the following questions:

1. National Airspace Regulator

- 1.1 Which body is responsible for airspace policy and regulation in your country?
- 1.2 What is its scope of responsibility?
- 1.3 What is its relationship to national military authorities?
- 1.4 Is the design and/or management of airspace delegated or sub-contracted to any other body?
- 1.5 Is there a mechanism for common planning and consultation with neighbouring states?
 - 1.6 Please provide contact details for relevant officials in the airspace regulatory body and for any senior legal advisers.
 - 1.7 Please state the languages for communication with these persons.

2 National Airspace Legislation

- 2.1 Please indicate the legal basis for national regulation concerning the design and management of airspace.
- 2.2 What is the legislative or regulatory procedure for issuing airspace management and design rules?
- 2.3 Please provide appropriate charts depicting airspace policy management and regulation processes, if available.

3. Conformity with ICAO Rules on Airspace Management and Design

- 3.1 Are present ICAO rules on airspace management and design fully implemented through your national legislation and regulation?
- 3.2 What are the differences to ICAO airspace management and design rules, if any?

3.3 Does your national law impose higher or additional standards?

4. Delegation of Service Provider Functions

4.1 Is it possible under national law to delegate air traffic service provider (ATSP) functions to:

- (a) another EU government or government controlled entity?
- (b) a privately controlled entity (either national or incorporated in another EU Member State)?

4.2 If there is such delegation, who is responsible for the final design of airspace?

4.3 Please specify any examples of cross-border air traffic service provision in your country.

5. Other Comments and Observations

Please indicate any particular concerns or priorities that you believe should be taken into account when proposing and defining a formal EU role in airspace regulation.

If there are any issues that you wish to discuss on an informal basis, please let us know the appropriate person to contact.