

FINANCING OF ATM TO ACHIEVE THE SINGLE EUROPEAN SKY

Final Report

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EXECUTIVE SUMMARY

Background

1. The European Commission has made the reform of air traffic management (ATM) in Europe one of its priority actions. To achieve this, it has put forward legislation to establish a Single European Sky (SES), that became effective on 20 April 2004. The legislation applies to current member states and to future member states as they join the Union. In addition, membership of the SES is open to non-member states, and Norway, Iceland and Switzerland have agreed to participate.
2. Implementation of the law will necessitate changes in the way air navigation service providers (ANSPs) and national regulatory bodies are organised and work. In broad terms, the changes comprise:
 - prescribed institutional arrangements, including the nomination of National Supervisory Authorities separate from service provision;
 - a common charging regime for all air navigation services;
 - the introduction of a single European Upper Flight Information Region, harmonised airspace classification, and common principles and criteria for route and sector design;
 - the introduction of the Functional Airspace Block as the fundamental unit of organising airspace;
 - improved civil-military cooperation;
 - moves towards more interoperability; and
 - enhanced requirements for financial reporting and accounting separation and transparency
3. Some of these changes will have financial implications for stakeholders: ANSP, governments and regulators, users, and other concerned parties. While any measures to implement the proposals should, in the long term, result in lower overall costs, in practice there may be short-term financial burdens on some stakeholders. In addition, the benefits may not always accrue to those required, under current charging and financing arrangements, to bear the cost.
4. Accordingly, the Commission launched a study into the financing needs of ATM in the Single European Sky. The study has three main phases:
 - A review of the financial implications of the SES legislation
 - A review of current financing schemes and their limitations
 - Proposals for additional or alternative financing mechanisms.
5. The Commission asked a group comprising Steer Davies Gleave and the Solar Alliance to undertake the study, which started in November 2003. This document is the Final Report from the study.

Our working method

6. Our working method was to minimise the burden of the study on stakeholders in the industry by making the maximum possible use of existing material, but nevertheless to

consult as widely as is feasible with as wide a range of stakeholders as is possible. We have done this using Open Stakeholder Meetings, Working Groups and bilateral discussions with stakeholders, and the preparation and discussion of “dossiers” on national ANSPs.

7. A major element of our approach to information collection was the preparation of “dossiers” on 26 national ANSPs. We compiled draft dossiers from all available information, including:
 - ANSPs’ Annual Reports, where available;
 - other publicly available information;
 - supplementary information made available to us by ANSPs;
 - CRCO returns; and
 - information collected by the PRU as part of the Performance Review Commission’s Information Disclosure.
8. The Terms of Reference also required us to seek information on the experience of ANSPs outside Europe. To help us do this, similar information was collected on a number of non-European ANSPs.

The Single European Sky legislation

9. The SES legislation comprises four Regulations:
 - Reg (EC) No 549/2004 laying down the **framework** for the creation of the SES;
 - Reg (EC) No 550/2004 on the **provision of air navigation services** in the SES;
 - Reg (EC) No 551/2004 on the **organisation and use of airspace** in the SES; and
 - Reg (EC) No 552/2004 on the **interoperability of the European Air Traffic Management Network (EATMN)**.
10. The **framework regulation** establishes a harmonised institutional and regulatory framework for the creation of the Single European Sky. It requires Member States to nominate ‘National Supervisory Authorities’, separate from service providers. It creates a ‘Single Sky Committee’ and defines how implementing rules are to be developed through mandates to Eurocontrol.
11. The objective of the **service provision regulation** is to establish common requirements for the safe and efficient provision of air navigation services in the Community. It sets out the tasks of the National Supervisory Authorities and mandates the adoption of Eurocontrol Safety Regulatory Requirements (ESARRs). It establishes the common requirements, which address, among other things, safety, quality, security and accounting systems. The regulation introduces a certification mechanism and the means of monitoring compliance. It also addresses the need for greater transparency and a new charging scheme for air navigation services to be developed.
12. The regulation on **organisation and use of the airspace** creates the conditions and requirements for creating functional airspace blocks. It also encourages the “progressive harmonisation” of airspace classification, based on the simplified approach defined in the Eurocontrol airspace strategy.

13. The objective of the **interoperability regulation** is to achieve interoperability across the EATMN, and to expedite the introduction of new operational concepts and technology, by defining essential requirements for the EATMN. The regulation will be supported by implementing rules, standards and Community specifications. Compliance with the regulation will be assured by a manufacturers 'declaration of conformity', which will be monitored by notified bodies.
14. **Implementation** of the SES regulations has recently begun with the formation of the Single Sky Committee. The Commission has issued a number of mandates to Eurocontrol to develop implementing rules in a number of areas, and more mandates will follow.

The implications of the legislation

Our approach to assessing the implications

15. The objective of the study was to obtain order of magnitude estimates of the **financial impact** only, based on credible assumptions, for the purposes of exploring the financing implications of the SES in Phase 3 of the study. We did not set out to justify the SES or any individual component of the legislation, or particular ways in which it may be implemented, in cost-benefit terms. Many non-financial benefits may also arise from the implementation of the legislation, particularly in safety. In addition, many of the measures that will result from the SES have the benefit of **enabling** other beneficial changes.
16. We began with a line-by-line review of the regulations, considering:
 - whether a cost was likely to be imposed, of what order of magnitude, and on whom; and
 - what the benefits might be.
17. Our classification of impacts into 'low', 'medium' and 'high' was based on the following criteria. 'Low-cost' items would require no more than two-three man-years across the SES. 'Medium-cost' items were those likely to require up to 0.5% of annual system costs. 'High-cost' items, in practice only the implementation of Functional Airspace Blocks, and the consequences of the interoperability regulation, would have a greater impact. For comparison purposes, costs and benefits assessed in real terms in 2004 prices and discounted back to 2004 at a discount rate of 8% a year (this is the figure used by Eurocontrol in its cost benefit analysis).

Low-cost items

18. Low-cost items typically involve implementing new practices, additional studies, consultation and regulatory compliance. Our estimates of the aggregate cost of the low-cost items is around €35m by 2025, spread between ANSPs, regulators and governments, with significant early inputs from the Commission and from Eurocontrol.
19. The financial benefits of the low-cost items are either not material in the financing context or intangible. We have therefore not attempted to quantify them.

Medium-cost items

20. Medium-cost items comprise:
- the institutional reform of separation of the ANSP from the National Supervisory Authority;
 - the development of implementation rules;
 - the harmonisation of airspace classification;
 - the uniform introduction of the Flexible Use of Airspace concept;
 - increased regulatory supervision;
 - the adoption of ESARRs;
 - the impact of a proposal on the licensing of controllers;
 - compliance with common requirements for certifying ANSPs;
 - the establishment of notified bodies to assess conformance with the interoperability regulations;
 - enhanced accounting systems and annual auditing; and
 - exchange of real time operational data.
21. We assessed the costs of the medium-cost items bottom-up, looking at whether they imposed additional requirements on each ANSP or regulator, and assessing the costs individually. The costs are summarised in the following table and figure. Benefits from all these medium-cost items have been assessed as non-financial – the benefits are either non-tangible or through enabling other beneficial changes.

FIGURE 1 SUMMARY OF MEDIUM-COST ITEMS (PRESENT VALUES)

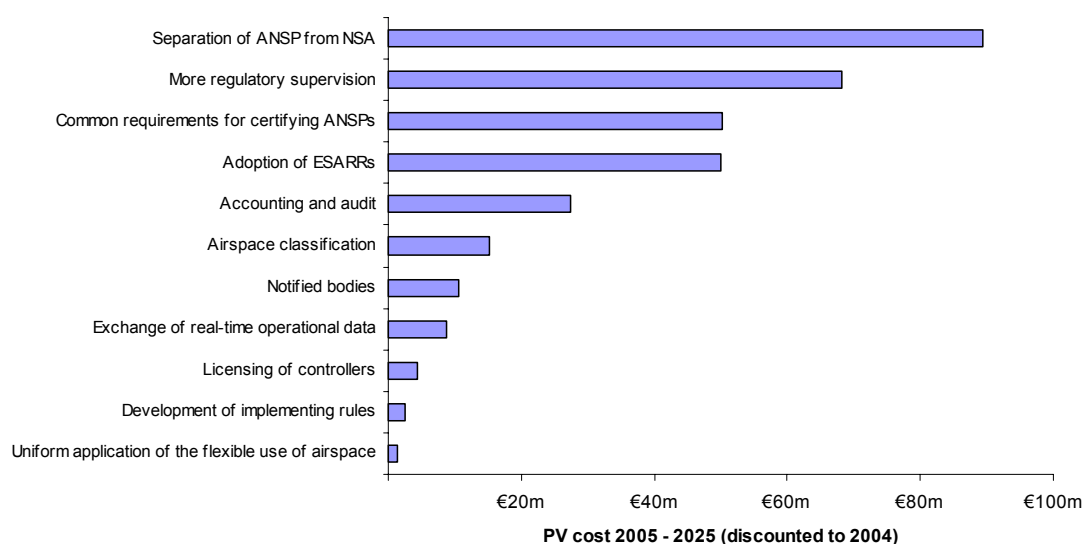


TABLE 1 FINANCIAL IMPACT OF MEDIUM-COST ITEMS

	Estimated cost or benefit (€m)						Annual (2011–2025)
	2005	2006	2007	2008	2009	2010	
Separation of ANSP from NSA	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Development of implementing rules	1.0	1.0	0.25	0.25	0.25		
Progressive harmonisation of airspace classification	5.9	5.9	5.9				
Uniform application of the flexible use of airspace	0.7	0.7					
More regulatory supervision	8.5	8.5	6.5	6.5	6.5	6.5	6.5
Adoption of ESARRs	15.8	15.8	15.8	1.2	1.2	1.2	1.2
Licensing of controllers	0.5	0.3	1.8	1.8	1.5		
Common requirements for certifying ANSPs	8.4	8.4	4.2	4.2	4.2	4.2	4.2
Notified bodies	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Accounting and audit	7.3	7.3	7.3	1.2	1.2	1.2	1.2
Exchange of real-time operational data	0.3	0.5	0.8	1.0	1.0	1.0	1.0
Total costs (€m)	58.4	58.4	52.6	26.2	25.9	24.1	24.1
Benefits (€m)	Intangible, not material, or linked to high-cost items						

High-cost items: Interoperability and the promotion of new technology

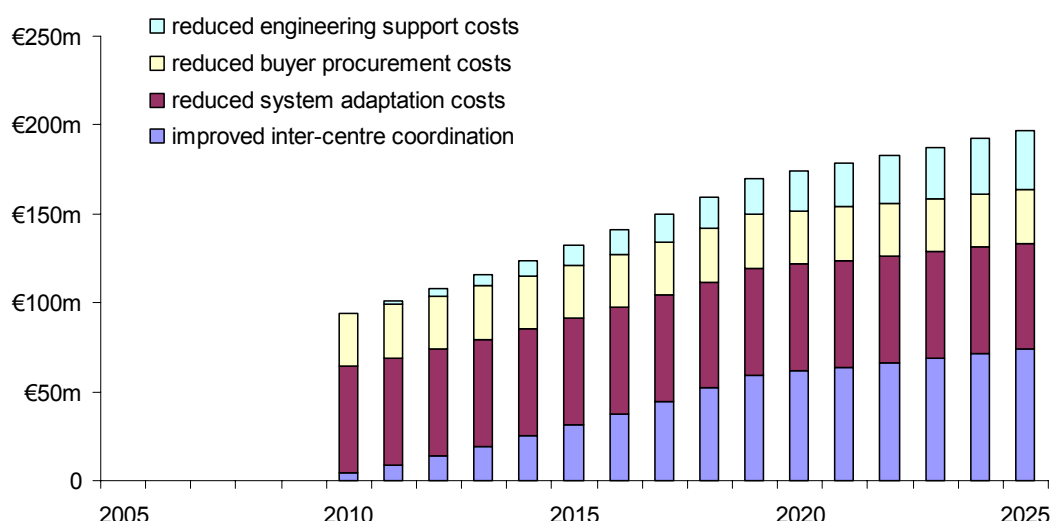
22. The objective of the interoperability regulation is both to achieve interoperability, and to ensure the coordinated and rapid introduction of new technology in ATM. The impact of the interoperability regulation can vary in two dimensions: its scope, and its speed of implementation.
23. At the lower-scope end, we have assumed that the regulation can be implemented by ensuring that air navigation service providers are using compatible technology in the most cost-effective way. This still requires significant efforts in developing harmonised interfaces, but is very much focused on the interfaces; with limited common functions. We have estimated the investment in ATM/CNS systems and equipment that would be required for these tasks as around €300m over six years from 2005 to 2010, or around 5% of the current annual investment costs of around €1,000m. This is about half of the amount currently spent on the Eurocontrol EATM Programme.
24. If the focus of implementation is rather on “ensuring the coordinated and rapid introduction of new agreed and validated concepts of operations or technology”, as is one of the objectives of the Interoperability Regulation, it could be argued that more

extensive redevelopment would be required. The ATM supplier industry believes the Single European Sky will require widespread system re-development; the industry will need to develop systems from ‘scratch’. For the purposes of this work, we have assumed that the longer-term costs of interoperability, estimated as around €2 billion spread over eight years, are not necessary costs of the SES.

25. The benefits of the lower scope of interoperability have been assessed as follows, and are summarised in the following figure:

- reduced procurement costs estimated as 5% of future system costs;
- lower system adaptation costs, estimated as 10% of future system costs;
- reduced engineering support costs, both through lower specialisation internally and through increased pooling or outsourcing opportunities as systems become more interoperable, amounting to 5% of engineering staff costs;
- improved cost-effectiveness through better inter-centre coordination, estimated as saving 1.5% in controller workload, applied to a progressively larger proportion of the SES as the installation of interoperable systems spreads.

FIGURE 2 POTENTIAL FINANCIAL BENEFITS OF THE INTEROPERABILITY REGULATIONS



26. The above analysis assumes that interoperable systems are introduced only at the end of the economic life of existing systems. Accelerated implementation, replacing systems before the end of their economic life, would entail major additional expenditure, but would bring earlier benefits. We have calculated that such accelerated implementation is unlikely to bring net benefits on the cost saving assumptions given above.

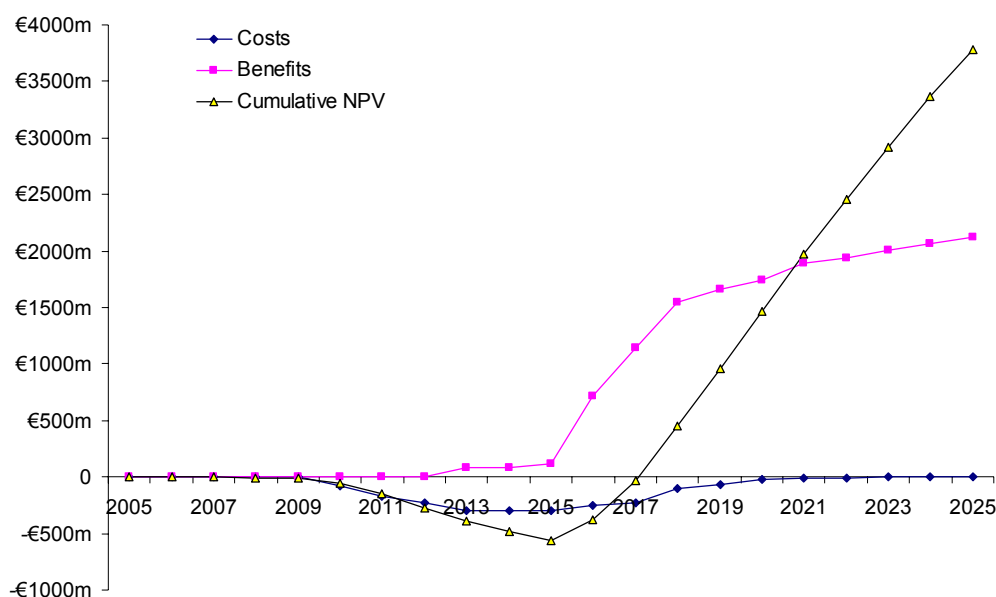
High-cost items: Functional Airspace Blocks

27. The SES legislation requires the upper airspace above FL 285 to be reconfigured into functional airspace blocks (FABs). The legislation is not prescriptive about how FABs should be managed.

28. We have examined four ways of implementing FABs:
- *Adjustment of boundaries to improve operational efficiency.* This model, adopted in Geneva ACC, involves the permanent **delegation** of control over some sovereign airspace to a non-national ANSP. The early stages of the Nordic Upper Air Centre also provide an example of this.
 - *Consolidated air traffic control centre.* Here a new larger centre is created and all but one of the remaining centres are decommissioned. The **consolidated centre model** is similar to the Maastricht or CEATS concept, except we assume the inclusion of lower airspace.
 - *Dynamically delegated airspace control.* In this model, the functional airspace block would cover the airspace of two or more states, and would be controlled from two or more centres. Sectors would be defined dynamically in response to traffic conditions, so that a given area of airspace would not necessarily always be controlled from the same centre – it would depend upon the sectorisation. This would require a high degree of interoperability, which might be achieved in two ways:
 - extensive development of new, highly interoperable systems; or
 - a lower level of interoperability but with the centres all procuring the same air traffic control equipment.
29. In practice a mix of these methods would be used, and our analysis is based on a illustrative mix of methods, although the dynamically delegated method based on high levels of interoperability has been excluded from the mix because it has not been assumed to be an essential requirement of the SES, and the use of this method would only become possible on a longer time-scale.
30. In the timescales of our study, we have assumed there would be a move towards consolidation of the lower airspace, although this is not a mandatory requirement in the regulations.
31. We assessed the order of magnitude of the costs and benefits of FABs using a scenario of implementation of FABs assumed in a recent Commission study. This does not imply that we regard this scenario as either optimal or likely. We assumed implementation dates for the FABs in this scenario resulting in a coverage of the SES upper airspace of close to 100% by 2020.
32. The costs of **consolidated** ACC functional airspace blocks were determined as follows:
- The implementation costs of the new centre were based on an average cost per sector of about €4m per sector, plus 10% for project definition. The number of sectors required was assumed to be 20% lower than in the separate centres that preceded the FAB. The centres were assumed to take five years to implement.
 - Decommissioning of the redundant centres was estimated as 20% of the estimated cost of implementation, including costs of staff redeployment and relocation.
 - Staff reductions in excess of 5% would result in a redundancy cost of 1 year's employment cost per staff member made redundant.
 - An alternate ACC would be retained for contingency purposes, which would be upgraded at an average cost of €3m per sector, assuming that no new buildings

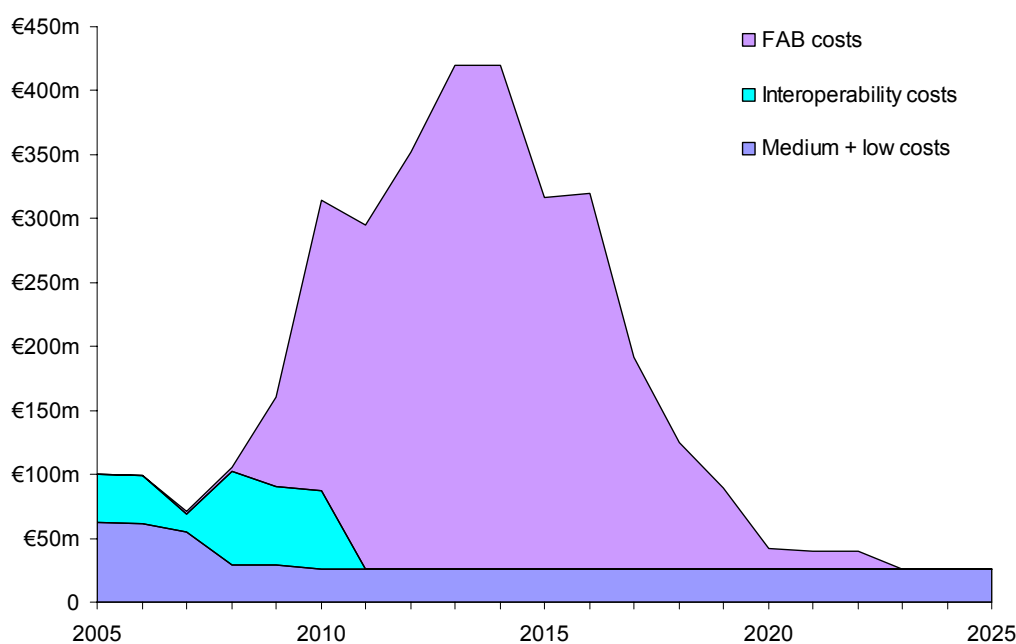
are required. The contingent centre would have 75% of the sectors of the main centre.

33. The costs of the **delegated** airspace control form of FAB were believed to be much lower, of the order of the project definition costs of the consolidated ACC FAB. No additional infrastructure is required; the airspace reconfiguration leads to fewer sectors required overall, so sufficient capacity is maintained with existing infrastructure. However, implementation of this method is dependent on there being opportunities for improvement by delegation, and it will not be a feasible method for the scenario of FABs assumed. It may be a much faster and cost-effective route to efficiency gains than large-scale consolidation.
34. The costs of the **dynamic airspace control** FAB were assumed to be the same as the consolidated ACC, excluding the costs of a new control room and of redundancies. Alternatively, the FAB could be achieved through a much higher level of interoperability, once the next generation of ATC systems had been developed. We estimate that the earliest this could be achieved is 2017 and have therefore not included this method in our illustrative mix.
35. The benefits of the functional airspace blocks arise from the improved sectorisation and traffic flows. We have assumed that different implementation methods yield similar financial benefits, and differ mainly in timing. The benefits are assumed to accrue immediately following the commissioning of the functional airspace block.
36. The main benefits are assumed to be:
 - **lower operating costs**; the assumed 20% reduction in sectors has been assumed to give rise to a 20% reduction in operating costs. The resulting benefits are of the order of €1b by 2010, rising to €1.5b by 2020; and
 - **increased flight efficiency**; we have assumed a reduction in flight-hours of 2% and equivalent savings both in ANS costs and in user costs; this amounted to around €400m a year once the full savings had been achieved.
37. **Increased allocative efficiency** could also be achieved in FABs, though a better ability to adapt resources to demand variations. The achievement of allocative efficiency gains would depend on the particular FAB – we would expect the potential to be highest when very small ACCs were consolidated into a bigger one. It could also be argued that consolidating upper airspace while separating it from lower airspace could reduce flexibility. We have not made an estimate of this benefit.
38. The costs and benefits for implementing the assumed FAB scenario using an illustrative mix of methods are shown in the figure below.

FIGURE 3 COSTS AND BENEFITS OF FABS - CONSOLIDATED CENTRE MODEL

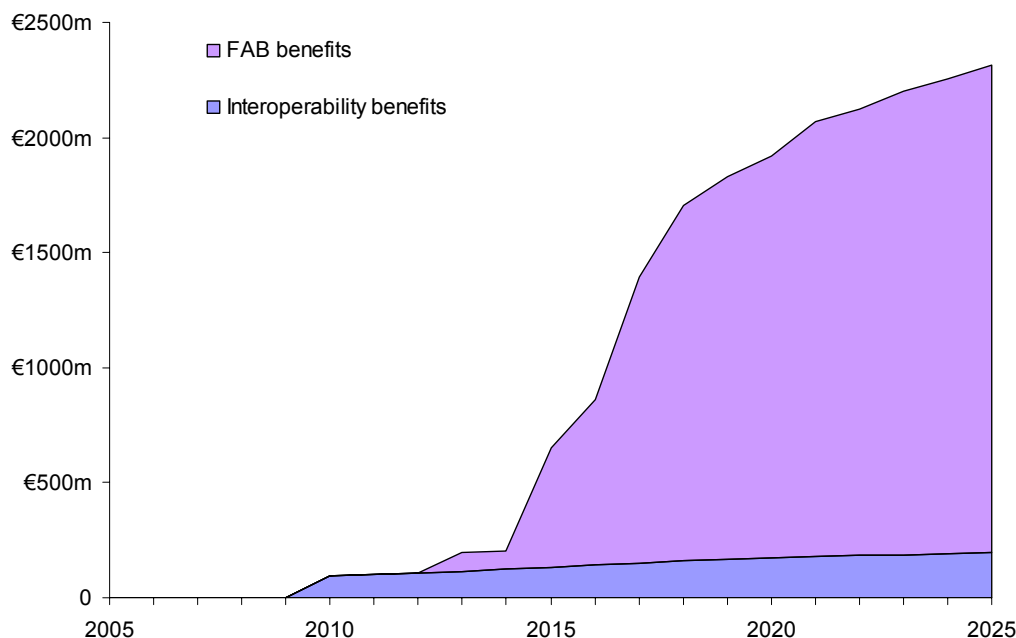
Overall costs and benefits

39. Figure 4 shows the overall costs of the low, medium and high-cost measures discussed above. The most important impact by far is that of the introduction of FABs. In the shorter-term, the costs of interoperability are significant, and the aggregate costs of the medium and low impact implications, while still small compared to those of the high-impact items, are still appreciable.

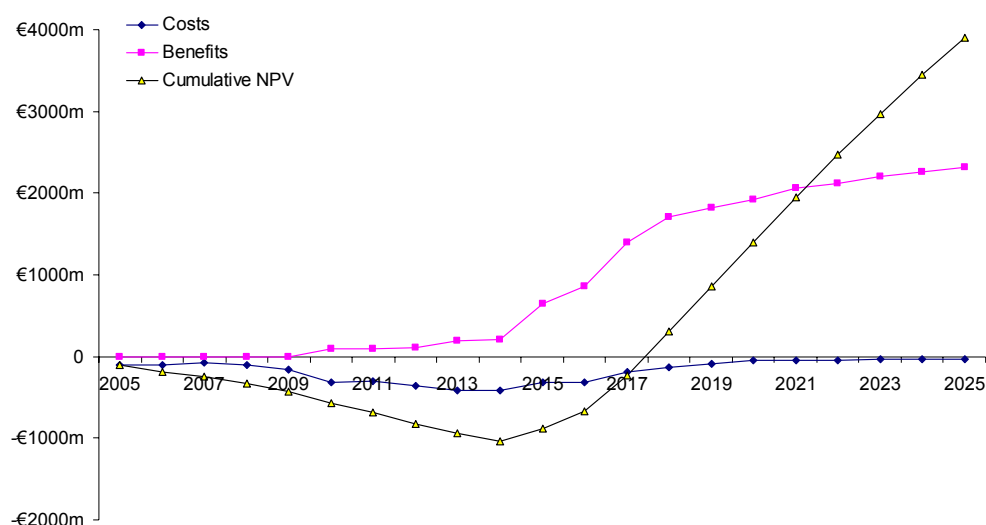
FIGURE 4 OVERALL COSTS OF SES IMPLICATIONS

40. Figure 5 shows the overall financial benefits of the measures. No financial benefits are shown for the medium- and low-impact items; their benefits are assumed either to be intangible or to arise from enabling the high-cost items.

FIGURE 5 OVERALL BENEFITS OF SES IMPLICATIONS



41. Finally, we compare the financial costs and benefits for the measures we have assumed. At this point it should be reiterated that we have not attempted to undertake a cost-benefit analysis of the SES programme or of any individual items in it. The estimates are order-of-magnitude only. Figure 6 and Table 2 compare the costs and benefits, and examines the discounted net present value of the measures. On the order-of-magnitude assumptions we have made, the benefits are long-term ones; the Net Present Value does not become positive until 2018.

FIGURE 6 COMPARISON OF COSTS AND BENEFITS**TABLE 2 SUMMARY OF PRESENT VALUE OF COSTS AND BENEFITS**

Class of items	Present values (€m)		
	Costs	Benefits	NPV
Low-cost items	21		-21
Medium-cost items	340		-340
Interoperability (low scope)	213	984	770
FABs (illustrative mix of methods)	934	4,715	3,782
Total, all items	1508	5,699	4,191

Current financing schemes

42. The Terms of Reference required us to obtain a picture of current financial schemes, to be able to identify potential gaps and deficiencies and where relevant propose other possible mechanisms.

Current financing background and mechanisms

43. Of the 27 states covered by the SES (excluding Iceland, which became a member in the course of the study), all but four were members of Eurocontrol. Member states of Eurocontrol are committed, for en-route charges, to the Eurocontrol Route Charging System. This system requires en-route charges to be set either to recover costs fully (taking one year with the next two) or according to a price-cap mechanism. The position for terminal navigation services is less fully prescribed, although most states follow similar principles of cost recovery or price capping. In some cases, particularly in the new EU members, explicit terminal navigation charges are not made, though in most cases progress is being made towards more uniformity.

44. The SES legislation mandates progress towards a “common” system of charging for all air navigation services, which suggests that further progress towards uniformity will be made.

Sources of funds

45. The main sources of revenue for ANSPs subject to SES legislation are:
- European en-route charges;
 - terminal navigation charges;
 - North Atlantic oceanic en-route charges;
 - charges for other services; and
 - reimbursement or payments from national Government.
46. Approximately three quarters of revenues are received through en-route charges, with a further one-fifth from terminal charges and only 4% from other sources. However, HungaroControl, the Hellenic CAA, and the Department of Civil Aviation Cyprus do not recover revenues from TNCs.
47. North Atlantic en-route charges are collected by the United Kingdom, Ireland, Portugal, and Norway. Those for Portugal are not a part of the SES. Those for the others are not yet decided.
48. The other sources of revenue for SES ANSPs come from charges levied for a range of services, usually not strictly ANS and therefore not covered by the SES laws.
49. A number of ANSPs receive direct income from their government to pay for exemptions, or the support of the provision of certain infrastructure or services, including in some cases terminal navigation services.

Additional sources of finance

50. With the exception of the ANSPs that are run as departments of the government most ANSPs finance any additional cash requirements through cash reserves and interest received in the first instance and add commercial or government borrowing when required. The mechanisms that are often used by a number of ANSPs as a source of additional finance are:
- borrowing directly from Government or National credit institution;
 - borrowing from the commercial banking sector through loans and bonds; and
 - cash reserves and movements in working capital on the ANSP balance sheet
51. In addition, a number of other mechanisms are occasionally used by ANSPs as a source of additional finance:
- Community funding, through TEN, PHARE, etc;
 - cross-border leasing;
 - loan facilities provided by the European Investment Bank; and
 - interest receivable from cash and other balances.

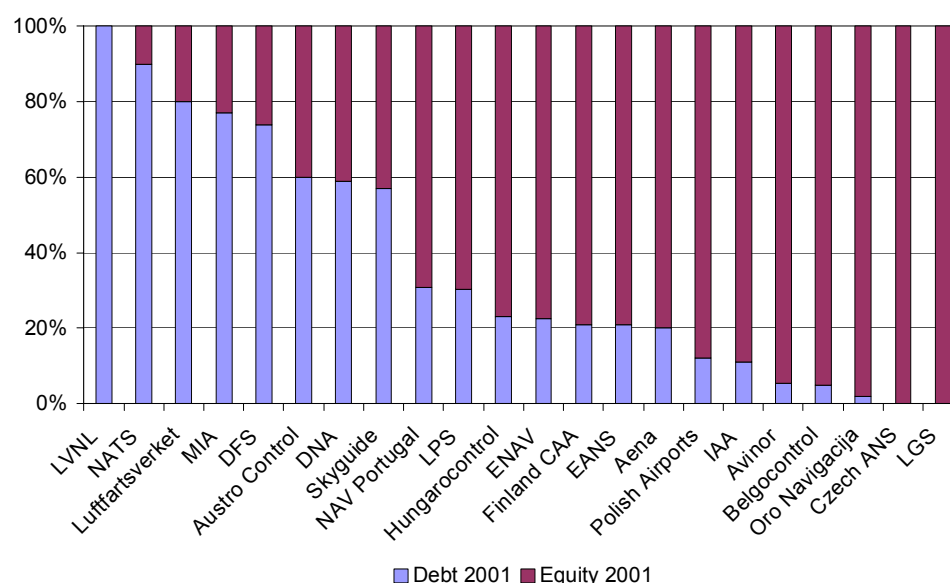
Capital structure

52. The capital structures used by ANSPs in the SES fall into the following categories:
- ANSPs which are Government departments (with no discrete capital structure);
 - ANSPs which are predominantly funded through equity;
 - ANSPs which are predominantly government debt funded; and
 - ANSPs that are predominantly funded through commercial markets.
53. Half the ANSPs fall into the predominantly equity-funded category. The distribution of capital structures is shown in Table 3.

TABLE 3 CAPITAL STRUCTURES OF SES ANSPS

Government department	Predominantly equity-funded	Predominantly debt-funded	
		Government debt	Commercial debt
DCAC Cyprus	Czech ANS	Austro Control	DFS Germany
HCAA Greece	EANS Estonia	LFV Sweden	Malta Air Traffic Services
ANSS Slovenia	Finland CAA	Skyguide, Switzerland	DNA France
	Irish Aviation Authority		LVNL Netherlands
	LGS Latvia		NATS United Kingdom
	Oro Navigacija Lithuania		
	NAV Portugal		
	Belgocontrol		
	HungaroControl		
	ENAV Italy		
	PPL Poland		
	LPS Slovak Republic		
	Aena Spain		
	Avinor		

54. These represent the capital structure for the whole organisation, which sometimes has a much wider scope than the ANSP – Aena, for example, runs Spain’s airports as well.
55. In Figure 7 we provide an overview of the capital structure in 2001 for those ANSPs for which it is relevant. All but seven have relatively low gearing.

FIGURE 7 SES ANSPs' CAPITAL STRUCTURE – 2001

Notes: Figures for Malta (MATS) and Hungary (Hungarocontrol) are for 2002, because of institutional changes

Why is financing an issue?

56. The vast majority of the ATM industry in Europe is allowed to recover its costs fully from users, taking one year with the next two. It is legitimate therefore to ask why financing is an issue. If ANSPs can recover all their costs, there should not be any problem with financing.
57. We identified a number of reasons why financing was an issue worth considering:
 - the timing of cash flows;
 - the charging system makes financing requirements sensitive to external shocks;
 - constraints on financing of investment;
 - the distribution of costs and benefits may not be the same;
 - user resistance to cost increases may cause sub-optimal behaviour; and
 - there are no financial incentives to work towards net benefits, especially system-wide benefits.
58. Furthermore, the continuing dominance of full cost recovery is not assured. The SES legislation explicitly permits (but does not mandate) a move to more incentive-based charging, which will, if adopted, change the risk allocation between users and ANSPs.
59. We have collected evidence on the first three of these issues, and examined whether this sheds any light on their importance.

The timing of cash flows

60. The principle of cost recovery requires that ANSPs fund their own investments. Capital expenditure may not be recovered as it is incurred through user charges, but through an allowance for depreciation and finance costs, after commissioning.
61. In principle, this could give rise to a problem if cash requirements significantly exceeded cash availability. To assess the size of this effect, we looked at the relationship between capital expenditure and depreciation for 26 ANSPs for the years 2000-2002.
62. Of the twenty, eleven ANSPs required additional financing above their depreciation charges, while nine countries incurred capital costs below depreciation charges. The net financing requirement over the sum of these countries was €329m, compared to a total capital expenditure of €1,742m, around 18%. In most cases capital additions were similar to depreciation charges. However, in some the required excess funding over the three years exceeded that recovered from users by a considerable multiple.

Sensitivity to external shocks

63. The years 2001 and 2002 saw the most serious downturn in traffic European aviation has experienced for a very long period. We explored the impact of these events on ANSPs and users. Our broad conclusion was that even an extreme shock of this kind does not place intolerable pressure on the financing system.

Legal and institutional constraints on financing

64. In general, the majority of ANSPs do not perceive any significant constraints on their financing arrangements under the existing arrangements. Under the cost recovery charging regime, commercial banks perceive ANSPs as low-risk customers.
65. However, ANSPs have identified some constraints:
 - capital availability limited by competing uses; for example if the ANSP also runs airports, use of capital for airport expansion could limit its use for ANS;
 - Government budget or borrowing limits;
 - financial covenant ratios; a small number of ANSPs are subject to financial covenant ratios or performance target ratios that constrain their financing arrangements;
 - limitations on the type of financial instrument used caused by the size of the ANSP; smaller ANSPs are constrained in their access to listed bond issues since they are usually issued at a minimum size.

Funding anomalies

66. There is a wide variation of practice between member states relating to transfers to and from government, and potential subsidy and cross-subsidy. Areas of variation include:
 - the payment of dividends;
 - the payment of tax on corporate profits;

- the treatment of Value Added Tax (VAT);
 - the extent of exemptions and the way that exemptions are financed;
 - any explicit subsidies from government;
 - implicit subsidies arising from the way the Eurocontrol contribution is handled.
67. A minority of SES ANSPs pay a **dividend** to their shareholders, Government and private. The total dividend distributed in 2000-2002 was €60m, which all went to member state governments. Of the seven ANSPs that paid dividends, the proportion of total turnover distributed ranged from 0.6% to 17.9%.
68. In many states, the ANSP is a statutory body explicitly exempted from **corporate taxes**. In others, it pays taxes according to normal rules. The total payable by SES ANSPs in 2000-2002 in corporate taxation was €90m. Of the SES countries, eleven made cash corporate tax payments to government in the period. This ranged from between 0.1% and 14% of turnover.
69. Taxation of over- and under-recoveries under the cost recovery mechanism is not always consistent. In some cases, over-recovery counts towards taxable profit, which can lead to timing problems with cash flow.
70. In a few cases, the ANSP is exempt from paying some of the social costs of employment.
71. Differences in the treatment of **Value Added Tax (VAT)** can also introduce significant distortions. The majority of ANSPs in the SES do not charge VAT on their en-route charges. However, VAT is usually charged on their inputs, which is fully recoverable from national government. There are however important exceptions to this practice that can seriously distort financial incentives. Avinor in Norway and LVNL in the Netherlands must pay VAT on inputs but **may not reclaim it**. This both increases the cost base and introduces a strong incentive for these companies not to outsource, whatever business economics dictates.
72. In some cases, the costs of military, VFR or other **exempt flights** are met by government from the receipts of general taxation. In others, they are included in the en-route or terminal cost base – an implicit cross-subsidy from paying users to exempt users. In others, the costs are funded out of the ANSPs' surplus from non-ATM activities, again representing a form of cross-subsidy. A wide variety of options are used to fund exemptions. Moreover, only for some of the ANSPs is the cost of provision of services to exempted flights transparent. The existing cross-subsidisation of exempted flights from general charges and the lack of transparency goes against the ICAO charging principles and the spirit of the SES legislation.
73. In some cases, a Member State government will provide a **direct subsidy** for an activity that is regarded as a social necessity, where it is considered unfair to recover the cost from the whole user base. Examples of this include:
- Italy, where the government funds ENAV for the provision of ANS facilities at small airports;

- France, where the government funds the costs of some regulatory activities through proceeds of the Civil Aviation Tax (TAC), levied on air passengers;
 - Malta, where the Government partly funds terminal services;
 - The Netherlands, where the government provides a contribution for regional airports ATM and a non-recurrent compensation related to the 11 September 2001 attacks;
 - Poland, PPL, where the State and Civil Aviation Office provide small-scale capital investment donations.
74. There are also differences between member states in the way that the costs of Eurocontrol flow through the system. In some cases, the flow is through the states' governments; in others, the transactions are directly with the ANSP. Sometimes the differences amount to an appreciable effective subsidy.

Limitations of current funding mechanisms

75. In general, ANSPs are happy with existing financing mechanisms. While under certain circumstances, existing cost-recovery methods could give rise to a shortage of funds, the analysis we have undertaken suggests that any such difficulties will be relatively rare.
76. Certain stakeholders perceive, however, the following limitations with the existing financing mechanism:
- There are currently **limited incentives for international co-operation** to improve multinational ATM system efficiency as opposed to national ATM system efficiency. National economic regulation may exacerbate this problem.
 - The **adverse impact on users and ANSPs of short term downturn in traffic** in revenues recovered to finance their operations (ANSP stakeholders).
 - Capital investment that has a **long lead time in the course of its construction** leading to significant financing requirements (ANSP stakeholders).
 - **Inadequate consultation** between ANSPs and users (Airline stakeholders).
 - A **lack of commitment for the ANSP community to deliver financial benefits** to users in return for the financing of up-front investment (Airline stakeholders).
 - **No strong incentive for cost efficiency improvements**, as a result of the cost-recovery mechanism (Airline stakeholders, one ANSP stakeholder).
77. Most of these limitations are not directly related to financing, but indirectly through the incentives and form of consultation that underpin the charging mechanism of ATM in the SES.
78. In addition the European Commission believe that there are specific constraints where:
- investments have very long term returns (that is, high up-front costs with the potential for significant long-term financial benefits); and
 - investments across the industry (provided by different stakeholders) require some synchronisation in their timing.

What are the implications of a different charging mechanism?

79. The lack of significant limitations on ANSP's existing ability to finance their operations is largely a consequence of the cost-recovery mechanism. Changes in charging arrangements to introduce incentive-based mechanisms are likely to be at the discretion of states' governments. Where they are introduced, however, they may worsen constraints and limitations on ANSPs' financing. Our approach to Phase 3 is based on an assumption that there are likely to be more options for charging in the future.

Lessons from other ANSPs

80. A range of financing options is used by non-European ANSPs. In the main, because of the ability to recover costs from users, the ANSPs are not taking great financial risk. However, in the case of NavCanada and Airways Corporation pressure comes from the governance and user agreement arrangements, and in the case of ATNS and ASA from independent regulation, to seek a commercial and efficient approach to delivery and financing. The governance and charging control arrangement will be key in providing incentives to more efficient financing behaviour for countries in the SES.
81. The FAA is a completely different model, relying on redistribution of receipts from general and specific aviation related taxation. It is the only ANSP receiving direct funding from Government.

Proposals for additional or alternative financing mechanisms

82. In drawing up proposals for additional or alternative financing mechanisms, we first set out a framework for exploring the different mechanisms. We then examined in succession:
- six specific new mechanisms;
 - the possible applicability of existing Community financial instruments; and
 - a possible new Community financial instrument.
83. Finally, we examine the possible implications of separation of infrastructure from service provision in ATM.

Framework for assessing financial mechanisms

84. We developed a framework to explore various potential amendments to existing financing mechanisms and new financing mechanisms. The range of factors to be considered comprised:
- the phase in a project that requires funding;
 - the type of project and the resulting pattern of cash flows;
 - the limitations and constraints that the financing methods address;
85. The framework is summarised in the table below.

TABLE 4 FACTORS AFFECTING FINANCING MECHANISMS

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints
Research & Development	Low and medium – Type 1	System, not ANSP specific benefits	Competing uses of finance
Decommissioning	Low and medium – Type 2	Downturn in traffic	Government budget and borrowing limits
Implementation	Interoperability – Development	Lead time of assets in the course of construction	Covenants from financial providers
Operation	FAB – Development	Inadequate user consultation	Size constrained access to finance
	Interoperability – Implementation & operation	Lack of commitment to benefits	
	FAB Implementation and Operation	No strong ANSP incentive to efficiency	

Additional or alternative financial mechanisms (ANSP or country)

86. We identified six options for additional financial mechanisms that could be used to finance part of the emerging costs of the SES:
- Manufacturer financing of up-front capital investment;
 - Intra-ANSP financing;
 - Consolidated bond;
 - Joint venture between ANSPs and airlines;
 - SES consolidated equity fund; and
 - Direct passenger fees.
87. Figure 8 shows how these mechanisms address the factors outlined in Table 4 above.
88. We note, however, that changes to the pre-existing governance, charging and economic regulatory frameworks applied to ANSPs would more directly address some of the limitations and constraints to financing identified by stakeholders in Phase 2 than new financing mechanisms *per se*.
89. Of those additional financial mechanisms, users are in practice unlikely to favour **joint venture arrangements**, at least in the short term. Likewise, the administrative hurdles and transaction costs of new **passenger fee** structures to recover incremental SES regulatory costs are likely to preclude their introduction. The design of the **consolidated equity fund** raises significant challenges in respect of the shareholders' effective control and management of the attendant risks, which may prove to be an insurmountable obstacle.

90. Of the mechanisms examined, we therefore believe that the **consolidated bond** and **manufacturer financing** may therefore be most fruitful for further investigation with relevant stakeholders.

FIGURE 8 SUMMARY OF CHARACTERISTICS OF OPTIONS

	Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
Joint venture (ANSP / Users)	Implementation & Operation	FAB Implementation & Operation	System Benefits Lack of consultation Lack of commitment to benefits		ANSPs Civil Users	Project or initiative specific
Small user Consolidated bond	All	FAB & Interoperability		Size constrained access to financing	ANSPs	ANSP specific
Intra-ANSP financing	All	FAB & Interoperability		Size constrained access to financing	ANSPs	ANSP specific
Manufacturer financing	Implementation	Interoperability and FAB implementation	Lead time of AICC	Government budget & borrowing limits	Manufacturers ANSPs	Country / ANSP level
Consolidated SES Equity fund	All but R&D	All but R&D		Government budget and borrowing	ANSPs Financial investors	ANSP Specific
Passenger / Cargo User fee	Regulatory costs	Small & medium costs			NSAs	National

Existing Community financial instruments

91. We examined the existing use and potential future use of existing Community financial instruments (TEN-T, EIB, research funding, etc) in supporting ATM and the achievement of the SES.

TEN-T and other sources of EU funding

92. The SES, and in particular its interoperability regulation, is consistent with the objectives of the treaty and objectives of Trans-European Networks (Transport) (TEN-T) funding. However, in the past, European funding for the transport sector has heavily emphasised rail and road, at the expense of air transport and other transport modes.
93. The SES objectives could be placed as a priority project to increase funding provided under TEN-T to the SES. However, we understand that this list has only just been revised and did not include SES. Moreover, the rules provide limitations as to the extent of contribution.

94. A number of Air Traffic Management projects have been supported by TEN-T funding, amounting in the last four years to around €50m. Further support has been made through the Research Framework Programme and more is planned. The European Commission has also provided other sources of funding through the Solidarity Fund, PHARE, FEDER and IPSA. However, ATM has not received a very high proportion of total funding from these sources.

The European Investment Bank (EIB)

95. The EIB provides finance on competitive terms to countries with eligible projects consistent with the implementation of European Commission policies. The use of EIB financing by ANSPs over the last five years has been limited; only two projects, with a total EIB contribution of €240m. Previously, EIB had provided funds to support ATM provision in a number of other SES countries.
96. For many of the larger ANSPs with investment grade credit rating, there is currently little benefit from using EIB as they can gain commercial money at a similar price without the constraints of EIB financing. For the smaller and medium-sized ANSPs, additional constraints and limitations imposed by the EIB may be an explanation for the relatively small number of ATM projects it currently finances.

The European Bank for Reconstruction and Development (EBRD)

97. As members of the EU or EEA, the countries of the SES will not be eligible for support by the EBRD following accession to the European Union in May 2004.

The European Commission's latest proposals

98. In addition to this, the Commission in July 2004 adopted a proposal for a Regulation (2004/0154 (COD)) to determine the general rules for the granting of Community Financial aid in the field of the trans-European transport networks and energy (amending Council regulation EC No 2236/95).
99. This regulation provided for specific support for the provision of the interoperability Regulation of the Single European Sky.

The applicability of existing instruments

100. The best opportunities for greater support would come from TEN-T (subject to the Commission's proposals being approved), EIB and research funding.

TABLE 5 FUNDING LIKELY TO COME FROM EXISTING COMMUNITY FINANCIAL INSTRUMENTS

Name	Amount (€ million)	Dependency
EIB	Project dependent - could be significant	Highly speculative, dependent on greater flexibility in administration and other existing constraints
TEN-T	Could be significant depending on the Commission's proposed Regulation being passed into law	Could be greater if the proposed Regulation is passed
Research	Currently limited to €20-30 million pa, but could be more depending on proposed changes	Dependent on the success of ATM projects in securing research framework funding

New Community financial instruments

101. The extent of funding available from the extensions of existing funding instruments proposed by the European Commission, will determine the need for new financial instruments at a Community level. During the study we have identified three possible areas to concentrate any additional Community funding:

- Research & Development;
- Compliance (to standards and requirements set in the SES); and
- Incentives for restructuring airspace.

Who should govern the instrument?

102. We believe that an independent agency (separate from Eurocontrol and the European Commission), acting on a terms of reference and objectives set by the European Commission, is potentially the most effective form of governance for any new Community financial instrument. This new agency would be advised by a representative committee comprising key stakeholders: Eurocontrol, users, ANSPs, manufacturers and the European Commission.
103. Applications for funding would be made to this agency, which would allocate funds according to a clear set of objectives set out in its terms of reference. The skills required by the agency would depend on the type of funding allocated. For FABs, an understanding of the operational benefits to be achieved would be a pre-requisite, and the decisions for funding are likely to take place on an occasional basis. However, direction of ongoing research and development funds would require a day-to-day work programme and an understanding of the objectives of the interoperability directive.

Checks and balances on the new Community financial instrument

104. The independent agency would be responsible for monitoring the success of the policy, and suggesting amendments to the rules and form of community financial support to the European Commission.

105. The agency would also be responsible for designing specific checks and balances in support of the financial support provided, they might include for the:
- Research & Development Fund: to achieve the implementation of the interoperability directives by certain key dates;
 - Compliance Fund: to achieve the standards required by SES to be independently audited; and
 - Airspace Restructuring Support Fund: Any soft loan arrangements would require some commitments to the achievement of system benefits and proposals, to be approved, as to how to share these benefits with users. Any support for social restructuring costs would need specific measurable objectives such as retraining and numbers of persons assisted.

Assessment of likely applicability

106. The introduction of such a new Community financial instrument would require consensus support from:
- Member states;
 - The European Commission; and
 - The ANSP and user communities.
107. We would expect some resistance to the introduction of new financial instruments, particularly from certain member states who have expressed opposition to the concept and from some ANSPs who believe that any participation of the European Commission in the financing of ATM is inappropriate. Moreover, there have been specific comments made on the introduction of a compliance support fund that rewards laggards at the expense of “first movers” in meeting the requirement of the SES.
108. However, after having sight of the emerging findings from Phase 1, other stakeholders have recognised the potential role for such a community instrument in easing the burden of up-front costs, ahead of the stream of financial benefits.
109. A new Community financial instrument would require the introduction of European legislation to establish its legal identity and governance. The potential for delay in introducing the instrument will be a key factor in determining its likely applicability and usefulness.

Financial impact illustration

110. We illustrate below how each of the funds might work. We also indicate the size of the total fund and over what period we believe such a fund might be needed.

Research & Development Fund

111. To implement the interoperability directive might need some €40-80 million per annum of research and development cost over the period to 2010. It is also likely that research and development associated with FABs will be significant (up to €50 million per annum).

112. The existing Eurocontrol budget for the provision of ATM research and development is in the region of €150-200 per annum (based on the share of EATMP, EEC and associated support costs). This could be supplemented with research funding available from the 6th Framework agreement as a source of a specific SES R&D fund.
113. Given the substantial amount of R&D funding available to ATM through national funding, funding from the European Commission and from the existing Eurocontrol budget, we suggest that **no supplementary funding is supplied from additional sources; rather existing funding should be redirected where appropriate to the specific requirements of the SES.**
114. Some of the funding provided to Eurocontrol by users, through the charging mechanism, should remain under its control. However a proportion of it should be redirected to meet the specific requirements of the SES. The precise allocation of the available funding would require further work. However, we would suggest that, at least in the initial five years some €75-125 million of R&D funding should be earmarked for the SES, and governed and allocated by an independent body set up under terms of reference set by the European Commission.

Compliance Fund

115. Our Phase 1 estimates indicated that the sum of low and medium-cost items is in the range of €25-60 million per annum. We would expect any fund provided by the European Commission to cover a high proportion of these costs for at least the first three to five years of the SES (to incentivise prompt compliance).

Airspace Restructuring Support Fund

116. The Research and Development fund would provide an allocation of funds to support the development of identification and development of FAB proposals.
117. For the incentivisation of FAB implementation, we suggest that soft loans could be provided through the European Commission, with the Commission responsible for funding the difference between commercial terms and the soft loan terms. We would expect these arrangements to be of greatest benefit during the initial stages of the implementation of the FABs, where benefits have not yet materialised.
118. The cost of such support might amount to some €48 million per annum over a ten year period.

Summary

119. A summary of the financial cost of the potential support from the new mechanisms is provided in Table 6. The amount of support required at a European level would be up to some €110 million per annum, in combination with up to €125 million per annum of redirected user charges.
120. In addition to these specific areas that we have identified through our analysis, the European Commission has also identified the following areas where it believes there is a strong case for additional community support:

- to incentivise airline investments both on board and on the ground; and
- to enable greater synchronisation of investments that have mutual dependency and benefits.

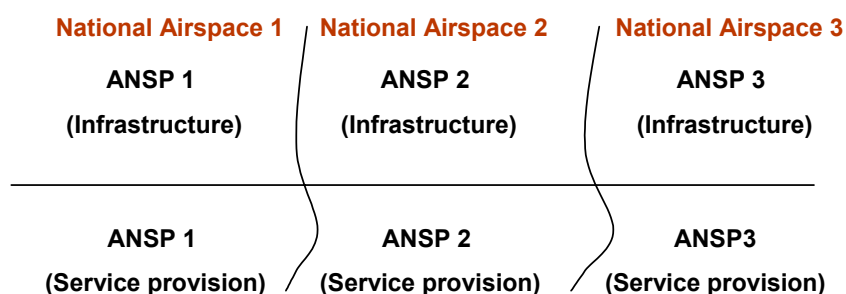
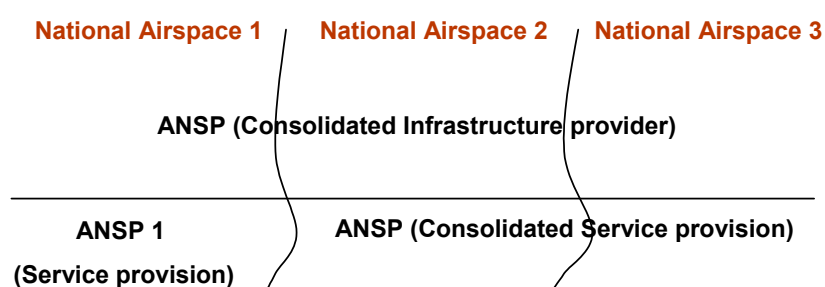
121. These are issues that have not been raised specifically by stakeholders to the study team during the study and therefore have not been analysed in any detail.

TABLE 6 SUMMARY OF SUPPORT FOR NEW COMMUNITY INSTRUMENTS

Name	Source	€ Million Amount per annum	Duration	€ Million Gross total
R&D Fund	Eurocontrol 6 th framework	75-125	5 years	375-625
Compliance Fund	Community taxation	25-60	3 years	75-180
Airspace Restructuring Fund	Community taxation	40-50	10 years	400-500
TOTAL		140-235		850-1,305

Separation between ANS infrastructure and service provision

122. The existing Air Traffic Management industry in the member states of the SES is based on vertically integrated ANSPs, at a national level. There is a limited amount of national airspace where control is delegated to neighbouring countries under bilateral and multilateral arrangements where the vertically integrated ANSP provides service across a national boundary. The SES framework encourages the creation of Functional Airspace Blocks where upper, and perhaps lower, airspace is controlled, where appropriate, across national boundaries.
123. The applicable geography of any future mandatory separation is likely to be at the national level. This type of national vertical separation would encourage the move towards horizontal integration by geography. However, any consolidation would be driven by the policy of individual nation states and the political will to accept the social and economic impacts of restructuring in return for any perceived benefits.
124. Vertical organisation separation would encourage horizontal integration to benefit from geographical scale and potential allocative efficiencies. There are likely to be significant allocative and scale economies from the provision of interoperable infrastructure, and similar scale economies from service provision (see Figure 9).

FIGURE 9 ARRANGEMENTS WITH VERTICAL SEPARATION**Vertical separation within vertical boundaries****Vertical separation with horizontal integration****Alternative approaches to vertical separation in ANS**

125. There are a number of potential options for introducing greater separation between ANS infrastructure provision and ANS service provision, including those illustrated in Figure 10:

- The provision of all infrastructure (ATM and CNS) could be separated from the front-line costs of service provision – principally ATCO employment and administrative costs; or
- The separation of CNS (infrastructure) costs from ATM (infrastructure and service provision) costs; or
- A three way split between “Infraco CNS” (the non-customer facing assets such as radar, headquarters, offices, etc.), “Infraco ATM” (customer-facing assets such as control centres, airport control towers, etc.), and the service provider.

FIGURE 10 ILLUSTRATION OF ALTERNATIVE APPROACHES TO ANS VERTICAL SEPARATION

Option i	Infrastructure provider	Service provider	
	All assets and systems Engineering and support staff	ATCOs and ATC support	
Option ii	Infrastructure provider	Service provider	
	CNS assets and systems Engineering and support staff	ATM asset and systems, engineering and support staff ATCOs and ATC support	
Option iii	Infraco CNS	Infraco ATM	Service provider
	Non-customer facing assets (radar, headquarters) and systems , engineering and support staff	Customer facing (ACC, control tower) asset and systems, engineering and support staff	ATCOs and ATC Support

126. Option (i) creates a structural environment that lends itself to concession or contract award of service provision, and ease of consolidation and interoperability for infrastructure provision. CNS and ATM infrastructure are consolidated into a single entity.
127. Option (ii) reflects a belief that CNS infrastructure could be more readily shared between service providers, outsourced or made contestable than ATM. It is consistent with the FAB structure of the SES. However, the proportion of the total ANS value chain covered by CNS is relatively limited (perhaps 20-25%).
128. Option (iii) is closest to the approach that has been applied to the liberalised rail markets, distinguishing between INFRACO CNS (Infrastructure Manager), from INFRACO ATM (Rolling Stock provider / leasor) and service provider (Railway Undertaking). The structure retains the benefits of the industry's preferred approach to service separation on the basis of CNS and ATM, while also achieving separation of the service provider from infrastructure. However, the many interfaces between different organisations and users may lead to significant losses of scope economies, and the transaction costs associated with setting up and running this type of structure are also likely to be significant.

Our views and conclusions

129. Any mandatory separation would need to have clear policy objectives, which might include some or all of:
- Promotion of efficient cost service provision;
 - Promotion of competition for the market; and

- Promotion of industry co-operation and consolidation.
130. The existing SES legislation promotes efficient cost service provision and industry provision. However, it is largely silent on competition and consolidation.
131. The relative costs and benefits of the affects of any restructuring would need to be assessed at a national level to take an analytical view of this question. However, given the existing SES objectives and actions already underway, the scale and other economies achievable would need to be set against the likely significant transaction costs and loss of scope economies.
132. Any industry restructuring might best be created through groups of ANSPs investigating and developing their own optimal organisational structure as a part of the development of FABs, rather than defining and mandating a common European-wide restructuring in early new legislation.

1. BACKGROUND

The Single European Sky legislation

- 1.1 The European Commission has made the reform of air traffic management (ATM) in Europe one of its priority actions. In response to a general perception that the costs of ATM, including the costs to airspace users of delays, were unduly high and efficiency low because of fragmentation of service provision, the Commission, supported by a High Level Group from member states, put forward legislative proposals for a Single European Sky (SES). The proposals aimed to improve the provision of air navigation services throughout the European Union, while maintaining the paramount importance of safety. The SES legislation became effective on 20 April 2004.
- 1.2 The Single European Sky legislation applies to current member states, and to future member states as they join the Union. In addition, membership of the SES is open to non-member states. Norway and Iceland have agreed to participate through their membership of the European Economic Area, and Switzerland will enter into a bilateral agreement with the Commission. It is envisaged that other non-member states will enter into similar bilateral agreements.
- 1.3 The SES legislation comprises four Regulations:
- Reg (EC) No 549/2004, laying down the **framework** for the creation of the SES;
 - Reg (EC) No 550/2004 on the **provision of air navigation services** in the SES;
 - Reg (EC) No 551/2004 on the **organisation and use of airspace** in the SES; and
 - Reg (EC) No 552/2004 on the **interoperability of the European Air Traffic Management network**.
- 1.4 The provisions of the legislation are described more fully in Appendix A to this report. They include a number of requirements that will necessitate changes in the way air navigation service providers (ANSPs) and national regulatory bodies are organised and work. In broad terms, the changes comprise:
- prescribed institutional arrangements, including:
 - the nomination of a National Supervisory Authority (NSA) for each member state. There is no obstacle to different states nominating a common NSA;
 - the separation of service provision from regulation, with the regulatory function at least functionally separate from service provision and equipped with sufficient resources and expertise to assure its independence;
 - certification and designation mechanisms for ANSPs;
 - a common charging regime for all air navigation services;
 - the introduction of a European Upper Flight Information Region, harmonised airspace classification, and common principles and criteria for route and sector design;
 - the introduction of the Functional Airspace Block as the fundamental unit of organising airspace;
 - improved civil-military cooperation;
 - moves towards more interoperability; and

- enhanced requirements for financial reporting and accounting separation and transparency.

The financial implications of the reforms

1.5 The intention of the Single European Sky proposals is to facilitate the Europe-wide provision of safe air navigation services at maximum efficiency and minimum cost to users. It is therefore implicit that any practical measures to implement the proposals should, in the long term, result in lower overall costs of air navigation (including the costs of delay and non-optimal routing). However, in spite of this, the legislation might still impose extra financial obligations on stakeholders:

- The geographical distribution of benefits may be different from that of costs; changes designed to benefit users in **aggregate** could lead to reduction in **total** air navigation services (ANS) costs, but still increase the average unit costs of one or more individual ANSPs. This could occur, for example, through the definition of functional blocks of airspace which result in improvements in overall system efficiency, but the loss of some scope and scale economies of individual ANSPs.
- Costs may need to be incurred before benefits are obtained; organisational changes, systems changes, and modifications to investment plans to take account of changes required to bring system-wide benefits, may require a trade-off between up-front costs incurred by ANSPs and perhaps governments, on the one hand, and long-term benefits to users, on the other.

1.6 These increased costs have financial implications for a variety of stakeholders. If the charging and cost recovery policies that are currently in use by most member states were retained, the classes of affected parties could potentially be as follows:

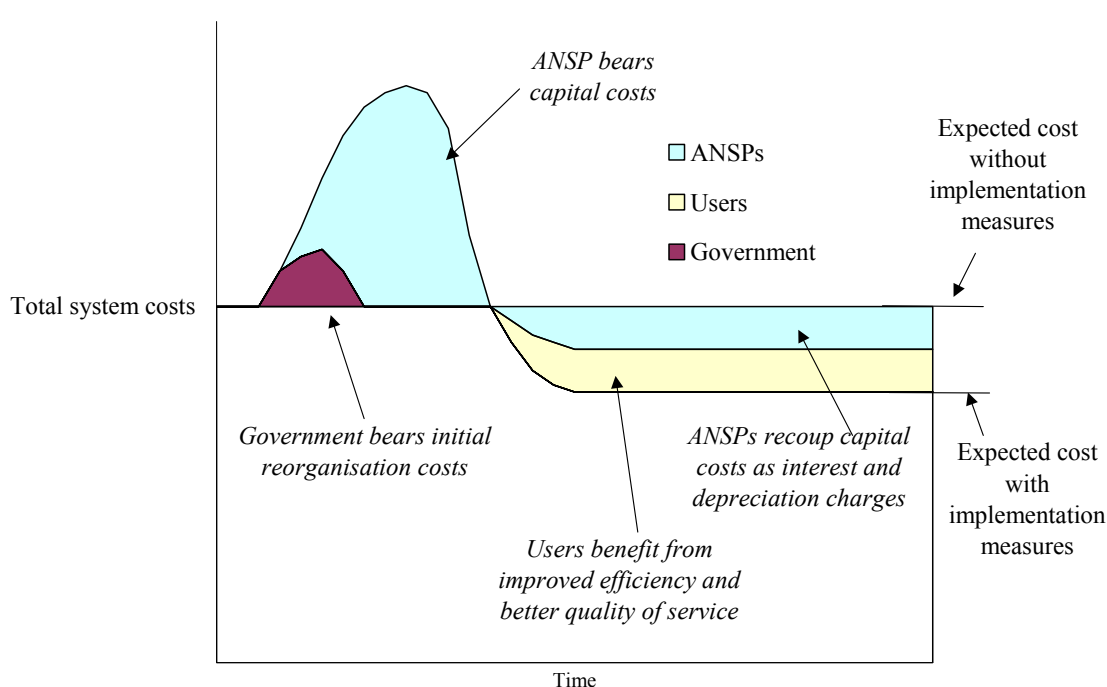
- if the incremental costs were deemed, under the rules of the existing EUROCONTROL Route Charging System, to be **operating costs**, the burden would fall on the **existing users** as charges would immediately increase.
- if they were deemed to be **capital costs**, the burden would fall initially on **ANSPs**, but would subsequently be recovered from **future users** through notional interest and depreciation charges. There would be a short-term cash flow issue for the ANSP, and a longer-term one for the users.
- not all states recover the costs of providing regulation through user charges levied through the EUROCONTROL Route Charging System (although some do, wholly or partially). The SES framework allows the costs of NSAs to be recovered from user charges, this is not mandated. Since some of the costs, particularly those of reorganisation to meet Single European Sky principles, will fall on regulators or other supervisory authorities rather than the ANSP, there is therefore a possibility that some costs would, by default, be funded by **general taxation**.

1.7 There may therefore be a short- to medium-term impact of the changes that could give rise to short-term financial burdens for regulators, service providers, and users, in pursuit of these longer-term gains.

1.8 This timing effect is illustrated in Figure 1.1. The graph illustrates the change in total system costs that result from a typical measure introduced in furtherance of Single European Sky objectives. The distribution of costs and benefits assumes that a route charging mechanism based on cost recovery is used.

- 1.9 The early costs, as the measure is introduced are, in this case, funded initially in part by government (they might be reorganisation or regulatory costs) but later, through substantial physical investments, by the ANSP. In the case illustrated, there is no up-front contribution by users – all the initial costs are deemed to be investment in the terms of the charging system used. Following commissioning of the investment, the net benefit (for example, better routings and reduced operating costs) is shared between users and the ANSP. There is a benefit to the user, in terms of efficiency giving rise to reduced user charges and/or better quality of service, and also a cash-flow recovery by ANSPs recouping the investment costs through depreciation and notional finance charges, and resulting in a lower future cost base.

FIGURE 1.1 ILLUSTRATION OF FINANCIAL IMPACT OF AN IMPLEMENTATION MEASURE



- 1.10 There may be difficulties in finding financial resources to fund this initial “hump” in cash requirement, for a number of reasons:
- Benefits of the reforms may not always be immediate and/or tangible (Figure 1.1 illustrates an example where the benefits are tangible, but not immediate).
 - Benefits may be distributed differently from costs. In particular, benefits may accrue to a class of users in one geographical area, while the costs are borne by those in another. Typically, the costs will be more localised and the benefits more widespread. Benefits may also accrue to one class of user, perhaps at the expense of another.
 - Large sums may be needed quickly if reform is not to be delayed, and individual ANSPs may not have the capacity to raise the necessary sums.
- 1.11 In addition, the reformed sector may be able to benefit from a broader re-examination of the way the sector is financed, to see if beneficial changes can be brought about by making changes to the financial tools available.

- 1.12 Accordingly, the Commission launched a study into the financing needs of ATM in the Single European Sky. The study had three main phases:
- A review of the financial implications of the SES legislation
 - A review of current financing schemes and their limitations
 - Proposals for additional or alternative financing mechanisms.
- 1.13 The first two of these phases were carried out in parallel.
- 1.14 The Commission asked a group comprising Steer Davies Gleave and the Solar Alliance to undertake the study, which started in November 2003. This document is the Final Report from the study. It covers, in addition to this introductory chapter on the background to the work:
- Chapter 2, describing our methods of working;
 - Chapter 3 giving our assessment of the financial impact of SES, constituting the output of Phase 1;
 - four chapters dealing with Phase 2:
 - Chapter 4, reviewing ANSPs' sources of funds and capital structure;
 - Chapter 5, assessing the importance of financing as an issue, and gathering evidence in some of the areas where financing may be an issue;
 - Chapter 6, examining a number of funding anomalies, such as inconsistent treatments of exemptions, taxation, and subsidies;
 - Chapter 7, describing the perceived limitations of current financing methods;
 - five chapters dealing with Phase 3:
 - Chapter 8, setting out a framework for assessing financial mechanisms;
 - Chapter 9 analysing additional or alternative ANSP or country financial mechanisms;
 - Chapter 10 discussing existing Community financial instruments;
 - Chapter 11 describing new Community financial instruments; and
 - Chapter 12 setting out the case for greater separation between ATM infrastructure and service provision
- 1.15 There are four appendices:
- Appendix A, which describes the legislation in more detail;
 - Appendix B, which reviews ANSPs' cost structures;
 - Appendix C, which analyses the response of the system to the shock caused by the events of September 2001, and assesses whether that response highlights any limitations to the financing system; and
 - Appendix D, which reviews the financing experience of selected non-European ANSPs.

2. OUR WORKING METHOD

Introduction

- 2.1 Our working method has been to minimise the burden of the study on stakeholders in the industry by making the maximum possible use of existing material, but nevertheless to consult as widely as was feasible with as wide a range of stakeholders as is possible.
- 2.2 The techniques we used to do this comprised Open Stakeholder Meetings, Working Groups and bilateral discussions with stakeholders, and the preparation and discussion of “dossiers” on national ANSPs.
- 2.3 At present, financing of ATM in Europe is organised very largely through states, by the operation of the Eurocontrol Route Charging system and similar systems. As a result the key points of contact in service provision are the national ANSPs. The only non-national ANSP of significant size, Maastricht Upper Area Centre, is financed through Eurocontrol and hence through the member states. We identified points of contact in the SES national ANSPs¹, and used these to collect information and initiate discussions. We identified points of contact on the government/regulatory side in a number of member states, but some member states were not able to do this.

Stakeholder Workshops

- 2.4 On 3 February 2004 the Commission held a Stakeholder Workshop in Brussels, at which the study, our approach, and the issues it raised, were discussed. The workshop was attended by individuals from all classes of stakeholders, including:
- ANSPs;
 - government officials and regulators;
 - users of air navigation services;
 - providers of finance;
 - suppliers to the industry;
 - labour representatives; and
 - Eurocontrol.
- 2.5 A further Stakeholder Workshop will be convened after the conclusion of the study.

Working Groups and bilateral meetings

- 2.6 We invited stakeholders in various classes to attend Working Groups at which the issues were discussed. We have also sought bilateral discussions and email

¹ Iceland agreed to join the SES after the start of the study; it was therefore not included in this analysis. The ANSP of Luxembourg is very small and has no responsibility outside a very small area of lower airspace, and was therefore not examined.

exchanges, particularly where stakeholders have been unable to attend Working Groups.

- 2.7 Two sessions of a Working Group of ANSPs were attended by representatives of twelve ANSPs. In addition, there were a number of bilateral discussions with ANSPs. All ANSPs were addressed with a list of questions concerning the particular implications of the SES legislation for them, as well as information that could be used to generalise to other ANSPs.
- 2.8 A Working Group of government officials and regulators was attended by representatives of three member states. A number of other representatives asked to be kept informed of emerging conclusions. Again, in all member states for which a contact was identified, officials were addressed with a list of questions concerning the particular implications of the SES legislation for them, as well as information that could be used to generalise to other states.
- 2.9 A number of users and users' organisations participated in bilateral and multilateral discussions.
- 2.10 A Working Group of suppliers to the industry was held, with the emphasis on the interpretation of the interoperability regulation on the potential costs thereof, and on methods of financing. We also held discussions with representatives of the financing community.
- 2.11 We worked closely with Eurocontrol, particularly with the Central Route Charges Office (CRCO), who have access to and a deep understanding of the financial information concerning ANSPs and in particular route charging, and with the Performance Review Unit (PRU), who have access to a wider range of information concerning ANS provision. We also had discussions with other Eurocontrol staff with insights into particular aspects of the implications of the SES legislation.

Dossiers on ANSPs

- 2.12 A major element of our approach to information collection, particularly to Phase 2 of the work, concerning existing methods of financing and their limitations, was the preparation of "dossiers" including the information relevant to our work on national ANSPs. These provided much of background information from which we were able to draw the general conclusions in this report at the Community level. The dossiers were not subjected to extensive revalidation with the contributing ANSPs, however, and have therefore not been included in this report.
- 2.13 We collected information on 26 national ANSPs – those of all SES Member States at the beginning of the study² except Luxembourg. Eurocontrol operates certain services on behalf of its member states (31 members and a number of candidates, including most but not all of the SES members plus some others), including:

² Iceland agreed to join the SES after the beginning of the study.

- the provision of air navigation services in upper airspace over the territory of Belgium, the Netherlands, Luxembourg and north-western Germany through the Maastricht Upper Area Control Centre;
 - the provision of flow management services through the European Central Flow Management Unit;
 - the provision of billing and revenue collection services through the CRCO; and
 - a number of other services in the areas of research and development and the promotion of international cooperation in the sector.
- 2.14 Eurocontrol has not been examined in detail in this study as in the past it has had no significant separate financing – it has been financed through the member states.
- 2.15 In addition, a number of other organisations may be regarded as “air navigation service providers” under the definitions of the legislation, but are generally small or specialised (such as airports that provide their own ANS, or aeronautical meteorological (MET) service providers). Our understanding is that small organisations are likely to obtain a derogation from any unduly onerous provisions of the SES.
- 2.16 The SES obligations are intended, however, to apply to MET service providers, and will have some financial implications. Of the ANSPs in the SES member states, some provide MET services internally. Twenty ANSPs, however, outsource MET, typically to the national meteorological organisation³. These organisations will therefore be subject to the provisions of the SES legislation. We did not examine these organisations and their financing, but believe that the implications will be small in the context of the overall impact of the SES.
- 2.17 Our approach was to compile draft dossiers from all available information, including:
- ANSPs’ Annual Reports, where available;
 - All other publicly available information, such as that available on ANSPs’ websites;
 - Supplementary information made available to us by ANSPs;
 - CRCO returns; and
 - Information collected by the PRU as part of the Performance Review Commission’s Information Disclosure and reviewed and compared as part of the PRU’s ACE 2001 Benchmarking exercise.
- 2.18 Most ANSPs produce an annual report, containing financial data. There are a few exceptions, although in most of these we were able to obtain equivalent internal documents. Some problems exist with particular ANSPs:
- in a few cases, ANSPs have changed corporate status in recent years, and a full three years’ comparable data were not available;
 - in some cases, the ANSP is part of an organisation providing a wider range of services than just ANS (including for example airport provision), and data

³ Eurocontrol Performance Review Commission, *Report on Aeronautical MET Costs*, 5 April 2004.

relating specifically to ANS is not published. Often it has been possible to obtain information relating to costs and revenues of ANS from other sources, such as the Information Disclosure to the Performance Review Commission, but in these cases it is not usually possible to distinguish the financing for different services.

- 2.19 Submissions to CRCO are made by 22 of the relevant member states, the exceptions being the four states that are not members of Eurocontrol⁴. These submissions include detail on the costs and revenues relating to en-route ANS. There is no comparable information on terminal ANS. CRCO submissions also include information on planned costs.
- 2.20 The submissions made to the Performance Review Commission provide more information on the full range of ANS. This information was first made fully available for 2001, when information on 24 of the 26 affected states was collected⁵. Information for 2002, while fully processed, was not available in complete form in time for use in our analysis and that for 2000 was only for a smaller subset of states who participated voluntarily. Nevertheless, some of the ANSPs assisted us by providing their 2000 and 2002 returns.
- 2.21 The draft dossiers were then provided to ANSPs for review. The ANSPs were invited to supplement our information where there were gaps, correct it if they saw errors, and explain apparent inconsistencies. In most cases, ANSPs responded in a cooperative manner to this process, and we have received substantial extra information.
- 2.22 The various sources of information used are summarised in Table 2.1.
- 2.23 The Terms of Reference also required us to seek information on the experience of ANSPs outside Europe. To help us do this, similar dossiers were compiled on a number of non-European ANSPs. Information was received from the ANSPs of Australia, South Africa, Canada, New Zealand and the US. The conclusions we have drawn from this information are presented in Appendix D.

⁴ Estonia, Latvia, Lithuania and Poland

⁵ The PRC's requirement for Information Disclosure applies to all Eurocontrol Member States. However, for the 2001 Information Disclosure, the three Baltic States, though non-members of Eurocontrol, supplied information to the PRC voluntarily. On the other hand, Greece and Cyprus, though member states, did not provide information.

TABLE 2.1 SUMMARY OF SOURCES OF INFORMATION AVAILABLE

State/ANSP	Annual report	CRCO return	ACE 2001	ANSP info
Austria	✓	✓	✓	✓
Belgium	✓	✓	✓	✓
Cyprus		✓		✓
Czech Republic	✓	✓	✓	✓
Denmark		✓	✓	✓
Estonia	✓		✓	✓
Finland	✓	✓	✓	✓
France	✓	✓	✓	✓
Germany	✓	✓	✓	✓
Greece		✓		
Hungary		✓	✓	✓
Ireland	✓	✓	✓	✓
Italy		✓	✓	✓
Latvia	✓		✓	✓
Lithuania	✓		✓	✓
Malta	✓	✓	✓	✓
Netherlands	✓	✓	✓	✓
Norway		✓	✓	✓
Poland	✓			✓
Portugal	✓	✓	✓	✓
Slovak Republic	✓	✓	✓	✓
Slovenia		✓	✓	✓
Spain	✓	✓	✓	
Sweden	✓	✓	✓	✓
Switzerland	✓	✓	✓	✓
United Kingdom	✓	✓	✓	✓

3. THE IMPLICATIONS OF THE LEGISLATION

Our approach to assessing the implications

- 3.1 In discussions with the Commission, it was clarified that the objective of Phase 1 of the study was to obtain credible, order-of-magnitude estimates of the **financial impact** of the SES, based on reasonable assumptions, for the purposes of exploring the financing implications of the SES in Phase 3 of the study. We were not required, and did not set out, to justify the SES or any individual component of the legislation, or particular ways in which it may be implemented, in economic cost-benefit terms, although in many cases, the legislation requires that measures taken under the SES should be subject to cost-benefit appraisal. Many non-financial benefits may also arise from the implementation of the legislation, particularly in the area of safety improvements. In addition, many of the measures that will result from the SES have the benefit of **enabling** other beneficial changes.
- 3.2 We have focused therefore on the order of magnitude of the financial cash costs and benefits of the regulations, and their relative timing. There is no implication that the programmes we have assumed in our assessment of the impact are optimal from an economic perspective.
- 3.3 On this basis, we began our work with a line-by-line review of the regulations, considering:
- whether a financial cost was likely to be imposed, of what **order of magnitude** ('low', 'medium' or 'high'), and (under existing charging and financing mechanisms) on whom;
 - whether the legislation was **permissive** – ANSPs or states were free to observe them if they wished - or **prescriptive** – ANSPs or states were required to comply with certain actions or obligations;
 - whether the financial costs were an **additional** cost imposed by the regulations, or would have been incurred in any case without the regulations;
 - what the **financial benefits** might be.
- 3.4 Our classification of impacts into 'low', 'medium' and 'high' was based on the following criteria. 'Low-cost' items would require no more than two months' staff effort per State, or a commensurate study by the Commission or Eurocontrol. 'Medium-cost' items were those likely to add between two months and several years' staff effort per State, but in total amounting to less than 0.5% of annual system costs. The high cost items were those likely to add costs of the order of several tens of millions of euros. In practice, only the implementation of Functional Airspace Blocks, and the consequences of the interoperability regulation, came into the 'high-cost' category.
- 3.5 Estimates of the total impact of low and medium cost items were developed from a bottom-up estimate of the impact on each State and organisation. The impact of the interoperability regulations was treated without reference to individual organisations. The impact of Functional Airspace Block (FAB) creation was based on a particular hypothetical implementation scenario. However, in practice there are many ways that

the FAB concept could be implemented, and our use of this particular scenario and its assumed method of implementation is intended to be illustrative and should not be interpreted as implying that it is in any way optimal.

- 3.6 Since the detailed implementation requirements of the regulations are being defined over the next few years, working assumptions were needed on what these might be. We checked many of these assumptions informally through various meetings with stakeholders and the Commission, and those in Eurocontrol responsible for the execution of the initial mandates. It was generally agreed that our interpretation was reasonable given the objectives of Phase 1: to generate order of magnitude financial cash costs and benefits.
- 3.7 For most requirements, the costs will be for extra staff time. We therefore made assumptions about the extra effort that each requirement will entail, and used the unit costs of employment determined in ACE 2001⁶ to estimate the overall financial cost. Depending on the nature of the regulation, actions were assumed to be carried out either by senior staff (ATCOs or senior managers), costed at ATCO employment costs, or by average-level staff, costed at average unit employment costs.
- 3.8 We assessed costs and benefits for the period to 2025 (although in some circumstances where investments with very long lives were concerned, such as the implementation of Functional Airspace Blocks, it was necessary to take into account benefits beyond that date). When discounted values are presented, we have used a real discount rate of 8% a year. This is a relatively high value to use in the light of current costs of capital in the market, and the relatively low risk of this industry, but it is consistent with general practice in ATM industry cost benefit studies⁷. We consider it to be a conservatively high estimate of the average costs of capital for the industry in Europe.
- 3.9 Many States have already implemented some of the SES requirements and are already absorbing the related costs. These were not included in our assessment on the assumption that they were not motivated by the Single Sky but by other reasons such as movement towards best practice, improving service quality, or national regulatory requirements.

LOW COST ITEMS

- 3.10 Table 3.5 show the impacts of items we classified as low-cost. Table 3.1 to Table 3.4 show the detailed breakdown of each of the low cost items. Typically, the impacts involve implementing new practices, additional studies, consultation and regulatory compliance. We made estimates of the level of cost required for each item. These were then scaled to the various affected organisations through 'cost drivers' such as revenue, numbers of staff, and IFR flights. The costs comprised both one-off implementation costs, which typically occurred over the first five years and on-going costs. The organisations principally included ANSPs and NSAs, but also

⁶ Performance Review Unit for the Performance Review Commission: *ATM Cost-effectiveness 2001 Benchmarking Report*, September 2003

⁷ A discount rate of 8% is normally used by Eurocontrol in order to compare projects. See for example, Eurocontrol's *Standard Inputs for EUROCONTROL Cost Benefit Analyses*, 23 September 2002.

Governments, the military, the European Commission, and Eurocontrol. The results of this analysis are shown below in Figure 3.1, which shows the costs incurred by each class of stakeholder each year, both during the transition to the new arrangements and thereafter. The total costs over the period to 2025 amount to €35m, and the discounted costs to €20.5m.

- 3.11 The financial benefits of the low-cost items are either not material in the financing context or intangible (in that the measures concerned are mainly enabling in nature). We have therefore not attempted to quantify them.

TABLE 3.1 IMPACT OF LOW-COST ITEMS: FRAMEWORK REGULATION

	Article	Additional?	Impact on?			Impact (thousand €)	
			ANSP	NSA	Other	One-off costs (total)	On-going costs (annual)
Nominate national supervisory authority	4	Yes		Yes	Yes	88	
Establish Single Sky Committee	5	Yes	Yes	Yes	Yes		404
Establish Industry Consultation Body	6	Yes			Yes	1,323	45
Extend SES to non EU States	7	Yes			Yes	110	24
Mandates outside of Eurocontrol	8	Yes			Yes	6	5
Consultation mechanisms for stakeholders	10	Partial	Yes	Yes	Yes	210	100
Performance evaluation	11 (1)	Partial			Yes	14	100
Identifying and promoting best practice	11 (2)	Partial			Yes		50
Evaluation of annual reports	12 (4)	Yes			Yes		5
Total impact of low-cost framework regulation items						1,751	733

TABLE 3.2 IMPACT OF LOW-COST ITEMS: AIRSPACE REGULATION

	Article	Additional?	Impact on?			Impact (thousand €)	
			ANSP	NSA	Other	One-off costs (total)	On-going costs (annual)
Division level at FL285	2	Partial	Yes			263	
Establish single EUIR	3 (1)	Yes	Yes			13	
Develop AIP for EUIR	3 (5)	Yes	Yes			165	
Common general principles for functional airspace blocks	5 (3)	Yes	Yes		Yes	165	
Mutual agreements for functional airspace blocks	5 (4)	Yes	Yes		Yes	1,576	
Necessary provisions for functional airspace blocks	5(5)	Yes	Yes		Yes	44	
Common principles or route and sector design	6 (1)	Partial	Yes		Yes	165	
Approval for modifications in route and sector design	6 (3)	Yes	Yes			657	
Temporary suspension adjustment to rules	8 (2)	Yes			Yes	55	
Total impact of low-cost airspace regulation items						3,103	0

TABLE 3.3 IMPACT OF LOW-COST ITEMS: SERVICE PROVISION REGULATION

	Article	Additional?	Impact on?			Impact (thousand €)	
			ANSP	NSA	Other	One-off costs (total)	On-going costs (annual)
Close cooperation amongst NSAs	2 (4)	Yes		Yes	Yes	88	
Issuing certificates of compliance	7 (3)	Yes		Yes		45	
Areas with non-certified ANS	7 (5)	Yes	Yes			18	
Monitoring ANSP compliance	7 (7)	Yes		Yes			119
Drafting of obligations for ANSPs	8 (2)	Yes	Yes	Yes	Yes	263	
Designation of MET provider	9 (1)	Partial	Yes			182	
ANSP written agreements	10 (2)	Yes	Yes	Yes	Yes	88	
Civil-military written agreements	11	Yes	Yes		Yes	88	
Annual report and independent audit	12 (2)	Partial	Yes			112	102
Transparent charging scheme	14	Partial	Yes		Yes	133	
Review of cost base	15 (2)	Partial	Yes	Yes	Yes	34	
Principles for setting charges	15 (3)	Partial	Yes	Yes	Yes	34	
Ongoing review of compliance	16 (1)	Yes			Yes		10
Investigation of non-compliance	16 (2)	Yes	Yes	Yes	Yes		20
Decisions on non-compliance	16 (3)	Yes			Yes		2
Adjustments to Service Provision Annexes	17	Yes			Yes		2
Total impact of low-cost service provision regulation items						884	221

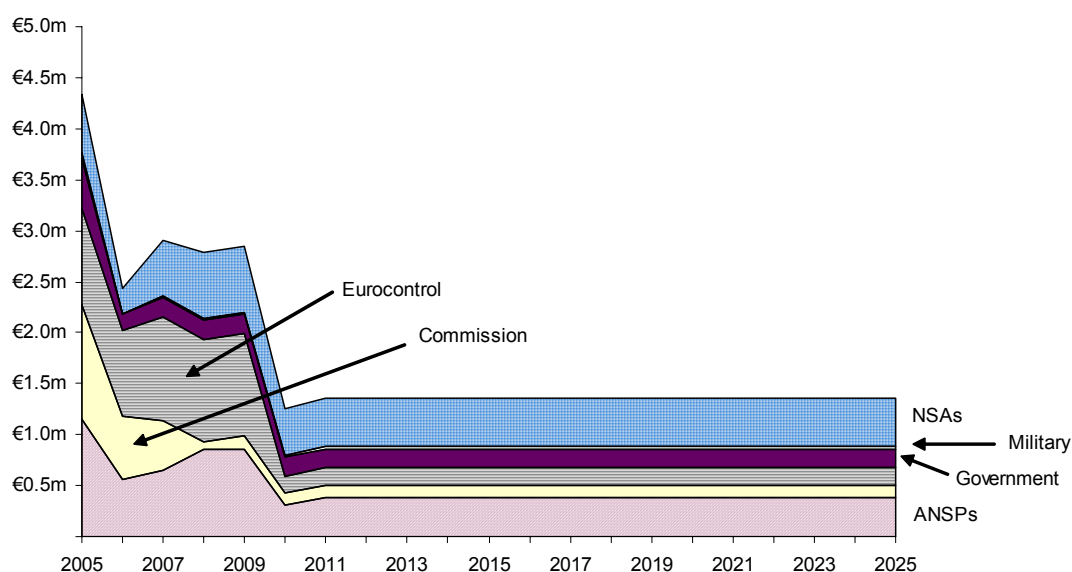
TABLE 3.4 IMPACT OF LOW-COST ITEMS: INTEROPERABILITY REGULATION

	Article	Additional?	Impact on?			Impact (thousand €)	
			ANSP	NSA	Other	One-off costs (total)	On-going costs (annual)
Compliance with implementing rules	3 (2)	Yes	Yes			42	19
Interoperability cost benefit	3 (4)	Yes			Yes	4,133	
Monitoring gaps in community specifications	4 (5)	Yes			Yes		49
Declaration of conformity	5 (1)	Yes					
Ensuring conformity	5 (2)	Yes				21	56
System verification	6 (1)	Yes	Yes			21	56
Declaration of verification and technical documentation	6 (2)	Yes	Yes			208	37
Restrictions on use in non-compliance	7 (1)	Yes	Yes	Yes		208	30
Reasons for non-compliance	7 (2)	Yes	Yes			88	6
Appropriate measures taken in non-compliance	7 (5)	Yes	Yes				
Shortcomings in Community specifications	7 (6)	Yes			Yes		
Total impact of low-cost interoperability regulation items						4,721	253

TABLE 3.5 SUMMARY OF IMPACT OF LOW-COST ITEMS

Regulation	Impact (m€)	
	One-off costs (total)	On-going costs (annual)
Framework regulation	1.75	0.73
Airspace regulation	3.10	0.00
Service provision regulation	0.88	0.22
Interoperability regulation	4.72	0.25
Total costs, all low-cost items	10.45	1.20
Benefits	Intangible or not material	

FIGURE 3.1 COSTS AND INCIDENCE OF LOW-COST ITEMS



Medium cost items

3.12 Medium-cost items comprise:

- the institutional reform of separation of the ANSP from the National Supervisory Authority;
- the development of implementation rules;
- the harmonisation of airspace classification;
- the uniform introduction of the Flexible Use of Airspace concept;
- increased regulatory supervision;
- the implementation of Eurocontrol Safety Regulatory Requirements (ESARRs);
- the impact of the proposal on the licensing of controllers;
- compliance with common requirements for certifying ANSPs;
- the establishment of notified bodies to assess conformance with the interoperability regulations;
- enhanced accounting systems and annual auditing;
- exchange of real time operational data.

Separation of ANSP from National Supervisory Authority

3.13 The Single Sky regulations require *functional* separation of the ANSP from its National Supervisory Authority. We note that this is distinct from *institutional* separation, under which ANSPs and NSA's do not exist in the same organisation. From various sources including discussions with stakeholders, we ascertained the following current status of separation.

TABLE 3.6 STATUS OF REGULATOR – SERVICE PROVIDER SEPARATION

Type of Separation	Number of ANSPs
Institutional separation	14
Functional separation	7
No NSA/ANSP separation	5

- 3.14 In some of the cases where there was institutional separation, some residual regulatory functions remained with the service provider. Our judgement was that implementing the legislation in these cases would not have a material cost.
- 3.15 The SES regulations require ‘functional separation at least’, but several stakeholders commented that they intended to undertake full institutional separation. We therefore estimated the costs of undertaking both functional and institutional separation in the above cases. Those States understood to be planning functional separation were Cyprus, France, Germany, Hungary and Ireland. The organisations concerned did not provide estimates of the implementation costs, with the exception of the French Direction de la Navigation Aérienne (DNA), which expected no additional cost; none was included in our analysis. We therefore made estimates based on recent experience from:
- the UK, which in 2001 completed the separation of NATS and CAA during NATS’s transition to a public private partnership. The costs of this separation were recorded as £9.8m (€15m)⁸, with no additional annual costs required.
 - Sweden, which has recently established a functional separation, which is estimated to add about €1.5m per year to the cost base.
- 3.16 Applying these figures in proportion to the number of staff in each ANSP, leads us to conclude the following:
- Functional separation may add a total of €9m a year. These ongoing costs result from a need for additional staff, for instance where both regulatory and service provision tasks were previously carried out by the same person.
 - The additional cost of achieving full separation would be around €11m per year for the first three years. These would be transition costs and we have not assumed any on-going costs. This is in line with certain regulator or government commitments that the costs of regulation should not increase as a result of institutional separation. The UK is an example of this.
- 3.17 The costs and benefits are summarised in the next table. The benefits are likely to be intangible – so we have not made a financial assessment of them. In the consolidated picture of the impacts of the medium-cost items, we have used the costs of **functional** separation, since this is the degree of separation that is mandated in the SES legislation.

⁸ National Audit Office, *The public private partnership for National Air Traffic Services Ltd*, 24 July 2002

- 3.18 We note also that it is proposed that some states designate and set up **joint** National Supervisory Authorities – this may result in some cost savings, but possible entail some set-up costs. We have not taken any developments of this kind into account in our assessments of costs.

TABLE 3.7 FINANCIAL COSTS AND BENEFITS OF ANSP–NSA SEPARATION

	2005	2006	2007	Annual (2008–2025)
Costs of functional separation (€m)	9	9	9	9
Costs of institutional separation (€m)	11	11	11	
Benefits (€m)	Not material, or intangible			

Development of implementing rules

- 3.19 The Framework Regulation defines how implementing rules are to be developed through mandates to Eurocontrol, while the other regulations state what they are likely to cover: namely airspace harmonisation, charging mechanisms and interoperability rules. To develop order of magnitude costs we treated these items together.
- 3.20 The ATM-CNS Interoperability Roadmap⁹ estimated 40 implementing rules would be required over three phases from 2004 to 2010. We have assumed that the interoperability rules could be achieved through a total of ten mandates (three of which have been issued at the time of writing), and an additional ten mandates (four of which have been issued at the time of writing) may be required for the other regulations. This comes to twenty mandates in total. We assumed Eurocontrol would require an average of 1.5 man-years of effort for each mandate, at a unit cost of €100,000 per man-year. We note that this estimate could be at the lower bound of requirements in many cases. Hence, the total cost of Implementing Rules is estimated to be around €3m over six years. We would expect any additional associated effort for mandates, such as studies, would already be part of Eurocontrol's programme of work. The European Commission has budgeted a contribution of €1m in 2004 for this work to be done by Eurocontrol and is considering an appropriate budget for 2005.
- 3.21 We have not identified any specific financial benefits of the implementing rules, and regard them as enabling other benefits of the SES. In summary, the costs are as follows:

TABLE 3.8 FINANCIAL COSTS AND BENEFITS OF RULE DEVELOPMENT

	2004	2005	2006	Annual (2007–2009)
Costs of mandates (€m)	1.0	1.0	0.25	0.25
Benefits (€m)	Not material or intangible			

⁹ Sofréavia for the European Commission, *ATM-CNS Interoperability Roadmap, Final Report*, August 2003.

Progressive harmonisation of airspace classification

- 3.22 The airspace regulation requires harmonisation of airspace classification, as defined in the Eurocontrol airspace strategy.
- 3.23 We based our estimates of the impact of this requirement on the business case for airspace harmonisation to ICAO Class C of airspace between FL195 and FL460 within the European Civil Aviation Conference (ECAC)¹⁰. This considers two scenarios for VFR traffic: Scenario 1, where VFR aircraft are restricted to temporary segregated airspace (TSAs)¹¹ and Scenario 2, where VFR traffic is also allowed outside TSAs, if appropriate conditions are met.
- 3.24 The costs from the above business case were modified to take account of harmonisation to a division level of FL 285 between upper and lower airspace, as specified in the SES legislation. The costs were also reduced in scope from the whole of ECAC to the SES airspace. This resulted in costs of:
- €6m for Scenario 1;
 - €13m for Scenario 2.
- 3.25 A draft Eurocontrol Notice of Proposed Rule Making¹² proposes the former scenario, whereby VFR traffic, above FL 195, is authorised only in reserved airspace, or in accordance with specific arrangements. Above FL 285, the proposal is for authorisation only in reserved airspace. Scenario 1 therefore is likely to be closest to the eventual outcome, and was therefore adopted for the purposes of this report.
- 3.26 Ultimately, the SES will extend to lower airspace. The number of different classes in lower airspace within a State is much higher than in upper airspace. Generally upper airspace has at most three different classes, whereas in lower airspace there could be up to five different classes. Lower airspace also contains aerodrome and terminal control areas, which will generally have a different airspace class than the surrounding airspace. For the purposes of our study, we estimated that the costs to harmonise classifications for lower airspace would be twice those of upper airspace.
- 3.27 The costs are summarised in the following table, assuming harmonisation of classification for upper and lower airspace. We have made no assessment of specific financial benefits, although this change is likely to enable improved cross-border traffic handling procedures.

¹⁰ Helios Technology for Eurocontrol, *Business Case for Airspace Harmonisation to ICAO Class C above FL195*, June 2003

¹¹ Or equivalent areas or accorded specific arrangements by the appropriate ATS authority.

¹² Eurocontrol, *Proposal for draft Eurocontrol rule for airspace classification*, PC/03/18/4, 13 October 2003.

TABLE 3.9 FINANCIAL COSTS AND BENEFITS OF HARMONISING AIRSPACE CLASSIFICATION

	2005	2006	2007
Costs to ANSPs (€m)	3.3	3.3	3.3
Costs to users (€m)	2.0	2.0	2.0
Costs to military (€m)	0.6	0.6	0.6
Total costs (€m)	5.9	5.9	5.9
Benefits	Not material or intangible		

- 3.28 The airspace directive also requires the adoption of common principles and criteria for route and sector design. This was dealt with as one of the low-cost items above.

Uniform application of the flexible use of airspace

- 3.29 From our stakeholder consultations, it was apparent that, in most states, ANSPs and regulators believed that they conformed to the Flexible Use of Airspace (FUA) Handbook or went further (through co-location or integrated civil-military control). However, a study in 2001 highlighted a number of shortcomings with the adoption of the handbook: differences in implementation, low use of conditional routes, insufficient international cooperation¹³. The Commission mandate to Eurocontrol highlights the main problem with the current FUA implementation as a lack of clear and mandatory regulation¹⁴. This leads to disparate procedures and instructions across Europe, with inefficient coordination between SES member states.
- 3.30 Given states' responses, we assumed that, for the most part, the FUA handbook is fully implemented in each State, but with differences between States' implementation. Costs are therefore likely to arise in harmonising these existing rules and procedures. We assumed an average of one man-year effort per State spread over two years, with costs divided equally between civil and military ANSPs.

TABLE 3.10 COSTS OF HARMONISING FLEXIBLE USE OF AIRSPACE IMPLEMENTATION

	2005	2006
Civil ANSP costs (€m)	0.37	0.37
Military ANSP costs (€m)	0.37	0.37
Total costs (€m)	0.74	0.74
Benefits	Intangible	

- 3.31 We have not assigned any direct benefits to the uniform application of the flexible use of airspace. It is likely that this regulation would encourage a higher utilisation of conditional routes and thereby improve horizontal flight efficiency. However, to

¹³ Eurocontrol, *Status of civil-military coordination in air traffic management*, October 2001

¹⁴ European Commission, *Mandate to Eurocontrol to assist the European Commission in the development of implementing rules on Flexible Use of Airspace*, March 2004.

avoid double counting with the benefits of functional airspace blocks, we did not attach a specific financial value to this benefit.

Enhanced regulatory supervision

- 3.32 The SES legislation requires NSAs to ensure the appropriate supervision of the application of the regulations, in particular with regard to the safe and efficient operation of ANSPs. This provision covers a number of areas of regulation, including economic regulation, airspace regulation and regulation of the application of interoperability. These items were dealt with above as low-cost items, typically requiring less than a man-year per State. However, given recent accidents and the subsequent Action Group for Aviation Safety (AGAS) report¹⁵, we estimated that this provision as it will be applied to safety regulation implied a particular requirement for increased safety regulatory resources in some States.
- 3.33 Some stakeholders commented that they would not necessarily recruit new safety regulatory staff, but may look towards outsourcing work to ‘recognised organisations’¹⁶. We have assumed that the costs of such oversight activities would be the same whether they were carried out externally or internally to the NSA.
- 3.34 We are also aware of a confidential report on the estimated shortfall in States’ regulatory resources, but have not been granted access for this study. However, the AGAS report gives some indication to the level of shortfall. It shows the results of a ‘safety maturity’ assessment carried out on regulators and service providers. The results indicated, out of a sample of 32 regulators and service providers, the following:
- About nine ANSPs and nine safety regulators have ‘mature arrangements’. They have assessed their own performance at around 70 (out of 100), which means that they are classed as having a ‘mature arrangement’ consistent with the Single European Sky;
 - The average self-assessment score for the remaining 23 regulators (about 70% of the total) was around 50. That is, 70% of the regulators met only 50/70, or 70%, of the ‘mature arrangements’.
- 3.35 Hence around 70% of regulators, on their own assessment, fall short of the level of ‘mature arrangements’ by 30%. We take ‘mature arrangements’ to be similar to those of the UK, a system where the level of resources and the functions of those resources are particularly transparent. Mature arrangements would include aspects such as safety management, separation monitoring, short-term conflict alert, and open reporting of safety statistics.
- 3.36 The number of safety regulatory staff required for each State to be compliant with SES regulations was therefore estimated to be in proportion to the UK’s. In the UK, the ratio of safety regulatory staff to ANSP staff is about 0.7%. Therefore, for each State, we estimated the requisite number of safety regulatory staff as 0.7% of ANSP staff. As there is likely to be a need for a minimum number of regulatory staff for even the

¹⁵ Eurocontrol, *Final report of the high-level European Action Group for ATM safety (AGAS)*, 20 March 2003

¹⁶ Service Provision Regulation Article 3.

smallest NSA, which we did not take into account, our estimate may be a lower bound overall.

- 3.37 We then equated the average shortfall in safety maturity, 30%, to a shortfall in regulatory staff of 30%. For example, a State with 1,000 ANSP staff would be *expected* to have seven safety regulatory staff, but was currently likely to have a shortfall of three staff.
- 3.38 This calculation was applied to 70% of the States in our sample. As we did not know which States fell in the 70% (shortfall) category, we took a view on those States were most likely to have mature arrangements. This gave us a list of States that were likely to have the supposed average 30% shortfall of regulatory staff. We then estimated the costs in two parts:
- The staff shortfall was estimated for each State, and the costs of making good this shortfall was based on the average employment costs of ATCOs in that State.
 - We assumed a training cost for the first two years, based on 30% of additional staff time and €500 per day. This came to an average cost of around €160,000 per State over two years. Given the general lack of safety regulatory resources, the task of training new staff is likely to be difficult to manage, and may require contracted staff from those regulators with ‘mature’ arrangements.
- 3.39 The resulting costs are summarised below. We foresee no direct financial benefits, although of course significant safety benefits are likely to arise.

TABLE 3.11 FINANCIAL COSTS AND BENEFITS OF INCREASING SAFETY REGULATORY STAFF RESOURCES

	2005	2006	Annual (2007–2025)
Cost of safety regulatory staff shortfall (€m)	6.5	6.5	6.5
Training costs (€m)	2.0	2.0	
Total costs (€m)	8.5	8.5	6.5
Benefits (€m)	Intangible		

Implementation of ESARRs

- 3.40 The rate of adoption of Eurocontrol Safety Regulatory Requirements (ESARRs) is generally regarded as disappointing at present¹⁷. Combined with the low level of safety maturity assessed in ECAC States, discussed in paragraph 3.34, and given the requirements of the different ESARRs, our SES estimates are based on the following assumptions:
- ESARR2 should not require extensive efforts to implement, as it has much in common with existing ICAO standards. Our previous experience¹⁸ was that

¹⁷ Eurocontrol, *The European convergence and implementation plan (ECIP) status report 2002*, March 2003.

¹⁸ Solar Alliance for the European Commission, *Candidate States study on ATM benchmarking for best practices*, January 2003.

States were nearly compliant, except for reporting to the Safety Regulation Commission, or they were limited by the progress of their safety regulator.

- ESARR3 is similar to quality management, requiring not just document processes and procedures, but cultural changes throughout the organisation. From the ECIP 2002 status report it is likely to be implemented late.
- ESARR4 requires systematic risk identification and mitigation for the introduction of new systems. From the ECIP 2002 status report it is also likely to be implemented late.
- ESARR5 is reported as being close to implementation¹⁹.

3.41 We would expect some additional progress to have been made in recent months, particularly given the high priority attached to safety by service providers. We estimated that ESARRs 3 and 4 would require the most effort to implement, because of the cultural change required and, for ESARR4, the need to learn new skills.

3.42 To make an order of magnitude estimate, we assumed that, on average, ESARR3 will require four days' effort per ANSP staff member, spread over a three-year period; that is, €14.6m for each of the three years. This agreed with estimates from some ANSPs. We further assumed that ESARR4 will require an average of 1 man-year per ANSP per year, or €1.2m per year. We have not identified any direct financial benefits, although safety benefits are likely to be significant.

TABLE 3.12 FINANCIAL COSTS AND BENEFITS OF ADOPTING ESARRS

	2005	2006	2007	Annual (2008 – 2025)
Costs of ESARR3 (€m)	14.6	14.6	14.6	
Costs of ESARR4 (€m)	1.2	1.2	1.2	1.2
Total costs (€m)	15.8	15.8	15.8	1.2
Benefits (€m)	Intangible			

Licensing of controllers

3.43 Article 5 of the service provision regulation requires the Commission to make proposals on the licensing of controllers. We assume that this would require appropriate 'on-the-job' training in local operating procedures and airspace. The cost impacts are therefore likely to be in harmonising training programmes and quality assurance, leading to a common student licence.

3.44 We have based our estimates on the work of the UK CAA on the costs of implementing ESARR5²⁰. These comprise less than 20 days' effort per ATS Unit, with a generic unit training plan developed by the CAA. We estimated that in future there will typically be one ANSP training college per State providing provisional ATCO licences, fewer than is currently the case. However, the efforts required to harmonise the licence may be greater. Hence we made a broad estimate of

¹⁹ Eurocontrol, *AGAS SSAP Implementation Status Report*, September 2003.

²⁰ UK CAA (SRG), *Regulatory impact assessment for the introduction of the UK harmonised ATC licence and supporting legislation*, 29 July 2002

implementing the SES requirement of one man-year per State. There will also be scope for generic training materials, which we assumed would be provided by Eurocontrol, which would entail an additional one-off cost. In summary, we estimated:

TABLE 3.13 FINANCIAL COSTS AND BENEFITS OF PROPOSALS ON THE LICENSING OF CONTROLLERS

	2005	2006	2007	2008	2009
European Commission costs (€m)	0.5				
Eurocontrol costs (€m)		0.3	0.3	0.3	
ANSP costs (€m)			1.5	1.5	1.5
Total costs (€m)	0.5	0.3	1.8	1.8	1.5
Benefits (€m)	Intangible or not material				

- 3.45 The benefits assumed to result from this measure are focused on the enabling effect that it would have on labour market flexibility, reducing training, and reducing the incidence of bottlenecks with a shortage of ATCOs. The benefits would therefore be manifest through general improvements in cost-effectiveness and increased quality of service, and direct cash benefits were therefore not estimated.
- 3.46 This provision may have an impact on small, non-national ANSPs (such as medium-sized airports that handle their own ATC). We did not make an assessment of the costs of such changes.

Common requirements for certifying ANSPs

- 3.47 Our estimates of the costs of common requirements for certification of ANSPs drew on a recent Commission study²¹. This includes an assessment of the impact of common requirements on ANSPs, and some data on the number of ANSPs that might be particularly affected by the regulations.
- 3.48 The areas identified as having particular cost impacts were:
- human resource policies;
 - automated occurrence reporting;
 - security policies;
 - data security plans and procedures;
 - Quality Management Systems (QMS);
 - customer consultations / complaints procedures; and
 - business plans.

These are discussed in turn below.

²¹ Booz Allen Hamilton for the European Commission, *Study on common requirements for the provision of air navigation services*, 6 August 2003.

- 3.49 *Adopt and document formal Human Resource (HR) policies.* At least nine of the 27 States already have formal HR policies in place. We estimated that the creation of such policies would require three man-months' input for each of the other 18 States, at the average annual cost per staff of €60,000 – the average unit employment cost of our 27-state sample. This yielded a total cost of €0.3m.
- 3.50 *Automated occurrence reporting as far as possible.* The Commission's Common Requirements study identified that at least eight service providers in EU States already use automated reporting. Examples are the UK's separation monitoring function or 'SMF', France's 'OPERA' and Maastricht UAC's 'ASMT'. We estimated that, at most, 18 ANSPs would need similar automated reporting systems. We also estimated that this tool would cost around €100,000 per ANSP on average, assuming that common development by Eurocontrol has largely been completed²². We therefore estimated a total cost of €1.8m.
- 3.51 *Systems and procedures for ensuring the security of its facilities and personnel.* We assumed this will require an audit of security measures, and procedures to be modified. We estimated €50,000 on average per ANSP, applied to 70% of States; in proportion to the 'safety maturity' assessment discussed in paragraph 3.34; this implied an additional cost of €0.9m in total.
- 3.52 *Security plans and procedures.* The cost of implementing data security plans and procedures was assumed to be proportional to ANSP revenue for all ANSPs, including Maastricht UAC.
- 3.53 The Common Requirements study included a survey of security planning, which revealed "*few declared policies in place*". We therefore assumed that, to an order of magnitude, most ANSPs would require efforts in this area. We estimated that the largest ANSPs might dedicate two man-years of effort for implementation, plus 10% of this for ongoing costs. This was scaled by revenue for each ANSP, and a cost per man-day applied for each individual ANSP. The resulting costs of implementing data security plans and procedures were €0.9m, spread over three years, and annual ongoing costs were €0.1m.
- 3.54 *Quality Management Systems.* The Common Requirements study identified that "*at least fifteen service providers have formal QMS in place to some extent in their organisation*". We also asked ANSPs about the status of their quality management systems as part of this study. Not all responded, and we supplemented our enquiries by looking at ANSPs' publicly available information. From this, we assumed that the following ANSPs required a certified quality management system: Austria, Cyprus, Denmark, Estonia, Finland, France, Greece, Ireland, Lithuania, Malta, MUAC, Norway, Slovenia and Spain. In addition, Austria and Estonia have quality management systems partially implemented, and we assumed that the effort required to complete the work amounted to 50% of that required for full implementation.

²² Eurocontrol, *AGAS SSAP Implementation Status Report* September 2003.

- 3.55 The costs were first estimated based on an all-industry survey of the cost of implementing a new QMS, expressed as a cost per employee²³ of between \$1,000 and \$4,500 depending on the size of organisation. However, estimates given to us by some ANSPs during the course of this study were much smaller, around €450 per staff member. This may be because ANSPs often already have quite formalised processes, and it may also be the impact of the revised ISO 9000:2000 standard. The estimate used in our analysis was therefore €450 per ANSP staff member, totalling €7.6m over two years. Annual costs were estimated at about 30% of implementation costs, based on another all-industry survey²⁴. This amounted to annual costs of €2.1m.
- 3.56 *Annual business plans.* The cost of producing annual business plans was estimated in a similar manner. The Common Requirements study states that, of service providers in Member States, nine currently have business plans covering a five-year period or more. We therefore estimated that, as a maximum, eighteen ANSPs would require additional business planning cost as a result of the SES. We estimated that the largest ANSPs might dedicate two man-years of effort to this, with a minimum effort of 0.25 man-years for the smaller ANSPs. ATCO employment costs were used to reflect the involvement of more senior staff. Since we did not know which ANSPs were already compliant, we calculated the total for 26 ANSPs and took two thirds of the result to reflect the fact that some were already compliant. The result was an annual cost of around €0.8m for the eighteen ANSPs concerned.
- 3.57 *Customer consultation and complaints procedures.* The Common Requirements study estimated that “a small majority of service providers have formal processes in place for customer involvement in service definition...”. It further stated that at least two ANSPs have no formal complaints procedures. We interpreted this as stakeholder consultation and related aspects such as complaints procedures were probably adequate for 13 ANSPs. We estimated that, on average, 20 days per year might be required per ANSP for consultation and 20 for complaints procedures. We applied this to the remaining ANSPs, at the average employment cost of all the States in our study. In total, this amounted to €0.1m per year.
- 3.58 The following table summarises the costs estimates for Common Requirements. No direct financial benefits were assumed. There are likely to be non-financial benefits, such as increases in safety and security and improved staff development. In addition these measures will enable other measures that will, in turn, bring financial benefits. For example some financial benefits, such as cost savings, might be expected to be identified through annual business planning.
- 3.59 We have also assumed that the twenty aeronautical meteorological service providers in states where ANSPs outsource these services will be required to meet the common requirements, and an estimate of their costs in complying with common requirements is included. It has been calculated using the same method as for ANSPs.

²³ Bob Tvrdik, CIRAS - *Costs and benefits of ISO 9000 registration*, 1997.

²⁴ *Study on tangible benefits of obtaining ISO 9000 certification*, 1999,
<http://www.fba.nus.edu.sg/research/pqrc/PQRCNW/readouts/pgWebISO.htm>

TABLE 3.14 FINANCIAL COSTS AND BENEFITS OF COMMON REQUIREMENTS

Common requirement	Estimated cost or benefit (€m)		
	2005	2006	Annual (2007–2025)
Adopt and document formal Human Resource policies	0.1	0.1	
Automated occurrence reporting as far as possible	0.9	0.9	
Systems and procedures for ensuring the security of its facilities and personnel	0.4	0.4	0.1
Security plans and procedures	0.5	0.5	
Quality Management Systems	3.8	3.8	2.1
Annual business plans	0.8	0.8	0.8
Customer consultation and complaints procedures	0.1	0.1	0.1
Total costs (ANSPs)	6.6	6.6	3.1
Total costs (MET service providers)	1.8	1.8	1.1
Total costs (all entities)	8.4	8.4	4.2
Benefits	Intangible or not material		

Notified Bodies

- 3.60 The interoperability regulation requires the assessment of conformity to interoperability standards to be carried out by ‘notified bodies’. The regulations place a number of requirements on the notified bodies, such as independence from the system in terms of design, manufacture, marketing etc. They also require professional integrity, technical competence and impartiality. Given such requirements, it is likely that many of the notified bodies will be integral to current regulators. We therefore estimated the impact to be an additional effort of 0.5 man-years per State per year. This cost would be to meet, and then maintain, the general criteria on notified bodies, particularly the need for technical competence. Using average ATCO staff costs in each State, the implied financial impact would be about €1.1m per year. No financial benefits additional to those of interoperability itself were identified.

TABLE 3.15 FINANCIAL COSTS AND BENEFITS OF NOTIFIED BODIES

Annual (2005–2025)	
Costs of notified bodies (€m)	1.1
Benefits (€m)	Intangible or not material

Enhanced accounting systems and annual auditing costs

- 3.61 The SES regulations impose a number of requirements on ANSPs which are likely to require them to include improved functionality in their cost and management

accounting systems. For example, the regulations²⁵ require ANSPs to identify the relevant costs and income for air navigation services and to keep consolidated accounts for other, non-air-navigation services. They also require ANSPs to produce accounts conforming to the International Accounting Standards adopted by the Community. The “common charging system” is also likely to impose greater transparency requirements than was customary in the past. We asked ANSPs a number of questions about their accounting systems, and established that some already had adequate systems which were regularly updated; these were excluded from the analysis.

- 3.62 Our cost estimates were based on a general industry survey²⁶, which gave cost estimates of financial systems according to total enterprise revenue, classified into different revenue bands. These estimates were then adjusted according to estimates provided by some ANSPs. Licence and implementation costs were calculated for those ANSPs who, in our judgement, would require enhanced systems. The resulting cost estimates are as follows, categorised in the different revenue bands:

TABLE 3.16 COSTS OF IMPLEMENTING ENHANCED ACCOUNTING SYSTEMS

Revenue band (m€)	Licence (€m)	Implementation (€m)	Total (€m)	Number of ANSPs	Total cost (€m)
>165	0.56	1.12	1.68	5	8.4
66-165	0.17	0.25	0.41	6	2.5
17-66	0.03	0.03	0.07	4	0.3
0-17	0.00	0.02	0.02	6	0.1
Total				21	11.3

- 3.63 The incremental costs were assumed to be spread over the three years 2005-2007, that is, €3.8m a year.
- 3.64 In addition to the system implementation costs, we also included an element for altering accounting procedures, to keep consolidated accounts of non-air navigation services and to accomplish the separation required by the charging system. This was estimated at 2 man-years’ effort for the largest ANSP, and scaled according to ANSP revenue; with a minimum of 3 months’ effort set for the smaller organisations.
- 3.65 Views on the costs that were likely to be incurred to conform to International Accounting Standards varied considerably between ANSPs. We therefore took one of the lower estimates, €250,000 and scaled this estimate to other ANSPs according to their revenue. We excluded ANSPs who believed they would not incur any costs; either because they already complied or would not have to under the Community legislation.

²⁵ Service Provision Regulation, Article 12 (3).

²⁶ CA magazine, Sep 2003, www.camagazine.com/index.cfm/ci_id/16455/la_id/1.htm

- 3.66 The SES regulations also require annual financial audits and financial reporting. We asked ANSPs whether they currently underwent an annual audit, and if so, what its costs were. The average audit cost per million euro of ANSP revenue was then calculated (€732 per €1m) and applied to ANSPs that do not currently undergo an audit. This resulted in an additional cost of audit of €1.2m per year.
- 3.67 The information provided to us by ANSPs suggested that the incremental costs of ongoing financial reporting would not be material. The incremental costs of implementation are summarised in the table below.

TABLE 3.17 FINANCIAL COSTS AND BENEFITS OF IMPLEMENTING ENHANCED ACCOUNTING SYSTEMS AND AUDITING

	2005	2006	2007	Annual (2008 – 2025)
Costs of accounting systems (€m)	3.8	3.8	3.8	
Costs of annual audit (€m)	1.2	1.2	1.2	1.2
Cost of enhanced processes (€m)	0.5	0.5	0.5	
Costs of implementing IAS (€m)	1.8	1.8	1.8	
Total costs (€m)	7.3	7.3	7.3	1.2
Benefits (€m)	Intangible, not material			

- 3.68 In addition to the impact on national ANSPs, the SES requirements may also impose changes on other organisations that fall within the definition of ANSP in the legislation; medium-sized airports that provide their own ANS, and MET service providers. However, we have not included the costs of enhanced accounting systems and reporting for these organisations.
- 3.69 These changes to financial systems will not of themselves bring any direct or tangible financial benefits. Their aim is rather to facilitate transparency and the consequent user scrutiny that will put pressure on costs and encourage moves to greater cost-effectiveness.

Exchange of real-time operational data

- 3.70 The estimated costs of this item were based on costing additional telecommunication links for a number of stakeholders ('top' airports and airlines). It was assumed that 100 such links would be required over the coverage area. Costs were calculated based on current costs of connection, rental of main communications link and local ends²⁷. The costs were calculated for 0.5Mbits per second transmission rates. No direct financial benefits were identified; the reasons for stakeholders investing in this technology are likely to be to improve their operations through more accurate data, which may then lead to cost savings.

²⁷ BT, *Private Circuits Price Information*, January 2002

TABLE 3.18 FINANCIAL COSTS AND BENEFITS OF REAL-TIME DATA EXCHANGE

	2005	2006	2007	Annual (2008–2025)
Leased line costs (€m)	0.3	0.5	0.8	1.0
Benefits (€m)	Intangible, not material			

Summary of medium-cost items

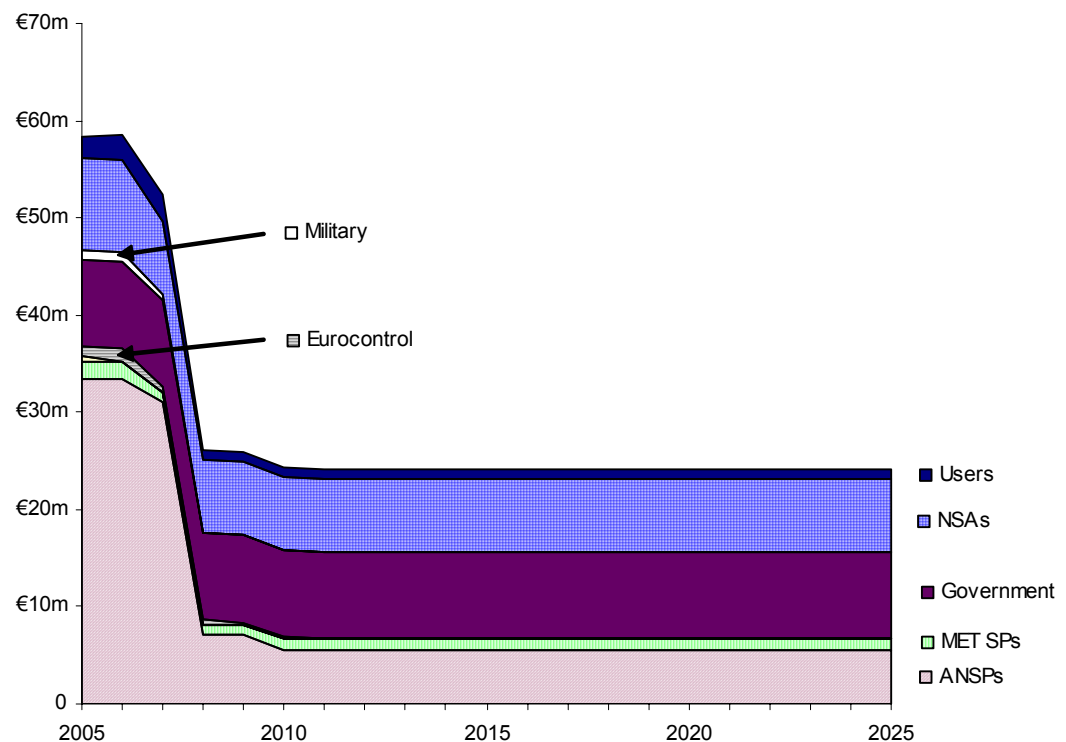
3.71 The medium cost items are summarised in the following table.

TABLE 3.19 FINANCIAL IMPACT OF MEDIUM-COST ITEMS

	Estimated cost or benefit (€m)						
	2005	2006	2007	2008	2009	2010	Annual (2011–2025)
Separation of ANSP from NSA	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Development of implementing rules	1.0	1.0	0.25	0.25	0.25		
Progressive harmonisation of airspace classification	5.9	5.9	5.9				
Uniform application of the flexible use of airspace	0.7	0.7					
More regulatory supervision	8.5	8.5	6.5	6.5	6.5	6.5	6.5
Adoption of ESARRs	15.8	15.8	15.8	1.2	1.2	1.2	1.2
Licensing of controllers	0.5	0.3	1.8	1.8	1.5		
Common requirements for certifying ANSPs	8.4	8.4	4.2	4.2	4.2	4.2	4.2
Notified bodies	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Accounting and audit	7.3	7.3	7.3	1.2	1.2	1.2	1.2
Exchange of real-time operational data	0.3	0.5	0.8	1.0	1.0	1.0	1.0
Total costs (€m)	58.4	58.4	52.6	26.2	25.9	24.1	24.1
Benefits (€m)	Intangible, not material, or linked to high-cost items						

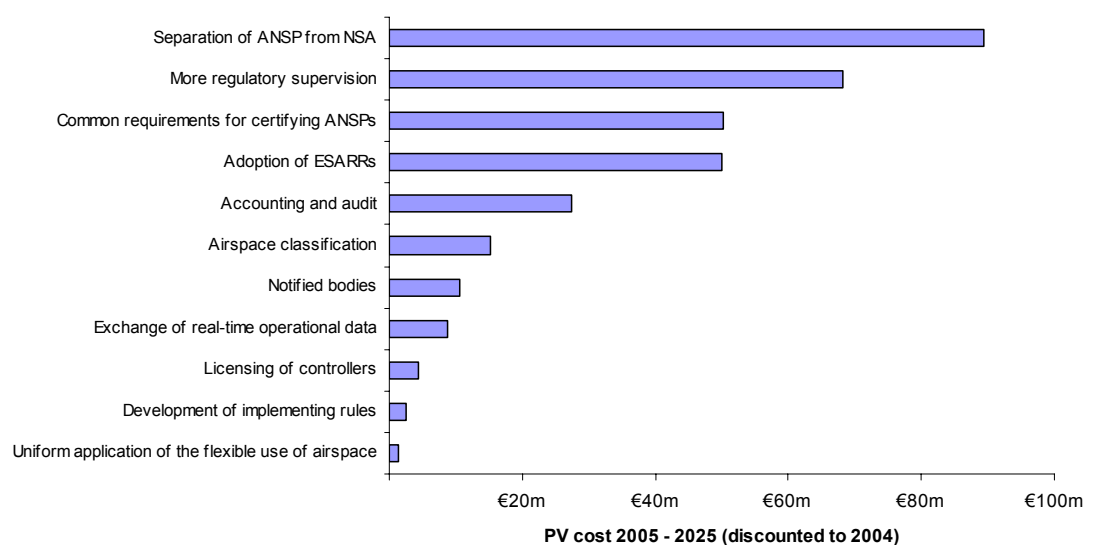
3.72 The incidence of the costs, both over time and by class of stakeholder, is shown in Figure 3.2. The bulk of one-off implementation costs fall on ANSPs, and occur in the first three years. On-going costs are spread among ANSPs, government and NSAs. Smaller elements of cost are incurred by the Commission, Eurocontrol and the military during the implementation period, and by MET service providers and users both during implementation and as on-going costs.

3.73 The discounted present value of the medium-cost items amounts to €328m.

FIGURE 3.2 COSTS OF MEDIUM-COST ITEMS AND THEIR INCIDENCE

3.74 Figure 3.3 shows the present value of the costs for the various medium-cost items for the period 2005 to 2025, discounted to 2004 at 8%.

3.75 Benefits from all these medium-cost items have been assessed as non-financial, or non-specific – the benefits are either non-tangible or arise through enabling other beneficial changes via the high-cost items discussed and quantified below.

FIGURE 3.3 SUMMARY OF MEDIUM-COST ITEMS (PRESENT VALUES)

Discretionary military costs

- 3.76 The above calculations include all the costs imposed on military ANS providers that in our view are a mandatory consequence of the SES legislation. However, a number of military issues have been highlighted during the course of the study. These may motivate some military authorities to partially adopt SES practices, although they are not legally bound to do so. For example, several military authorities provide civil control services: regional airports in France or lower and middle airspace radar services in the UK etc. The costs of military adaptation to the Flexible Use of Airspace and harmonised airspace classification have already been included in the study. The military perspective is worthy of in-depth study, however, we have made some initial estimates of the cost impact of military ATC conforming with the SES common requirements, ESARRs, accounting systems and controller licensing. No Europe-wide statistics on controller numbers or costs were available for the study, and we do not know how many would be affected. We estimated around 4,000 military controllers would be affected and assumed average ANSP costs for them. The calculations were then made in the same way as for the civil ANSPs. The impact of functional airspace blocks is assumed to form part of the FAB development cost and has not been separately calculated. Because of the uncertainty over whether this cost is a mandatory requirement of the SES, the figures have not been included in the summaries calculated later in this chapter.

TABLE 3.20 DISCRETIONARY MILITARY COSTS

	Estimated cost (€m)					
	2005	2006	2007	2008	2009	2010
Adoption of ESARRs	1.0	1.0	0.6	0.0	0.0	0.0
Common requirements for certifying ANSPs	1.9	1.9	1.9	0.1	0.1	0.1
Accounting and audit	1.2	1.2	0.5	0.5	0.5	0.5
Licensing of controllers	1.8	1.8	1.8	0.3	0.3	0.3
Total costs	5.9	5.9	4.8	0.9	0.9	0.9

High cost items – interoperability and the promotion of new technology

- 3.77 The objective of the interoperability regulation is both to achieve interoperability of the ATM network, and to ensure the coordinated and rapid introduction of new technology in ATM.
- 3.78 The interoperability regulation poses perhaps the **greatest challenge** in assessing its financial cost and benefit implications. Interoperability and new technology are widely believed to bring financial benefits, but they are difficult to define. The question of interoperability was addressed by the US GAO²⁸ (General Accounting

²⁸ Interoperability is here defined by the GAO as the ability of disparate systems to work together efficiently and effectively over a network: United States General Accounting Office AO. *Air Traffic Control, complete and enforced architecture needed for FAA systems modernisation*, February 1997. The GAO report highlights fundamental differences in how systems communicate as a cause of additional costs. For example, the PAMRI

Office), which examined the impact of incompatibilities between existing ATC systems. These incompatibilities led to higher costs to maintain and develop systems and required costly interfaces to 'translate' between systems. Furthermore, the use of different software languages and standards is believed to reduce the ability to reuse software components and thereby gain economies in new system development.

- 3.79 Looking across other industries does not give pertinent examples. Benefits are expected for new digital telecommunication and broadcast services, although assessing this in advance is cited as being impossible²⁹. Our study therefore aims to capture the high and low ends of the scale of interoperability costs and benefits.
- 3.80 The impact of the interoperability regulation can vary in two dimensions: its **scope**, and its **speed of implementation**.
- 3.81 At the lower end of the scope of implementation, we assumed that the regulation can be implemented by ensuring that air navigation service providers are using compatible technology in the most cost-effective way. This still implies significant efforts in developing harmonised interfaces, but implies actions which are very much focused on the interfaces; with limited common functions. This category would include the current development of FDP (Flight Data Processing) systems and Mode S for example. We estimated that this would require a six-year development programme for interoperable ATM/CNS systems and equipment as follows:

TABLE 3.21 ESTIMATES FOR INTEROPERABILITY COSTS

Development activity	Cost estimate (€m)					
	2005	2006	2007	2008	2009	2010
Agree operational concept (2010 - 2020)	12.0	12.0				
System architecture development	12.0	12.0				
Define operational requirements	12.0	12.0				
Define system functional and technical requirements			12.0	12.0		
Standardisation costs	1.7	1.7	1.7	1.7	1.7	1.7
Product development				60.0	60.0	60.0
Total Costs	37.7	37.7	13.7	73.7	61.7	61.7

- 3.82 To put the above estimates in context, we note that around €1,000m is invested in ATM/CNS annually in Europe³⁰. The above estimates average around €50m a year, or

function is a collection of systems interfaces for radars and weather systems, so that they can be used by the Host Computer System. The original cost was \$38M, and the FAA "spends millions annually" to maintain it.

²⁹ European Commission, *Barriers to widespread access to new services and applications of the information society through open platforms in digital television and third generation mobile communications*, COM(2003) 410 9 July 2003.

³⁰ PRC, *Performance Review Report 5*, 2002 estimated ATM investments to be of the order of €400m and CNS around €600m. For our purposes we have assumed that the navigation and surveillance do not require substantial interoperability efforts, and have estimated the relevant investment to be around €600m.

5% of current annual investment costs. This is about half of the amount currently spent on the Eurocontrol EATM Programme. Whether these costs are additional costs of the SES will depend on how well aligned EATMP already is to the SES interoperability requirements that are eventually agreed.

- 3.83 For the above analysis, we did not include the cost of modifying the interfaces to existing legacy systems. For example, we assumed that a new radar system would require the same interfacing effort to enable it to function with existing data processing systems (the legacy system) whether or not the new radar system met the new standard on interoperability. We might expect that, as interoperability was increased across all systems, the incremental interfacing costs would decrease. However, over time, standards are modified³¹ and new technologies implemented, so that backward compatibility is not guaranteed: preserving backward compatibility might add significant costs to a new technical/system innovation.
- 3.84 We believe that this lower scope of interoperability is a practical proposition if managed carefully, and cite two recent examples which support this:
- *Mode S surveillance.* By 2008, the majority of VFR and IFR flights will be required to carry Mode S transponders: Enhanced Mode S in the UK, France and Germany; Elementary in many other States, with the remainder retaining Mode 3A/C secondary surveillance radar. There are likely to remain interface problems with new or legacy systems, and clearly there will be three different categories of functions. Nevertheless, it would be hard to argue that these systems will not be 'interoperable'; data will be able to be exchanged in real time over European networks using standardised formats. The deployment might also be regarded as cost effective, as it takes into account the different operational needs in different regions.
 - *Flight Data Processing.* There are currently three major developments in progress: 'eFDP/FI', 'iTEC-FDP' and Maastricht UAC. There are also efforts to ensure a basic level of interoperability between them³². 'eFDP/FI' and 'iTEC-FDP' are two common procurements and there are clearly risks as to whether they will be interoperable with each other. Given the focus on this by the Commission and Eurocontrol, we might assume that the risks can now be controlled. The concern for the European ATM network, however, will be the degree to which these systems can provide a platform for future operational concepts. Through these common procurements, FDP interoperability may be provided for the medium term, but not the longer term.
- 3.85 If the focus of implementation is rather on "*ensuring the coordinated and rapid introduction of new agreed and validated concepts of operations or technology*"³³ it could be argued that more extensive redevelopment would be required. The ATM supplier industry believes the SES will require widespread system re-development; the industry will need to develop systems from 'scratch'. This is argued from an internal

³¹ IEE Rail Professional Network, *INTER-operability or IN-operability, do standards help or hinder?*, Seminar, 19 April 2001.

³² Sofréavia for the European Commission, *ATM-CNS interoperability roadmap final report*, 18 August 2003

³³ Article 1 (3) of the Interoperability Regulation

system interoperability perspective, whereby the internal functions and modules will need to be redesigned, without much hope of reusing software code. The Aircraft European Contractors Manufacturers Association (AECMA) has estimated that these re-development costs may reach €200-300m per year. This cost estimate is difficult to challenge without more in-depth study; however, the FAA's failed procurement of the Advanced Automation System (AAS) gives an order of magnitude comparison. AAS was originally estimated at \$2.5 billion, and to be completed by 1996³⁴. Hence AECMA's estimates, aggregated over 10 years, are of the same order of magnitude as earlier US attempts to develop a new system from scratch.

- 3.86 For the purposes of this work, we have assumed that the costs of moving to this higher level of interoperability are not necessary requirements of the SES. While the new concepts and technologies are the focus of Eurocontrol work, there is uncertainty as to which of them should be implemented and how they will bring benefits to ATM. We have therefore not investigated the potential benefits any further, nor included them in our overall assessment. We note, however, that this enhanced level of interoperability may be required for one of the possible ways in which FABs could be implemented, discussed in the next section. For the purposes of assessing the costs of this implementation method, we have estimated the costs of achieving this higher level of interoperability as €250m a year for the eight years 2005-2012, based on estimates from AECMA, but we have not included this in our estimates of the cost of implementing the SES.
- 3.87 The financial benefits of reaching the lower level of interoperability are likely to be as follows:
- Reduced procurement costs for purchasers: ANSPs should save costs in developing detailed procurement specifications as they can refer to industry standards and specifications; this has been estimated as leading to a 5% reduction in future system procurement costs.
 - Lower system adaptation costs for ANSPs, through a reduced need to adapt available 'commercial off-the-shelf' systems: The potential lower costs of system adaptation have been estimated from one supplier's view that around 20% of ACC system costs were incurred in such adaptation to the particular requirements of the customer. We have estimated that half of these costs might be avoided through common standards and specifications. This would result in a 10% reduction in system procurement costs.
 - Economies of engineering support, through shared resources, lower specialisation and increased outsourcing opportunities: We assumed each ANSP adopting interoperable systems would be able to achieve a 5% reduction in ongoing engineering costs, both through internal economies with common systems, and through pooling or outsourcing resources with other ANSPs operating the same systems. We assumed that the reduction could be achieved over two years, and that no redundancy costs would be involved; the relatively small reduction could be achieved by natural wastage.

³⁴ The programme was partly abandoned though, and the US General Accounting Office (GAO) estimated that \$1.5 billion was wasted: only \$1.1 billion worth of the work done on AAS was reused in the successor programs.

- Improvements in sector productivity through improved inter-centre coordination: The PRC's US-Europe study³⁵ identified inter-centre coordination as a possible reason for the lower ATCO productivity in Europe; there was a higher workload created in handing over traffic between centres in Europe than the US. The US experience is that the hand-over workload is the same intra-sector as inter-centre. Although there is no quantitative evidence for this, it is likely that system interoperability plays some part in bringing about the higher level of performance US performance. We estimated the benefit of this as follows:
 - From a previous study³⁶, we assumed that the average time taken to control 100 aircraft is 116 minutes, of which about 10 minutes are spent on coordination tasks. The proportion of controller time spent on coordination is hence assumed as 10/116, or 9%;
 - We estimated that about 30% of this coordination would be between centres, so around 3% of total controller workload was dedicated to inter-centre coordination;
 - We estimated that improved interoperability would halve the inter-centre coordination time required;
 - We applied this reduction in inter-centre coordination time to the number of sector hours in the European system, to determine a reduction in sector hours; and
 - We then valued this reduction in sector hours at the average cost per sector hour, based on ACE 2001 figures. For 2001, this gave a figure of about €33m. We then grew sector hours in line with the forecast growth in traffic and applied the financial benefit from 2010. Because improved coordination would only occur as more and more ANSPs adopted interoperable systems, we applied the benefit incrementally from 10% of the full estimated benefit in 2010 to 100% in 2019.

3.88 In addition, there may be benefits from operational flexibility, through, achieving the operational improvements of functional airspace blocks without a need to consolidate Area Control Centres (ACCs). We have explored this scenario in the next section on functional airspace blocks, through the 'dynamic airspace control' scenario, which assumes that centres remain as they are, but act tactically as a single ACC.

3.89 In addition, there may be other areas of benefit that are difficult to quantify within the scope of this study.

- support to the 'free' movement of controllers, by achieving cost savings in training through a common Human-Machine Interface (HMI), and common procedures;
- greater competition in the provider market, whereby ANSPs might supply services remotely;
- greater competition in the equipment supplier market, implying cost savings for ANSPs; and

³⁵ PRC, *A comparison of performance in selected US and European en-route centres*, May 2003

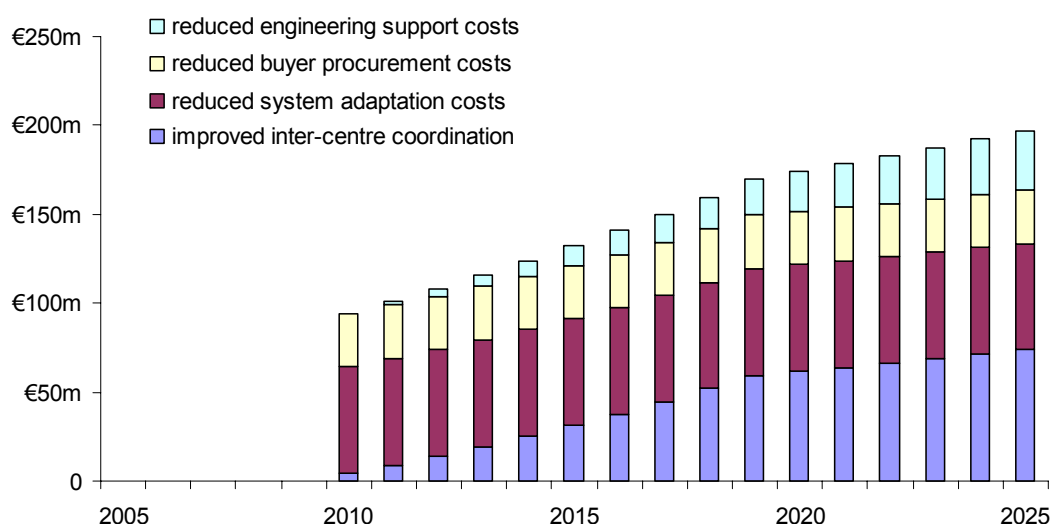
³⁶ Helios Technology for the European Commission, *Roadmap for the implementation of data link services in European Air Traffic Management (ATM): Application Assessment*, October 2002.

- more rapid development and implementation of new concepts, bringing forward their benefits..

3.90 The costs and benefits will also depend on the timing of implementation. The least-cost scenario of implementation would be to implement new interoperable systems **at the end of the economic lives of existing systems**. This would result in a relatively slow spread of the benefits through the system. The benefits of this scenario are illustrated in the figure below. An alternative scenario would involve the more rapid introduction of interoperable systems. This would entail major additional costs, as systems would be replaced prematurely, but would bring forward the achievement of the operational benefits. We examined the costs and benefits of accelerated implementation, and concluded that early achievement of the benefits discussed above would not justify the cost of premature replacements of systems. In practice it is possible that the implementation rules to be drafted would require the introduction of interoperability on a specified timescale that would require such accelerated implementation.

3.91 We note also that an automatic acceleration of interoperability would be brought about if Functional Airspace Blocks (FABs) were introduced through the building of new consolidated centres. This would bring the accelerated interoperability benefits without extra costs. On the other hand, some of the benefits ascribed to interoperability would be reduced by the introduction of FABs – for example, the benefits of improved inter-centre coordination would be reduced if the programme of implementing FABs reduced the number of centres. On balance, we have assumed that these effects cancel each other out and have not attempted to quantify either.

FIGURE 3.4 POTENTIAL FINANCIAL BENEFITS OF THE INTEROPERABILITY REGULATIONS



High-cost items - Functional Airspace Blocks

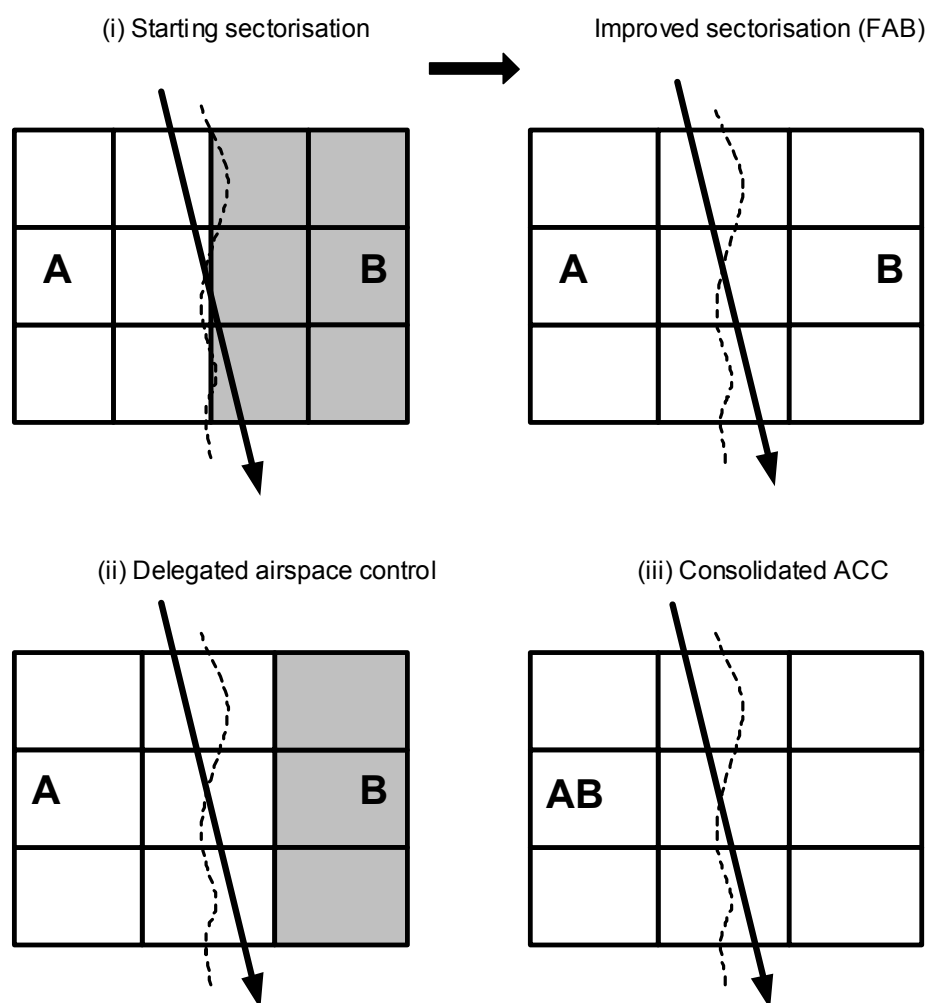
3.92 The SES legislation requires the upper airspace above FL 285 to be reconfigured into Functional Airspace Blocks (FABs). The regulations also place requirements on the intended outcome of an FAB including, among other things, the following:

- optimal use of airspace accounting for air traffic flows;
 - justification by their overall added value, on the basis of cost-benefit analyses;
 - a fluent and flexible transfer of responsibility for air traffic control between air traffic service units.
- 3.93 The European Commission has recently issued a mandate to Eurocontrol to investigate the key issues in developing functional airspace blocks. There are clearly system-wide issues that need to be addressed: operational, technical, economic, financial, social, organisational, legal, institutional and military requirements all need to be coordinated. This work is likely to lead to a separate mandate on the development of common general principles for the establishment and modification of FABs.
- 3.94 The legislation itself however is not prescriptive about how FABs should be managed. Some examples of blocks of airspace that are at least in part based on operational requirements rather than national boundaries already exist. Maastricht Upper Area Centre (MUAC) controls upper air space over the territories of Belgium, Luxembourg, the Netherlands and north-west Germany. Skyguide, from its Geneva ACC, controls a substantial amount of French airspace. Larger countries have divided their airspace into blocks that may at least in some respects already be functionally optimal.
- 3.95 There are further plans for similar airspace blocks that fit some of the criteria for FABs. The upper airspace over eight central European nations is planned to be controlled from a single centre – the Central European Air Traffic Services (CEATS) Upper Air Centre. Similarly, upper airspace over Denmark and Sweden is planned to be controlled from a new Nordic Upper Air Centre (NUAC).
- 3.96 These blocks do not, however, fulfil all the high-level criteria for FABs established in the SES legislation. Many of their horizontal boundaries are still determined by national sovereignty, and there is no evidence that their external boundaries, either vertical or horizontal, have as yet been fully optimised. Nevertheless, they provide models for exploring some of the costs and benefits of FABs.
- 3.97 The Maastricht and CEATS models have a common feature; they consolidate control of upper airspace into an **additional** centre, whilst retaining separate centres for lower airspace control. The Swiss model, whereby the boundaries between national ANSPs are altered from national boundaries to improve operational efficiency, preserves existing centres while moving towards a functionally oriented airspace organisation, is different, however; it results from a desire to improve operational efficiency by altering the boundary of existing airspace. The NUAC model has many of the characteristics of the Swiss model, although the adjustments are on a much larger scale, and the boundaries of the airspace block are still those of national airspace. The new Upper Air Centre in Malmö was originally planned to cover the whole of Swedish airspace. Its capacity was such, however, that it was adequate to control airspace in Denmark, Norway and Finland as well. These three countries were invited to cooperate in the project, with Denmark having agreed, and Norway and Finland for the moment reserving their position.
- 3.98 Other models could also be envisaged. Instead of confining the consolidation to upper airspace, and thereby maintaining or even increasing fragmentation, fragmentation could be reduced by consolidating existing centres. This could be done in upper

airspace, lower airspace, or both. Recent examples of consolidation of lower airspace centres have taken place in Germany, and more are envisaged, although in these cases national boundaries have continued to form part of the boundaries of the blocks, so they are not strictly FABs. It has been observed that confining FABs to upper airspace tends to reduce flexibility and productive efficiency, by reducing the scope for collapsing sectors at off-peak times.

- 3.99 In our analysis we therefore distinguish between the design of the FAB and the way it is managed, although of course the proposed management arrangements will affect the optimal design. In this sense, we assumed the functional airspace block to be the optimal sector configuration for efficient traffic flows. This is illustrated in part (i) of Figure 3.5, which shows two centres, A and B, which are adjacent but either side of national boundaries. The bold arrow in the figure shows the predominant direction of traffic. The creation of a functional airspace block would then support a more efficient cross-border sectorisation. It would also enable a redistribution of traffic flows to reduce the distance travelled by flights within the airspace block.

FIGURE 3.5 FORMS OF FAB IMPLEMENTATION – DELEGATED CONTROL AND CONSOLIDATED ACC MODELS

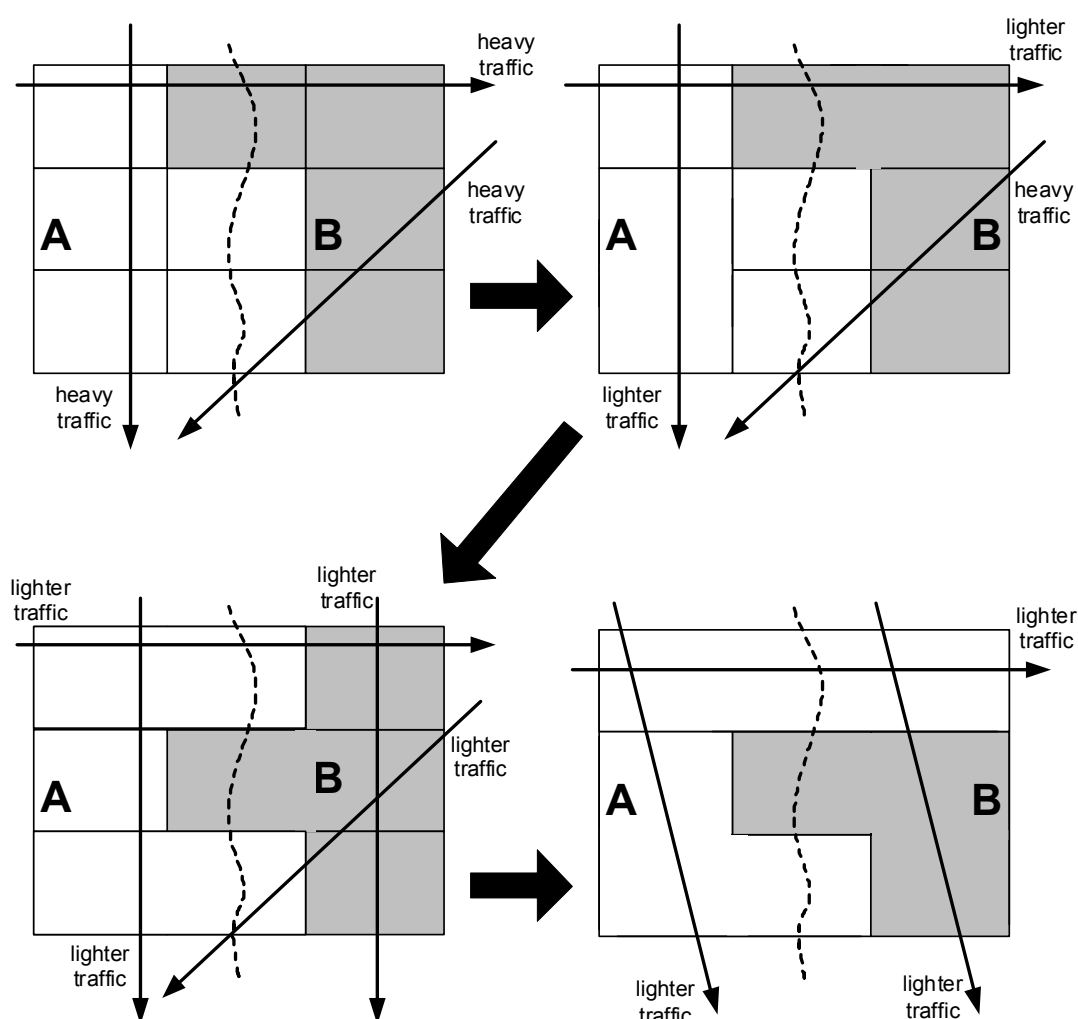


3.100 The implementation could then take a variety of forms, as follows:

- *Adjustment of boundaries to improve operational efficiency.* This is the model adopted in Geneva ACC, involving the **delegation** of control over some sovereign airspace to a non-national ANSP. This is illustrated in part (ii) of Figure 3.4, which shows the delegation of some airspace control from centre B to centre A. Depending on the individual centres, there does not need to be any net transfer of airspace control. The early stages of NUAC provide a good example of this. Danish upper airspace will be transferred to Malmö, while there is a parallel proposal (the Skane project) in which some Swedish lower airspace will be controlled from Copenhagen.
- *Consolidated air traffic control centre.* Here a new larger centre is created (or evolved from existing facilities), and all but one of the remaining centres are decommissioned. We have assumed that in this case one of the existing centres would be upgraded for contingency reasons, and possibly also for lower airspace control and as a training centre. While the new consolidated centre would have the requisite system redundancy, this contingency backup centre would be available in the event of catastrophic system failure. The **consolidated centre model** is illustrated in part (iii) of Figure 3.5 and is similar to the Maastricht or CEATS concept, except that we assumed that lower airspace would be included.
- *Dynamically delegated airspace control.* In this model, the functional airspace block would cover the airspace of two or more states, and might be controlled from two or more centres. Sectors would be defined dynamically in response to prevailing traffic conditions, so that a given area of airspace would not necessarily always be controlled from the same centre – it would depend upon the sectorisation. This **dynamic airspace control** model is illustrated in Figure 3.6, which shows the centres reducing sectors in response to variation in traffic volume and orientation. The four diagrams demonstrate how both sectorisation and the control of airspace can be altered in different traffic conditions. A number of centres would therefore be acting effectively as a “virtual” ACC. This would require a high degree of interoperability, which might be achieved in two ways:
 - extensive development of new, highly interoperable systems at the higher level of interoperability defined in the previous section; or
 - all the centres procuring the same air traffic control equipment and systems – this may require some premature renewal of systems.

3.101 The above implementation models do not explicitly include the current models for CEATS, Maastricht and NUAC. However, the consolidated centre model draws heavily on them. In the timescales of our study, we assumed there would be a move towards consolidation of the lower airspace. Although this is not a mandatory requirement in the regulations, many stakeholders commented that the main benefits of SES are unlikely to be achieved otherwise.

FIGURE 3.6 FORMS OF FAB IMPLEMENTATION – DYNAMIC AIRSPACE CONTROL



3.102 The costs and benefits of implementing FABs were assessed using a consistent scenario of implementation of FABs based on that assumed in a recent Commission study³⁷. This does not imply that we regard this scenario as either optimal or likely; rather, it provides a basis for the illustration of order-of-magnitude financial impacts, which are the focus of our work.

3.103 In practice, this or any scenario of implementation of FABs for the whole of the SES will be accomplished using a mix of the implementation methods described above. It is not possible at this stage to assess which methods are appropriate for the different blocks, and we have therefore selected an illustrative mixture of implementation methods. In the following paragraphs we describe how the costs for the different implementation methods have been assessed.

3.104 Costs for the **consolidated centre** implementation model were assessed as follows:

³⁷ Sofréavia for the European Commission, *FDP institutional issues study*, 11 July 2002.

- The implementation costs of the new centres were based on an average cost per sector known from NUAC and CEATS estimates³⁸. This cost was about €4m per sector. There would clearly be differences in actual costs of particular centres in practice, depending on system complexity and legacy systems in each case; we believe this, however, to be a reasonable working assumption for our purposes. A reduction in the number of sectors was assumed (see the discussion below on benefits), but sufficient capacity was assumed to allow for traffic growth.
- We allowed a factor of 10% of the implementation costs for project definition. Decommissioning of the redundant centres was estimated as 20% of the estimated cost of implementing the new centres: hence, for example, a seven-sector centre would be estimated as costing €28m to implement and €5.6m to decommission. These costs include the necessary building and technical decommissioning.
- The consolidation is likely to involve staff redeployment, relocation and redundancy. Redeployment and relocation costs were assumed to be within the estimates of decommissioning costs used above. We assumed that the cost reductions would be accompanied by a need for 20% fewer staff, compared with levels without the FAB. 5% of this would be achieved through natural wastage. We assumed that the remaining reduction would require an average of 1 year's redundancy pay per staff member no longer required. In practice, the actual number of redundancies could be much lower, depending on the level of natural wastage achieved.
- We assumed that one of the existing ACCs would be retained for contingency or other purposes, which would be upgraded at an average cost of €3m rather than €4m per sector, as no new buildings would be required. We assumed that the contingent centre would have 75% of the sectors of the main centre.

3.105 In practice there are a number of possible contingency arrangements and it may even be possible for functional airspace blocks to share contingency centres. Such issues are beyond the scope of this study however, and the above assumptions set out the broad possibilities and order of magnitude costs.

3.106 We took a view on likely different implementation dates in creating the new centres, based on a common assumption that they would take five years to implement. The following table summarises the scenario. Nine FABs are assumed to cover 99% of SES airspace. The table shows the airspace and number of sectors required for each FAB. We have not otherwise identified FABs, so as not to detract from the purpose of this work in developing order of magnitude costs. The costs of the 'consolidated' centre model are also included for illustration of their order of magnitude.

³⁸ Integra Consult for the Nordic UAC Project Group, *Nordic Upper Area Control Centre Project, Phase 1 Report, Appendix 11*, 12 December 2002.

TABLE 3.22 ASSUMED ILLUSTRATIVE SCENARIO OF FAB IMPLEMENTATION

FAB	Airspace thousand km ²	Cumulative % of SES	FAB sectors	Costs €m				Operational year
				Develop FAB	Implement FAB	Decommission centres	Upgrade contingent centre	
1	1,902	17%	55	22	224	59	127	2013
2	390	20%	94	38	383	87	217	2015
3	1,159	31%	69	28	281	98	159	2015
4	2,971	57%	46	19	187	84	106	2015
5	1,237	68%	77	31	313	86	178	2016
6	418	72%	41	17	167	36	95	2017
7	583	77%	14	6	57	50	8	2017
8	2,010	95%	62	25	252	79	143	2018
9	387	99%	25	10	102	60	58	2020

Note: Some of the FABs envisaged are partly outside the present SES boundaries. The column giving km² of airspace refers to the total covered by the FAB; the cumulative proportion of SES airspace refers only to that within the SES.

- 3.107 The costs of the **delegated** airspace control form of FAB were believed to be much lower, of the order of the project definition costs of the consolidated centre FAB (that is, 10% of the implementation costs of the consolidated centre model). No additional infrastructure is required; the airspace reconfiguration leads to fewer sectors required overall, so sufficient capacity is maintained with existing infrastructure. Staff reductions or reduced staff growth could be achieved without major redundancy or relocation. The estimated costs per sector amounted to around €300,000. However, implementation of this method is dependent on there being opportunities for improvement by delegation. It can only therefore be implemented piecemeal and opportunistically, and cannot form the basis for a system-wide introduction of FABs such as that described in the Sofréavia study. This method may be a much faster and cost-effective route to efficiency gains than large-scale consolidation.
- 3.108 The costs of the **dynamic** airspace control FAB based on common systems were assumed to be the same as the consolidated ACC, excluding the costs of the new control room. This assumes the centres in question already have sufficient space to make upgrades. Each centre would then upgrade with the same ATC system. Implementation using this method is assumed to be one year later than that for the consolidated centre model; it was assumed to require achievement of the lower level of interoperability discussed in the previous section.
- 3.109 Alternatively, the FAB could be achieved through the higher level of interoperability available once the next generation of ATC systems had been developed. We estimate that the earliest this could be achieved is 2017. The development costs of the higher level of interoperability (around €2 billion) are a prerequisite of this implementation scenario. However, the implementation costs of this method are relatively low – they involve only reconfiguring of the systems to allow definition of new sectors. Since the need to achieve this level of interoperability will postpone the achievement of FAB

implementation by this method, we have not included it in our illustrative mix of methods.

- 3.110 The benefits of the functional airspace blocks arise from the improved sectorisation and traffic flows. We have not assumed that these differ greatly according to the different implementation methods; the different implementation methods yield similar financial benefits, which mainly differ according to their timing and the level (and hence feasibility) of industry restructuring that would be required in order to implement them. The benefits are assumed to accrue immediately following the operational service date of the functional airspace block. This is assumed to be:

TABLE 3.23 IMPLEMENTATION DATES ASSUMED FOR FAB IMPLEMENTATION

	First FAB operational	Last FAB operational
Consolidated	2013	2020
Dynamic (common systems)	2014	2021
Dynamic (high interoperability)	2017	2024

- 3.111 As mentioned previously, we have assumed different FABs are implemented at different times according to complexity and other factors. There are clearly issues over the feasibility of the different models, both in technical and political terms, which are beyond this study. These issues are likely to be considered by Eurocontrol following the Commission's mandate on FABs.
- 3.112 The main financial benefits, discussed in turn below, are believed to be:
- lower operating costs;
 - increased flight efficiency; and
 - potentially, increased ANSP allocative efficiency.
- 3.113 We have assumed that the **lower operating costs** derive directly from the lower number of sectors needed to operate a functional airspace block. The assumed 20% reduction in sectors has been assumed to give rise to a 20% reduction in operating costs. The resulting annual benefits are of the order of €1 billion by 2010, rising to €1.5 billion by 2020.
- 3.114 The PRC estimated³⁹ that on average, routes under current airspace organisation were 8.9% horizontally longer than direct routes. However, as parts of the flight are 'uncompressible', the PRU roughly estimated that the potential for **increased flight efficiency** from reorganised airspace was roughly 2-5%. We applied an improvement of 2% and therefore assumed a reduction in flight-hours by 2% per year following the implementation of each FAB.
- 3.115 The reduction in flight time was valued in a similar manner to that of flow management delay. The annual financial saving was valued at €40 per minute⁴⁰, or

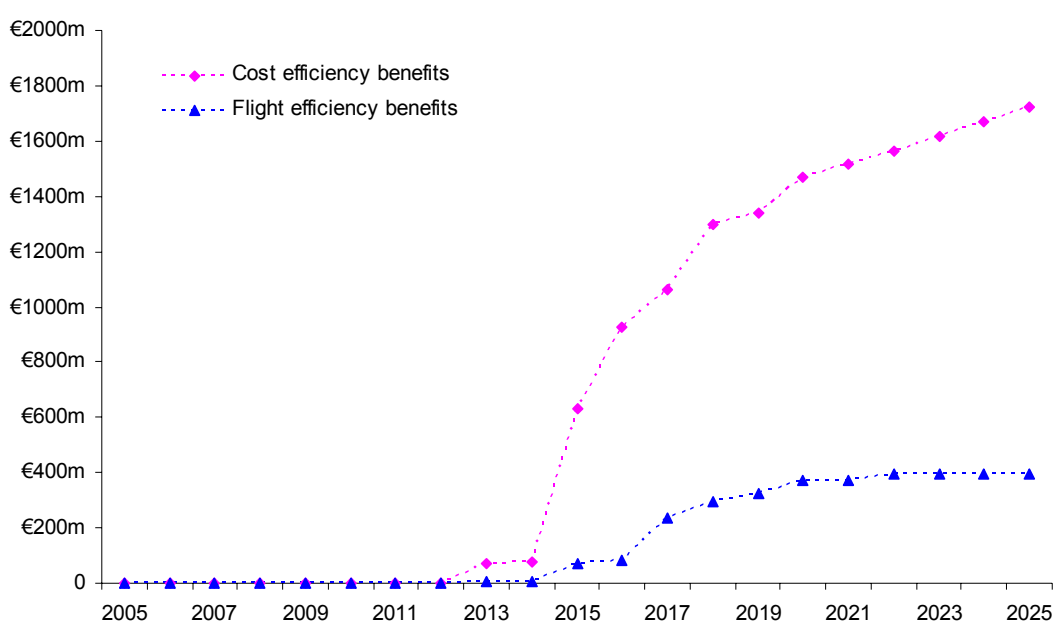
³⁹ PRC, *Performance Review Report 6*, 1 May 2003

⁴⁰ Institut du Transport Aérien, *Costs of air transport delay in Europe*, November 2000.

around €400m a year for all functional airspace blocks. However the first two years were valued at 20% of this, to correspond to savings in short term variable costs such as fuel and maintenance. This assumes the full benefits would take effect once the shorter flight times were reliable and consistent and carriers made adjustments to their operations and hence their staff and equipment costs.

- 3.116 The potential for **increased ANSP allocative efficiency** arises from centres' need to adapt resources to demand variations, opening and closing sectors according to the daily and hourly traffic flows. However we did not make estimates of their efficiency gains as we have no evidence to suggest how activity might change. If a larger centre, built to manage a FAB, replaces one or more very small centres (say with fewer than six sectors) it might be expected to have greater flexibility in opening and closing sectors. However, two stakeholders have commented that they believe that flexibility will *decrease* in some respects, as there will be fewer sectors (20% fewer in our estimates) to be flexible with. Splitting upper airspace from lower airspace could also reduce flexibility, unless there is also parallel consolidation in lower airspace, as in the Skane project. It may be that consolidating smaller centres into FABs increases flexibility, but consolidating larger ones decreases it.
- 3.117 The following figure summarises our estimates of the benefits of lower operating costs and increased flight efficiency.

FIGURE 3.7 POTENTIAL BENEFITS OF FUNCTIONAL AIRSPACE BLOCKS

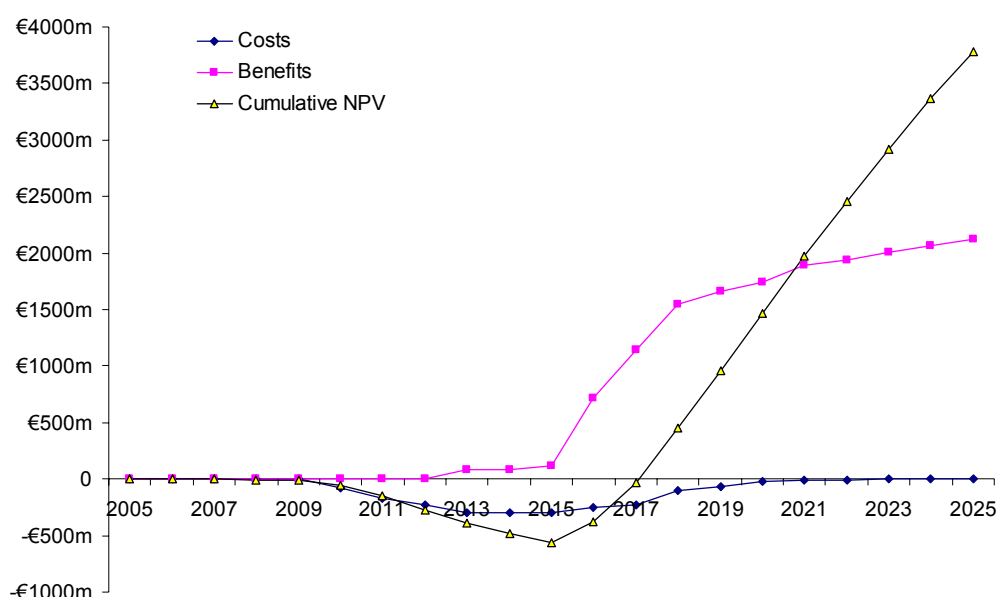


Costs and benefits of FABs

- 3.118 In this section, we compare the financial costs and benefits of the SES using the different implementation methods. Figure 3.8 illustrates the costs and benefits of the scenario of FABs assuming implementation through a mix of the consolidated centre model, the delegated model, and the dynamic airspace control model achieved through common systems. The dynamic airspace control model achieved through high

interoperability has not been included because of the need for high system-wide up-front investment, which has not been included in our assessment of SES impacts. We note, however, that there are additional benefits of this implementation method in terms of enabling future concepts, as discussed in the section on interoperability. The interoperability is assumed to support a high level of flight data functions, enabling, for example, 4D trajectory negotiation.

FIGURE 3.8 COSTS AND BENEFITS OF FABS – ILLUSTRATIVE MIX OF IMPLEMENTATION METHODS



- 3.119 The figures illustrate the very long lead times for these investments, and hence highlight the need for appropriate financing mechanisms to enable them to be undertaken efficiently. The relevant mechanisms are discussed later in this report. The results are summarised in the next table, which gives present values of financial costs and benefits from 2005 to 2025, discounted to 2004.

TABLE 3.24 PRESENT VALUES OF COSTS AND BENEFITS FAB IMPLEMENTATION

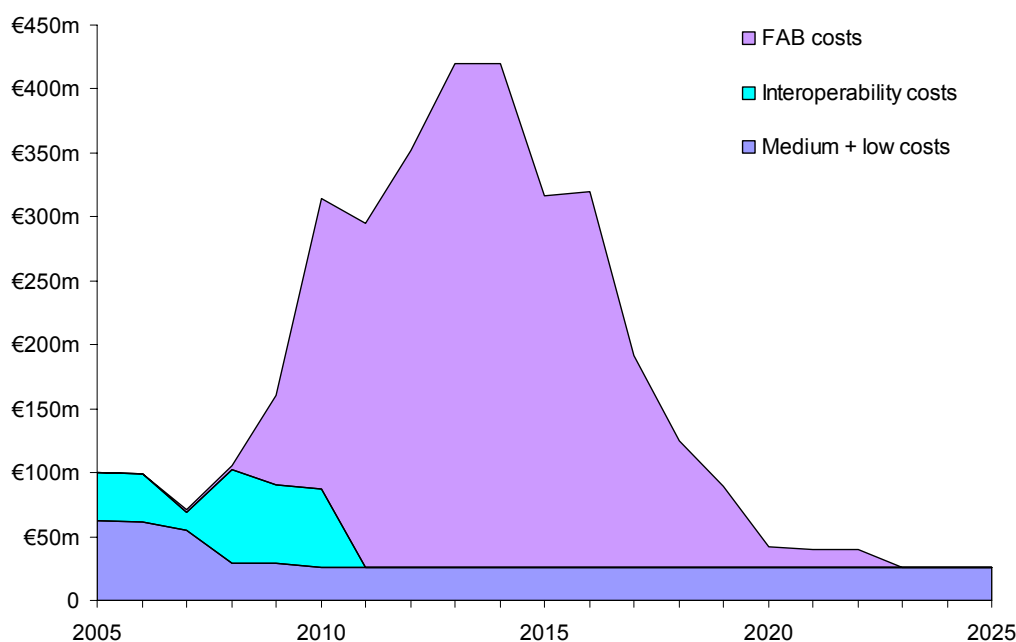
Implementation method	Cost (€m)	Benefit (€m)	NPV (€m)
Illustrative mix of methods	1,277	4,927	3,650

Summary of SES costs and benefits

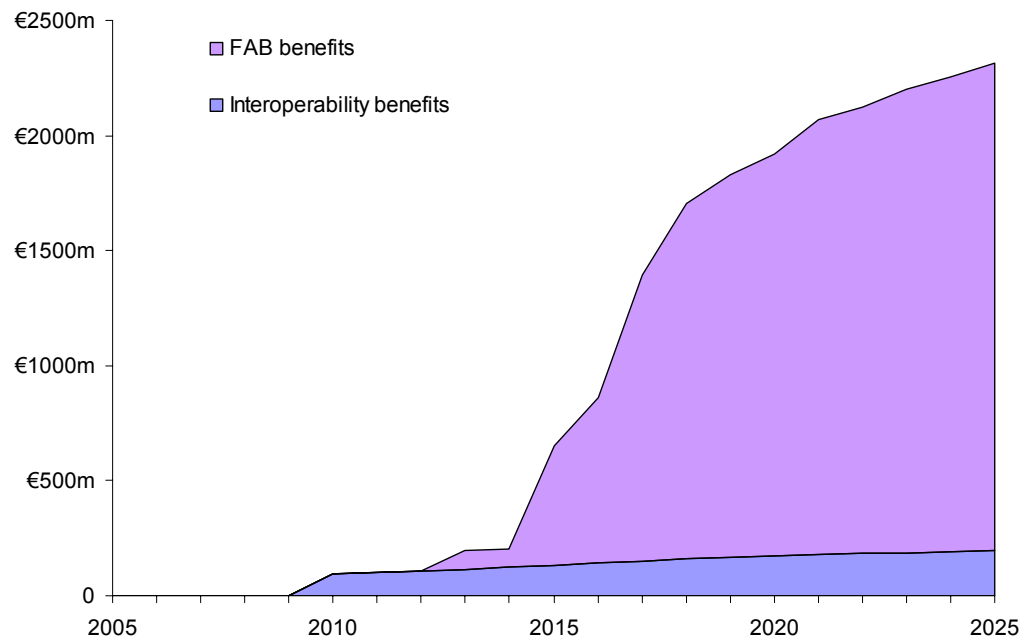
- 3.120 In previous sections we have examined the costs and benefits of individual implications of the SES legislation. In this section we examine the overall picture.
- 3.121 In looking at this overall picture it should be re-emphasised that the estimates we have made are intended to be order-of-magnitude figures only, intended to help us gain some indication of the range of cash flow implications of the SES requirements.

- 3.122 Figure 3.9 shows the total costs of the measures discussed above. The most important financial impact by far is that of the introduction of FABs. In our analysis we have used the costs for an illustrative mix of implementation methods for FABs. It should be borne in mind that more extensive use of delegation of airspace at FIR boundaries might give beneficial results without such large expenditure and such a long elapsed time. In the shorter-term, the costs of even the lower level of interoperability are significant, and the aggregate costs of the medium and low impact implications, while still small compared to those of the high-impact items, are still appreciable.

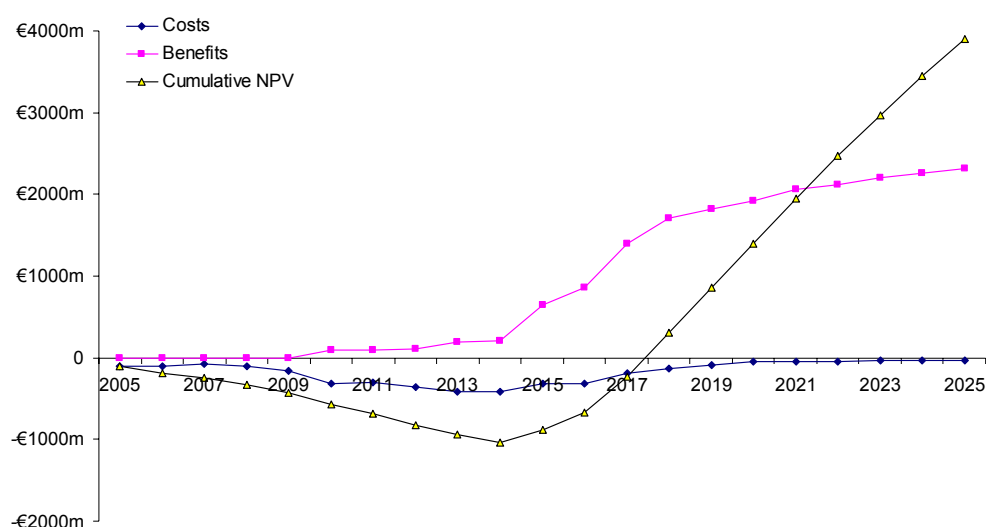
FIGURE 3.9 OVERALL COSTS OF SES IMPLICATIONS



- 3.123 While these figures appear high, they should be put in the context of an overall annual turnover for ANS in the SES countries of over €6 billion, with annual capital investment of around €1 billion. Even at its peak, the investment needed for the fundamental reforms stimulated by the SES is less than 10% of current turnover.
- 3.124 Figure 3.10 shows the consolidated financial benefits of the measures. Unsurprisingly, as with the costs, the largest benefits arise from the implementation of FABs. No financial benefits are shown for the medium- and low-impact items; their benefits are assumed to be either non-financial (such as enhanced safety), intangible or to arise from enabling the high-impact items.

FIGURE 3.10 OVERALL BENEFITS OF SES IMPLICATIONS

- 3.125 Finally, we compare the financial costs and benefits for the measures we have assumed. At this point it should be reiterated that we have not attempted to undertake an economic cost-benefit analysis of the SES programme or of any individual items in it. The estimates are only order-of-magnitude financial impact figures. compares the financial costs and benefit impacts, and examines the discounted net present value of these financial impacts. This shows that, on the order-of-magnitude assumptions we have made, the benefits are long-term ones; the Net Present Value does not become positive until the benefits accruing after 2018 are taken into account.

FIGURE 3.11 COMPARISON OF COSTS AND BENEFITS

3.126 The costs and benefits are summarised in Table 3.25.

TABLE 3.25 SUMMARY OF PRESENT VALUE OF COSTS AND BENEFITS

Class of items	Present values (€m)		
	Costs	Benefits	NPV
Low cost items	21		-21
Medium cost items	340		-340
Interoperability (low scope)	213	984	770
FABs (illustrative mix)	1,277	4,927	3,650
Total, all items	1,851	5,911	4,059

3.127 It is interesting to look at these benefits in comparison to the targets currently being suggested by the Performance Review Commission.

3.128 The PRC has proposed cost-efficiency targets based on unit costs; that is, euro per IFR flight km⁴¹. The proposed targets are an improvement in unit costs of 3% per year in real terms. They believe this is achievable given recent comparisons with the US⁴².

3.129 The US-Europe comparison shows the European ATM system to be currently around 70% more expensive than the US. It also highlights the fact that the US controls twice the amount of traffic, in the same volume of airspace, using present day technology and operational concepts. The PRC believes their cost effectiveness targets to be

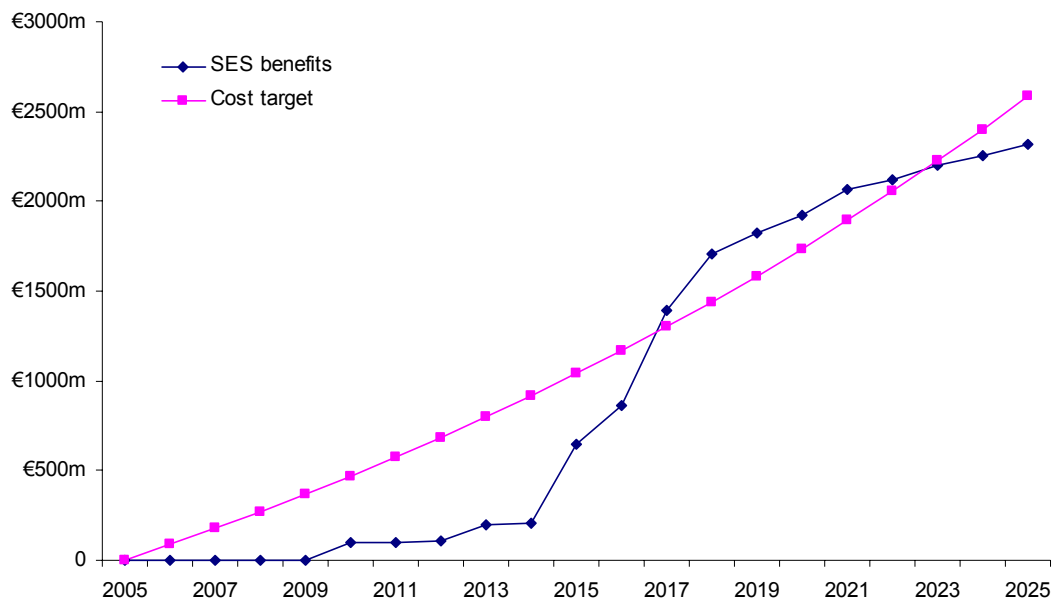
⁴¹ PRC, *Performance Review Report 7*, April 2004

⁴² PRC, *A comparison of performance in selected US and European en-route centres*, May 2003

achievable in this context, and cites the initiatives that may achieve this: the Single European Sky and the revised Eurocontrol Convention. Figure 3.14 compares the benefits of the SES measures as assessed above with those achieved by attaining the target of a 3% annual efficiency improvement. The SES benefit estimates assessed above are of the same order of the proposed cost-effectiveness target.

- 3.130 The levels of cost and benefits should also be viewed in the context of the overall scale of the industry – as described earlier, annual capital expenditure in the absence of these initiatives is already around €1bn.

FIGURE 3.12 COMPARISON OF SES BENEFITS WITH PROPOSED COST-EFFECTIVENESS TARGETS



4. CURRENT FINANCING SCHEMES

Introduction

- 4.1 In this chapter we review current financing schemes. The Terms of Reference require us to obtain a picture of current financial schemes, to be able to identify potential gaps and deficiencies and where relevant propose other possible mechanisms. This review includes a survey of how ATM is financed in each Member State, including different sources of revenues, loans, and subsidies.
- 4.2 The structure of the chapter is as follows. We first examine the background to financing in the 27 SES member states⁴³. We then review the sources of funds available to Member States' ANSPs, and the methods by which external finance is obtained. Finally we review the capital structure of the various national ANSPs, with particular attention to their gearing (where this is meaningful) and to the cash reserves.

Current financing background and mechanisms

- 4.3 Of the 27 states covered by the Single European Sky, all but four are members of Eurocontrol, and one of those four is a prospective member. Member states of Eurocontrol are committed, for en-route charges, to the Eurocontrol Route Charging System. This system requires en-route charges to be set either to recover costs fully (taking one year with the next two) or according to a price-cap mechanism. In practice, Poland follows a similar system. At present it does use the Route Charging System but is committed, through its forthcoming Eurocontrol membership, to join the mechanism by 2006. The Baltic States are not members, but make some use of CRCO and of similar route charging principles. International Civil Aviation Organisation (ICAO) membership commits all member states to cost-recovery principles.
- 4.4 The position for terminal navigation services is less fully prescribed, although most states follow similar principles of cost recovery or price capping. In some cases, particularly in the new EU members, explicit terminal navigation charges are not made, though in most cases progress is being made towards more uniformity.
- 4.5 The SES legislation provides for the creation of a "common" system of charging for all air navigation services, so further progress towards uniformity will be made. Work is already being taken forward by Eurocontrol in this respect.
- 4.6 While there is therefore generally a degree of homogeneity between the mechanisms currently used, there are differences of detail, some of which are important for this study. These include:
- differences in the way the costs of regulation and the supervisory authority are recovered; in some cases, these are passed on to users, in others they are recovered through general taxation;
 - differences in the practices for charging for military use of airspace; and

⁴³ Excluding Iceland, which agreed to join after the study started

- differences in charging for VFR and other exempt flights.

4.7 We examine such funding differences in Chapter 6.

4.8 ANSPs' borrowings from the state and the market are affected by their corporate status, and the existence of guarantees and funding controls; these differences then also affect taxation payable by ANSPs.

4.9 If future rules for common funding are to be applied equitably, these differences must be fully understood and allowed for.

Sources of funds

Introduction

4.10 This section provides an overview of the sources of funds currently used by ANSPs to finance their ANS operations. We first review the main sources of revenues, then review additional sources of financing used by ANSPs for:

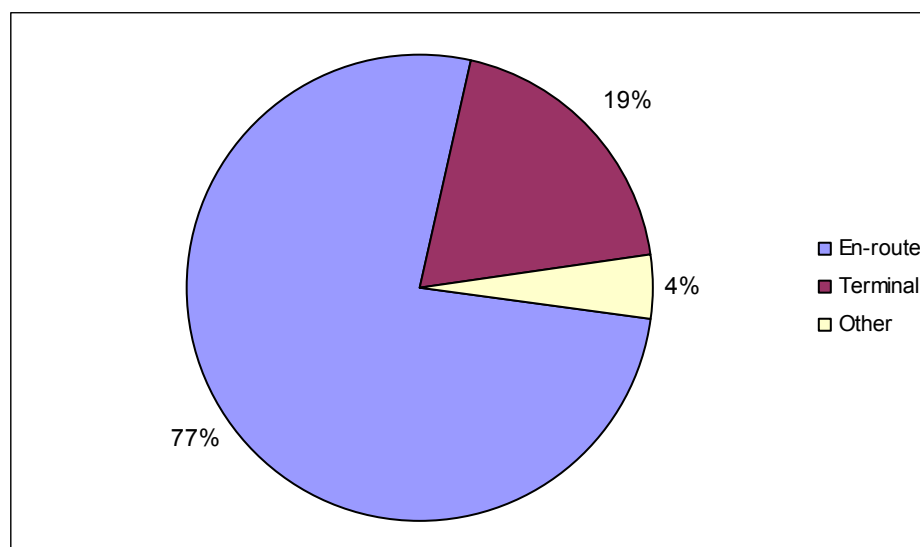
- major investments;
- financing requirements caused by the timing difference between cash outlays for capital expenditure and cash recovery through depreciation and finance components of user charges; and
- under- or over-recovery of costs due to traffic forecasting errors.

Revenues

4.11 The main sources of revenue for ANSPs subject to SES legislation are:

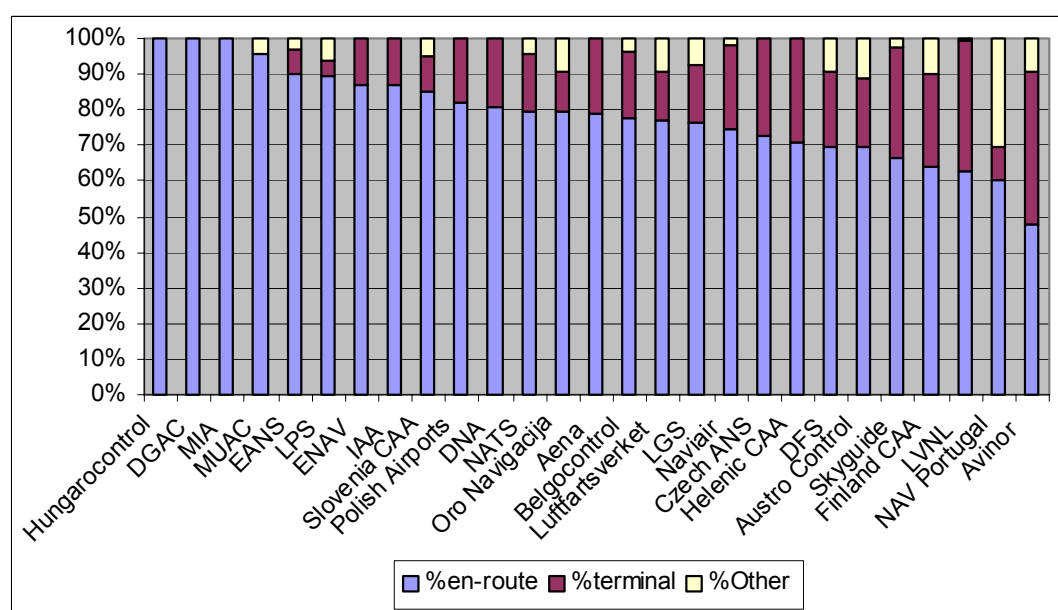
- European en-route charges;
- terminal navigation charges;
- North Atlantic oceanic en-route charges;
- other ANS charges; and
- reimbursement or payments from national Government.

4.12 Figure 4.1 provides an overview of the proportions of revenue derived from en-route charges, terminal and all other sources of ANS revenue in 2001, for all ANSPs in the SES. The data are taken from the ACE 2001 PRC Benchmarking Report, with the exception of the countries who did not disclose information, namely Greece and Cyprus, and Poland, which did not provide information for ACE 2001. For these countries we have used figures supplied to us directly by the respective ANSPs. The ACE 2001 figures do not include oceanic revenues, as oceanic ATM was outside the scope of the ACE exercise. Around three quarters of revenues are received through en-route charges, with a further one-fifth from terminal charges; only 4% comes from other sources.

FIGURE 4.1 SOURCES OF ANS REVENUES FOR SES ANSPS, 2001

*Please note that ACE data in general does not report data from ANSPs Oceanic Businesses. An exception to this is NAV Portugal where in its "Other Revenue" line the PRU includes revenues from the Oceanic Business in the Santa Maria FIR

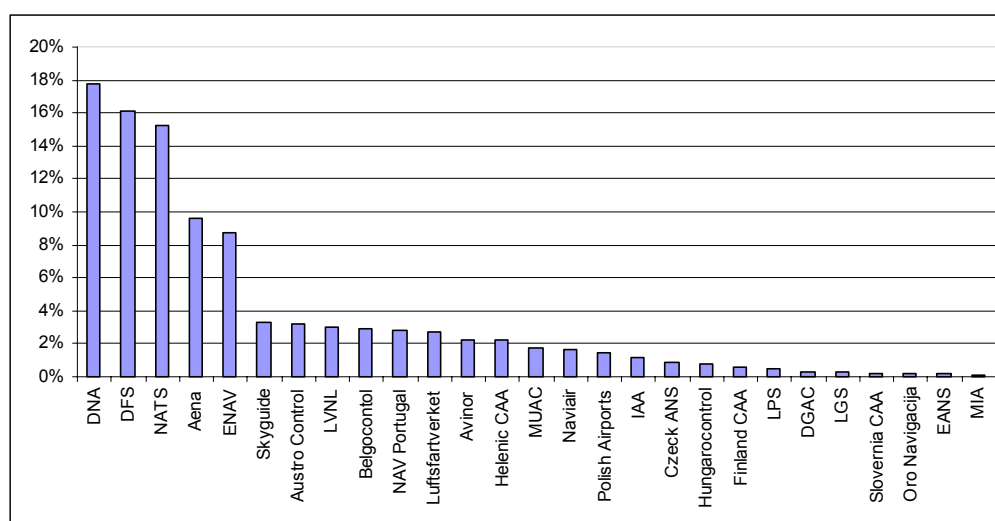
- 4.13 Figure 4.2 shows the split of revenue by source for individual ANSPs. The data used are the same as for the consolidated presentation above. Most ANSPs receive between 60% and 90% of their revenue from en-route charges. There is a considerable variation in the "other revenue" category: almost half of ANSPs receive no income under this category, whereas for other ANSPs it can comprise up to 10% of total revenues, and for NAV Portugal the figure is 30% (note this includes revenues from the Oceanic business of the Santa Maria FIR). Avinor collects over 50% of its revenues from terminal and other charges.

FIGURE 4.2 SOURCES OF ANS REVENUE BY ANSP, 2001

Proportion of total revenues by country

- 4.14 Figure 4.3 shows what proportion each national ANSP, plus Maastricht Upper Air Centre (MUAC), contributed to the total ANS revenue for SES ANSPs in 2001. The data are derived from the ACE 2001 report and include over and under recoveries in that year. For Cyprus, Greece and Poland we have used data received directly from the ANSP. The graph demonstrates that the SES, in terms of ATM revenues is dominated by five ANSPs – DNA, DFS, NATS, Aena and ENAV.

FIGURE 4.3 PROPORTION OF TOTAL ANS REVENUES FOR THE SES BY ANSP



En-route and North Atlantic charges

- 4.15 As shown above, for the majority of SES ANSPs, en-route charges are the main source of revenue to fund their operations. The exception is Norway (Avinor), with less than 50% of its total revenue from en-route charges.
- 4.16 North Atlantic en-route charges are collected by the United Kingdom, Ireland, Portugal, and Norway. Under the SES legislation, it is for each country to determine whether these parts of airspace will form a part of the SES. Portugal wishes to exclude its North Atlantic operations from the SES. From discussions with ANSPs we understand that other States have not yet decided their position.

Terminal navigation charges

- 4.17 The second largest source of revenue for the majority of SES ANSPs is the proceeds of terminal navigation charges (TNCs). However, HungaroControl, the Hellenic CAA, and the Department of Civil Aviation Cyprus do not recover revenues from TNCs, while Malta Air Traffic Services received terminal services charges from the airport and government since 2002 and Slovenia ANSS receives its revenue for terminal services directly from the government.

Other revenues

4.18 The other sources of revenue for SES ANSPs come from charges levied for a range of services including:

- flight inspections services;
- aeronautical publications;
- ATCO training;
- ANS Consultancy services;
- external charges for staff used by other government agencies; and
- rental of buildings and equipment.

4.19 These revenues usually amount to less than 3% of total revenues.

Re-imbursement and payments from government

4.20 A number of ANSPs receive direct income from their government to pay for exemptions, or the support of the provision of certain infrastructure or services – for example regional or small airports' terminal navigation facilities, or retaining 24-hour operations when it is not commercially justified. This is discussed in more detail in Chapter 6.

Additional sources of finance

4.21 In Table 4.1 we provide an overview of the additional sources of funds used by each of the ANSPs in the SES.

4.22 Additional sources of financing need to be found by ANSPs when their cash expenditures exceed their cash receipts from charges and reimbursements. The long-term sources of financing used by SES ANSPs are a combination of Government loans, commercial loans, EIB loans and lease arrangements.

Common mechanisms for additional finance

4.23 The mechanisms that are often used by a number of ANSPs as a source of additional finance are:

- borrowing directly from Government or Government backed credit institution;
- borrowing from the commercial banking sector through loans and bonds; and
- cash reserves and movements in working capital on the ANSP balance sheet.

4.24 With the exception of the ANSPs that are run as departments of the government, most ANSPs finance additional cash requirements through cash reserves and interest received in the first instance, and add commercial or government borrowing when required.

TABLE 4.1 ANSPs' MAIN ADDITIONAL SOURCES OF FINANCE

ANSP	Annual 2000-2002	Long term sources
Austria	Interest receivable, Cash, Cross-border lease	Commercial loans, Government loans, Leasing arrangements
Belgium	Interest receivable, Cash	Government loans, Guarantees
Cyprus	Government budget	Government budget
Czech Republic	Interest receivable, Cash	Cash
Denmark	Government borrowing	Government borrowing
Estonia	Interest receivable, Cash	EIB loans
Finland	N/a	EIB loans, Commercial loans, Leasing arrangements
France	Commercial loans, Cash, Interest receivable	Commercial loans
Germany	Commercial loans, Cash, Interest receivable, Cross-border lease	Publicly listed bond, Commercial loans
Greece	Government budget	Government budget
Hungary	Cash	-
Ireland	Commercial loans, Cash	-
Italy	Cash, Interest receivable	Cash reserves, leasing arrangements
Latvia	Interest receivable, Cash	-
Lithuania	Interest receivable, Cash	Commercial loans
Malta	Commercial loans, Equity injection	-
Netherlands	Commercial loans, Interest receivable, Cash	EIB loans, Commercial loans, leasing arrangements
Norway	N/a	N/a
Poland	None	Commercial borrowing
Portugal	EIB loans, Interest receivable, Cash	EIB loans
Slovak Republic	Cash, Interest receivable	EIB loans
Slovenia	Government borrowing	Government borrowing
Spain	N/a	EIB loans, Government loans, Commercial loans
Sweden	Government loans, interest receivable, Cash	Government loans, leasing arrangements
Switzerland	Government loans, Cash, Cross-border lease	Government loans, Commercial loans, leasing arrangements
United Kingdom	Commercial loans, Interest receivable, Cash	Commercial loans, leasing arrangements

N/a = not available

Supplementary mechanisms used as a source of additional finance

- 4.25 In addition, a number of other mechanisms are occasionally used by ANSPs as a source of additional finance:
- Community funding, through TEN, PHARE, the Cohesion Fund, the Regional Fund, or the Research Framework programme;
 - cross-border leasing;
 - loan facilities provided by the European Investment Bank and European Bank for Reconstruction and Development; and
 - interest receivable from cash and other balances.

Capital structure

- 4.26 This section provides an overview of the range of capital structures used by ANSPs operating in the SES. We subsequently compare these with the non-European ANSPs we have investigated and draw out any implications for the study.
- 4.27 The capital structures we report are for the borrowing organisation. Therefore, for integrated airport and ANS providers, we report the gearing of the total organisation, as these organisations do not usually allocate such corporate debt between ANS and other services.

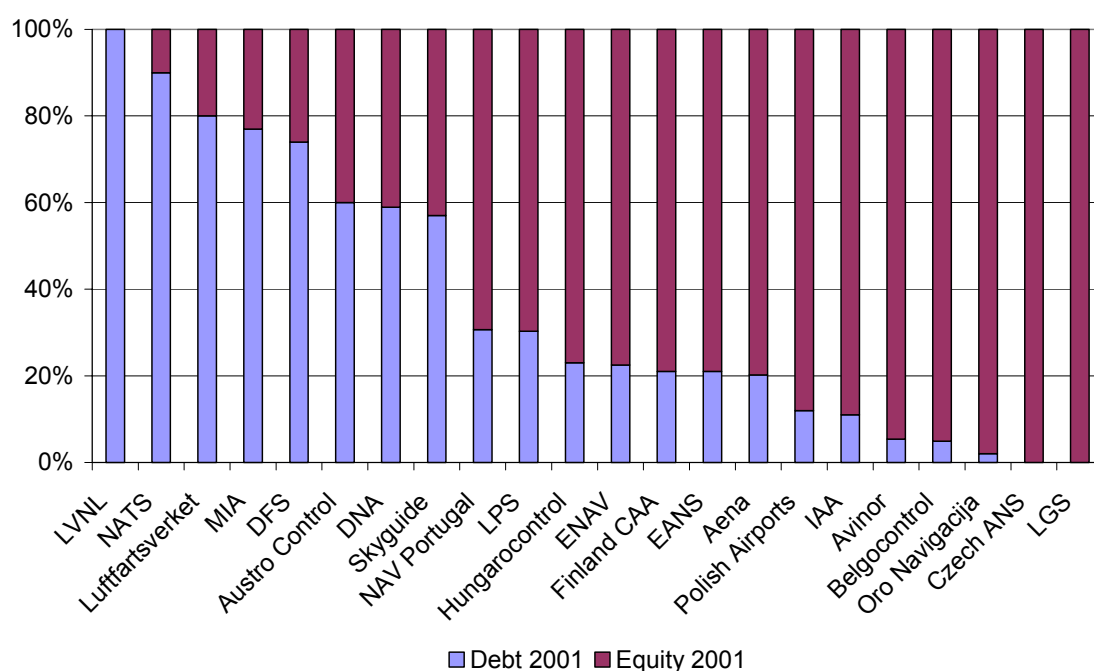
Overview of capital structures used by ANSPs in SES

- 4.28 The capital structures used by ANSPs in the SES fall into the following categories:
- ANSPs that are Government departments (with no discrete capital structure);
 - ANSPs that are predominantly funded through equity (retained earnings and cash reserves);
 - ANSPs that are predominantly government debt funded; and
 - ANSPs that are predominantly funded through commercial debt.
- 4.29 Half the ANSPs fall into the predominantly equity-funded category. The distribution of capital structures is shown in Table 4.2. DNA in France, while a government department, nevertheless may and does borrow commercially, and issue bonds. It is therefore included in the category of commercial debt-funded ANSPs.

TABLE 4.2 CAPITAL STRUCTURES OF SES ANSPs

Government department	Predominantly equity-funded	Predominantly debt-funded	
		Government debt	Commercial debt
DCAC Cyprus	Czech ANS	Austro Control	DFS Germany
HCAA Greece	EANS Estonia	LFV Sweden	Malta Air Traffic Services
ANSS Slovenia	Finland CAA	Skyguide, Switzerland	DNA France
	Irish Aviation Authority		LVNL Netherlands
	LGS Latvia		NATS United Kingdom
	Oro Navigacija Lithuania		
	NAV Portugal		
	Belgocontrol		
	HungaroControl		
	ENAV Italy		
	PPL Poland		
	LPS Slovak Republic		
	Aena Spain		
	Avinor Norway		

- 4.30 In Figure 4.4 we provide an overview of the capital structure in 2001 for those ANSPs for which it is relevant. As shown in Table 4.2, all but eight of these ANSPs have relatively low gearing compared to airlines and commercially operated airports, and are predominantly equity-funded. Information for HungaroControl, Malta ATS, and Avinor (Norway) is only available for 2002 because of changes in their institutional structure. Naviar (Denmark) is unable to provide information on its capital structure.
- 4.31 In general, the trend in 2002 has been for ANSPs to increase their gearing, for example IAA, ANS, and DFS, although Belgocontrol has a policy to eliminate debt from its balance sheet by 2008.

FIGURE 4.4 SES ANSPs' CAPITAL STRUCTURE – 2001

Notes: Figures for MATS (Malta), Hungarocontrol, and Avinor (Norway) are for 2002, because of institutional changes

Overview of capital structures used by non-European ANSPs

4.32 Figure 4.5 provides an overview of the capital structures for those ANSPs outside Europe that we have studied, for the financial year ending within 2003. They range from NavCanada, nearly completely debt-funded, through mainly commercial debt funded Airways New Zealand, to the relatively lowly geared Air Services Australia and Air Traffic and Navigation Services, South Africa. The US Federal Aviation Administration is a Government department and therefore does not have a comparable capital structure. It is wholly funded through government annual budget and reserves.

FIGURE 4.5 NON-EUROPEAN ANSP CAPITAL STRUCTURE 2003***Implications for the study***

- 4.33 There is a clear potential for increasing the proportion of debt funding across a number of the ANSPs of the SES. However, the capital structure is linked to the corporate structure and governance of the ANSP. The SES should increase the pressure on ANSPs to produce efficient costs, which in turn will lead to ANSPs examining the efficiency of their capital structure. This is likely to result in the opportunity for increasing the financial gearing where this is efficient. However, for ANSPs who currently do not pay any dividends, this may not be the case.

5. WHY IS FINANCING AN ISSUE?

Introduction

- 5.1 The vast majority of the ATM industry in Europe is allowed to recover its costs fully from users, taking one year with the next two. It is legitimate therefore to ask why financing is an issue. If ANSPs can recover all their costs, there should not be any problem with financing. In this chapter, we explore this issue briefly and consider some evidence that sheds some light on the question.
- 5.2 Our initial review of this question, and discussion with various classes of stakeholders, confirmed its legitimacy; a number of ANSPs, governments and users reiterated it to us. We were able to identify a number of reasons why financing might be an issue worth considering:
- the timing of cash flows;
 - the charging system makes financing requirements sensitive to external shocks;
 - constraints on financing of investment;
 - the distribution of costs and benefits may not be the same;
 - user resistance to cost increases may cause sub-optimal behaviour; and
 - there are no financial incentives to work towards net benefits, especially system-wide benefits.
- 5.3 In addition the European Commission believe that there are specific constraints where:
- investments have very long term returns (that is, high up-front costs with the potential for significant long-term financial benefits); and
 - investments across the industry (provided by different stakeholders) require some synchronisation in their timing.
- 5.4 Furthermore, the continuing dominance of the full cost recovery system for charging is not assured. One major ANSP, NATS, is already under a modified form of price-cap regulation, in which risks are shared between the users and the ANSP. The SES legislation explicitly permits (but does not mandate) a move to more incentive-based charging, which will necessarily, if adopted, change the risk allocation between funders and ANSPs.
- 5.5 On the first three of the issues in paragraph 5.2, we have collected evidence, and in the rest of this chapter we examine whether this sheds any light on their importance.

The timing of cash flows

- 5.6 The current principle of cost recovery, as embodied in the Eurocontrol Route Charging System, requires that ANSPs fund their own investments. Capital expenditure may not be recovered through user charges as it is incurred. Instead it must be recovered through an allowance for depreciation and finance costs.
- 5.7 In principle, this could give rise to a problem if cash requirements significantly exceeded cash availability. At certain points in the investment cycle, especially with the lumpy investment characteristic of ATM, this effect could be significant,

particularly as depreciation charges are not permitted to be recovered until the asset becomes operational, and in some ANSPs a large proportion of assets are under construction at some points in the investment cycle. To assess the size of this effect, we looked at the relationship between capital expenditure and depreciation for 26 ANSPs for the years 2000-2002.

- 5.8 Table 5.1 provides an overview of the data collected. We have been able to collect the information for 22 ANSPs. Not surprisingly, different ANSPs over the period studied are at different parts of their investment cycle. Moreover, management's reaction to traffic downturn in 2001 and 2002 may have been to rein in some of the planned cash capital expenditure. Of the 22, twelve ANSPs required additional financing above their depreciation charges, while ten countries incurred capital costs below depreciation charges. The net financing requirement over all these countries was €332m, compared to a total capital expenditure of €2,133m, around 18%. This was influenced by large financing requirements from DFS, IAA, ENAV, LFV and Skyguide over the study period. In most cases capital additions were similar to depreciation charges. However, in some, the required excess funding over the three years exceeded that recovered from users by a considerable multiple (around 4 in IAA, and 6.5 in MATS).

Sensitivity to external shocks

- 5.9 The years 2001 and 2002 saw the most serious downturn in traffic European aviation has experienced for a very long period. It is therefore an excellent testbed for hypotheses about the impact of current charging and financing methods when faced with an external shock.
- 5.10 We analysed the impact of these events on ANSPs and users, using CRCO submissions for 2001, 2002 and 2003. Our broad conclusions are that even an extreme shock of this kind does not place intolerable pressure on the financing system. Details of our analysis are shown in Appendix C.

Constraints on financing

- 5.11 In general, the majority of ANSPs do not perceive any significant constraints on their financing under the existing arrangements. Under the cost recovery charging regime, the commercial banking community perceives ANSPs as low-risk customers. This can be demonstrated by the favourable credit ratings applied by Moody's and Standard & Poor's for ANSPs seeking commercial borrowing.
- 5.12 However, ANSPs have identified some constraints:
- capital availability limited by competing uses;
 - Government budget or borrowing limits;
 - financial covenant ratios;
 - specific tax constraints in some individual states; and
 - limitations on the type of financial instrument used caused by the size of the ANSP.

TABLE 5.1 CASH CAPITAL ADDITIONS AND DEPRECIATION CHARGES € MILLION

ANSP	2000-2002 capital additions	2000-2002 depreciation	Net financing required	Ratio financing / deprec
Austria	64.4	69.6	-5.2	-0.07
Belgium	53.3	44.6	8.7	0.20
Cyprus				
Czech Republic	57.4	35.7	21.7	0.61
Denmark	44.3	24.2	20.1	0.83
Estonia	6.9	4.3	2.6	0.60
Finland	19.8	21.2	-1.4	-0.07
France	485.6	506.5	-20.9	-0.04
Germany	508	413	95	0.23
Greece				
Hungary	3.3	6.6	-3.3	-0.50
Ireland	73	15	58	3.87
Italy ²	202	70	132	1.89
Latvia	6.9	11.2	-4.3	-0.38
Lithuania	1.6	8.4	-6.8	-0.80
Malta	9.0	1.2	7.8	6.50
Netherlands	49.7	75	-25.3	-0.34
Norway				
Poland	31.7	28.2	3.5	0.12
Portugal	43.8	49	-5.2	-0.11
Slovak Republic	5.2	11.4	6.2	0.54
Slovenia	4.9	7.6	-2.7	-0.36
Spain				
Sweden	101	28	73	2.61
Switzerland ³	68	33	35	1.06
United Kingdom	293	339	-46	-0.14
TOTAL SES ANSPs	2,133	1,801	332	0.18

Notes:

- 1 Blank entry – data not available
- 2 For ENAV only the 2002 data is considered reliable by ENAV; that year's data is presented here
- 3 Only two year's data available for Switzerland as there was a change in institutional structure from Swisscontrol to Skyguide in 2001

Capital availability limited by competing uses

- 5.13 A number of ANSPs are also responsible for the provision of other services, including airport operations and regulatory oversight. The ANSPs operating under this model include:
- Cyprus: the DCAC (although the Government of Cyprus is in the process of letting concessions for the two main airports on Cyprus);
 - Greece: the Hellenic CAA;
 - Finland: the Civil Aviation Administration;
 - Norway: Avinor AS;
 - Poland: the Polish Airports State Enterprise (PPL);
 - Spain: Aena; and
 - Sweden: the Swedish CAA - Luftfartsverket, LFV (but in 2005 it is planned to split LFV between a regulator and service provider with separate ANS and airport divisions).
- 5.14 Some ANSPs have highlighted that capital availability is limited by competing uses of their organisation's capacity to raise capital. For example, if the financing available to the organisation is used for airport operations and infrastructure; this can constrain the amount available to finance ANS services. However, in contrast, another ANSP indicated that an integrated corporate structure had helped with the financing of ANS services. Operating surpluses created through the provision of airport services were used to finance ANS.

Government budget and borrowing limits

- 5.15 Some ANSPs that are organised as government departments are subject to the constraints of the State budget, and the financing made available through the annual budgetary allocation. This has the potential to constrain ANSP in their investment plans. Others, such as MATS and DNA, are required to seek government approval for their budgeted investment before taking out additional commercial loans.
- 5.16 Moreover, some of the corporatised ANSPs are subject to overall borrowing constraints, for example:
- Ireland: The Irish Aviation Authority is authorised to borrow to a limit of €127 million (in 2002 it used facilities of €45 million);
 - Sweden: Luftfartsverket, LFV (including airport operations and regulatory activities) is subject to a borrowing constraint of €874 million (in 2002 it used €709 million of these facilities); and
 - Poland: PPL is not allowed to borrow from the Government.
- 5.17 Naviair (Denmark), while an autonomous state enterprise, is only allowed to borrow from the Government. It is not clear whether this restriction is a statutory one, customary, or simply the cheapest source of finance.

Commercial covenants / ratios

- 5.18 A small number of ANSPs are subject to financial covenant ratios or performance target ratios that constrain their financing arrangements. These financial covenants form a part of normal commercial banking arrangements: for example, NATS and Skyguide have covenants linked to their loan agreements. Moreover, in order to maintain their favourable credit ratings from Moody's, Standard & Poor's and other agencies, the ANSPs need to sustain favourable financial ratios; these will reflect the organisations' specific gearing levels.
- 5.19 LFV management, for example, aim to operate on the basis of a 25% equity to assets ratio.

Limitations on the type of financial instrument used caused by the size of the ANSP

- 5.20 Some of the smaller ANSPs, in terms of financial resources, total turnover and financial requirements, are constrained in their access to certain financial instruments. For example, listed bond issues are usually issued at a minimum size that may be beyond the financial requirements of the smaller ANSPs.
- 5.21 Other ANSPs are limited by their management or constitution, for example:
- Finland CAA is prevented from issuing publicly listed bonds by the statute of the company.
 - LFV management has decided that it is not politically acceptable to use cross-border leasing as a financing mechanism.
 - Skyguide is limited by statute not to raise equity beyond 50% of its capital base.
 - Slovenia ANSS is prevented by statute from borrowing from commercial markets (although its successor Sloveniacontrol Ltd will be allowed to do so).

6. FUNDING ANOMALIES

Introduction

6.1 In this chapter, we examine a number of issues relating to transfers to and from government, and potential subsidy and cross-subsidy. This is an area in which there is a wide variation of practice between member states. Areas of variation include:

- the payment of dividends;
- the payment of tax on corporate profits;
- the treatment of Value Added Tax (VAT);
- the extent of exemptions and the way that exemptions are financed;
- any explicit subsidies from government;
- implicit subsidies arising from the way the Eurocontrol contribution is handled.

Dividends

6.2 As discussed earlier, while four of the SES ANSPs are government departments, the others all have some kind of corporate structure. Sometimes this is that of a corporate statutory body, with its constitution defined by its own statute; others are bodies fitting into a general category of publicly-owned enterprises; still others are normal joint-stock companies in which the Government owns the shares, and in two cases, there is part private ownership (although for Skyguide the private shareholding is very small).

6.3 In principle, these corporate bodies could pay dividends to their shareholders. However the majority of ANSPs do not pay dividends and some retain all profits. The total dividend distributed in 2000-2002 was €60 million, which went to member state governments. For the seven ANSPs that paid dividends, the proportion of turnover distributed ranged from 0.6% to 17.9%, with a mean of 4.2%. Thus some ANSPs that use equity financing are effectively doing so without a commensurate cash payment.

Taxation on corporate profits

6.4 Joint-stock companies are generally liable to taxation on their corporate profits. Some corporate ANSPs, however, are exempted from corporate taxation by their own statute.

6.5 The total corporate taxation payable by SES ANSPs in 2000-2002 was €90 million. Of the SES countries, eleven made cash corporate tax payments to government in the period. These ranged from between 0.1% and 14.8% of turnover.

TABLE 6.1 TAX AND DIVIDEND PAYMENTS AS A % OF TURNOVER

Country	Dividends % of turnover (average 2000-2002)	Taxation as % turnover (average 2000-2002)
Austria		0.1%
Czech Republic		5.2%
Denmark	5.4%	
Estonia	17.9%	
Finland	2.0%	
Germany	0.6%	0.3%
Ireland	1.4%	0.4%
Latvia		1.7%
Lithuania		0.1%
Poland		14.5%
Portugal (2001 and 2002)	0.9%	4.3%
Slovak Republic		0.9%
Sweden (LFV Group)	1.0%	1.6%
United Kingdom		0.6%
Total paid (€ million)	61.1	90.0
Average	4.2%	3.0%
Minimum	17.9%	14.5%
Maximum	0.6%	0.1%

Value added tax

- 6.6 The majority of ANSPs in the SES do not charge Value Added Tax (VAT) on their en-route charges. However, VAT is usually charged on their inputs, and fully recoverable from national government. The exceptions to this are contained in the table below. In practice non-exempt revenues tend to be fairly small.

TABLE 6.2 SES ANSPS CHARGING VAT ON ROUTE CHARGES

ANSP/Country	VAT rate	Exemptions from paying VAT
IAA, Ireland	21.0%	Airline operating on a revenue basis, predominantly operating internationally
Skyguide, Switzerland	7.6%	Airline operating on a revenue basis, predominantly operating internationally
Austro Control, Austria	20.0%	Airline operating on a revenue basis, predominantly operating internationally
ANS, Czech Republic	5.0%	International flights
LFV, Sweden	25.0%	Airline operating on revenue basis
LPS, Slovak Republic	19.0%	Airline operating on a revenue basis and is not registered business in Slovak Republic
CAA, Finland	22.0%	International flight for business purposes only
NATS, United Kingdom	17.5%	Aircraft MTOW of 8 or more metric tons and Aircraft of less than 8 metric tons if the user is situated outside the United Kingdom and makes flights for business purposes only
DFS, Germany	16%	Airline operating on a revenue basis, predominantly operating internationally

6.7 There are however important exceptions to this practice that can seriously distort financial incentives. Avinor in Norway and LVNL in the Netherlands must pay VAT on inputs but **may not reclaim it**. This both increases the cost base and introduces a strong incentive for these companies not to outsource, whatever business economics dictates.

6.8 Within the SES charging rules there may be the opportunity to unify the approach to the application of VAT, which might be beneficial to users. However, as we understand the European Union *acquis communautaire* there is still the ability for Member States to determine their own approach to taxation⁴⁴.

Exemptions

6.9 All ANSPs exempt certain classes of flights from en-route charges, TNCs or both. A number of generic approaches to exemption and their funding are taken by ANSPs in the SES:

- direct Government payments in respect of exempted flight charge receipts;
- direct payments from the Military for exempt military flights;
- the costs are incorporated into the general en-route and terminal navigation charges cost base (that is, cross-subsidised by user charges);
- there are none or very few exempt flights; or

⁴⁴ *Sixth Council Directive of 17 May 1977 on the harmonization of the laws of the Member States relating to turnover taxes – Common system of value added tax: uniform basis of assessment (77/388/EEC)*, as subsequently amended and corrected

- exempt flights are funded from reserves (that is, from profits) or from non-ATM revenues.

6.10 In Table 6.3 we provide a summary of the approach to the funding of exemptions by ANSPs. The figures indicate the wide variety of options used to fund exemptions. Moreover, only for some of the ANSPs is the cost of provision of services to exempted flights transparent. Where it exists, the cross-subsidisation of exempted flights by other user charges and the lack of transparency goes against the ICAO charging principles and the spirit of the SES legislation.

Direct subsidies

6.11 In some cases, a Member State government will provide a direct payment for an activity that is regarded as a social necessity, where it is considered unfair to recover the cost from the whole user base. Examples of this include:

- Italy, where the government funds ENAV for the provision of ANS facilities at small airports;
- France, where the government funds the costs of some regulatory activities through proceeds of the Civil Aviation Tax (TAC), levied on air passengers;
- the Maltese Government's payments in lieu of part of terminal services;
- the Netherlands, where the government provides a contribution for regional airports ATM and a non-recurrent compensation related to the September 11 2001 attacks; and
- Poland, PPL, where the State and Civil Aviation Office provide small-scale capital investment contributions.

TABLE 6.3 FUNDING OF EXEMPTIONS

State	How exemptions funded	Value 2000-02 € Million
Austria	Payment from Military, Charge to Government	26.2
Belgium	Cost base	9
Cyprus	N/a	N/a
Czech Republic	Reserves and non-ATM revenues	N/a
Denmark	Payment from Government	N/a
Estonia	Cost base	0.03
Finland	Payment from Military	2.3
France	Payment by Government	108.8
Germany	Payment from Federal Govt (civil & military)	210
Greece	N/a	N/a
Hungary	Cost base	0
Ireland	Payment by Government (civil & military)	3.5
Italy	Payment by Government	117
Latvia	Cost base	V small
Lithuania	Cost base	N/a
Malta	Payments by Government (civil) and Military	1.3
Netherlands	Payment by Government	4.1
Norway	N/a	N/a
Poland	Currently cost base, future not exempt	N/a
Portugal	Cost Base	N/a
Slovak Republic	N/a	N/a
Slovenia	Cost base	N/a
Spain	Cost base	N/a
Sweden	Military direct charges, Civil through cost base	N/a
Switzerland	Payment from Government	6
United Kingdom	Military payment, civil from cost base	2.9

N/a = not available

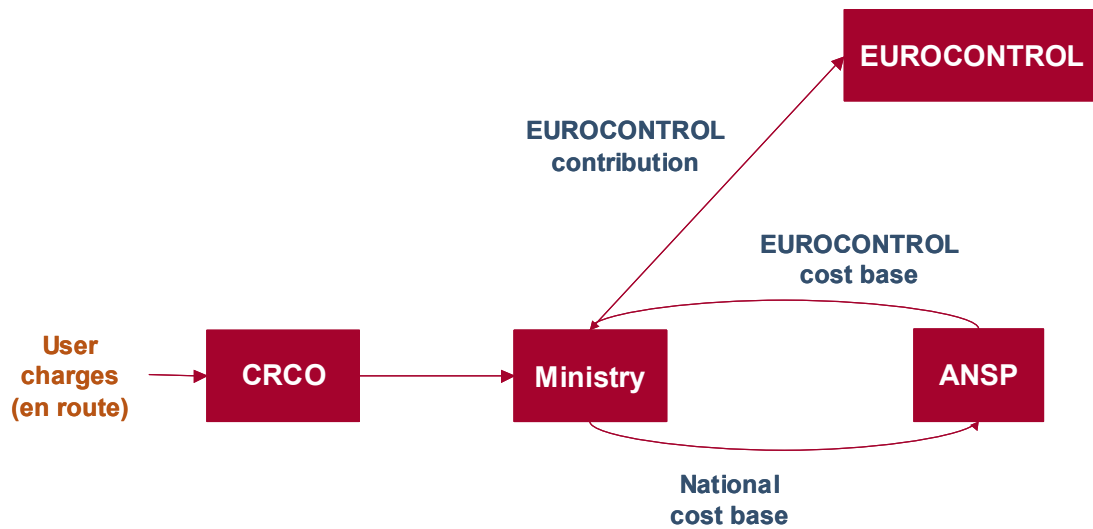
The funding of Eurocontrol

- 6.12 Most SES member states are members of Eurocontrol and therefore finance its activities. The activities of Eurocontrol are costed and the costs included in a cost base, which is then recovered from member states in agreed proportions.⁴⁵ The

⁴⁵ There are three keys for the division of Eurocontrol costs: one for general European activities, one for MUAC, and a third for CEATS.

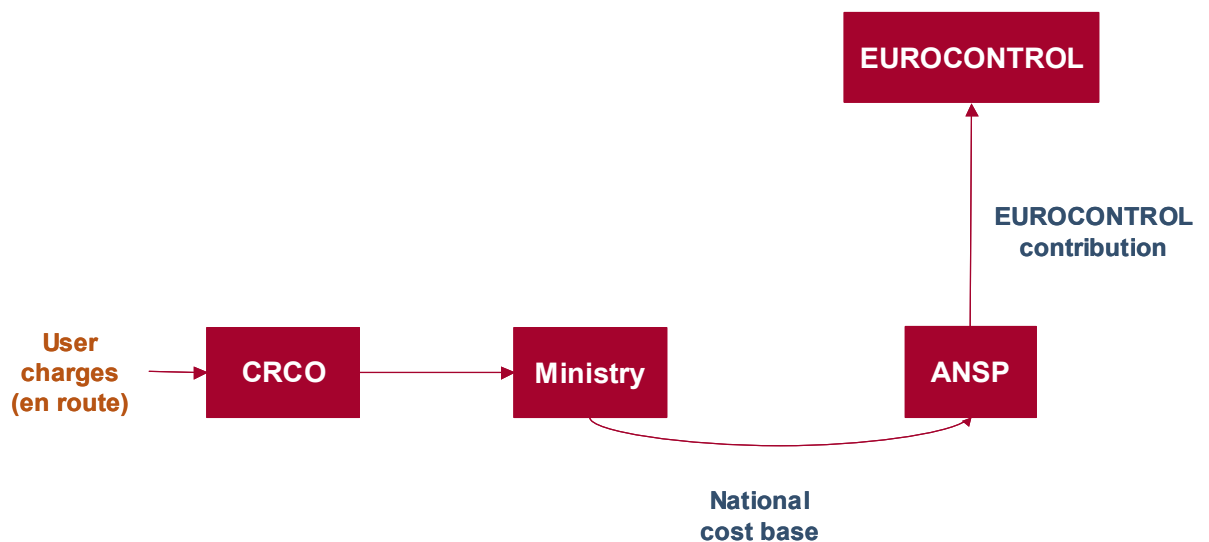
member states in turn include their assigned Eurocontrol cost base in their own en-route cost bases, and recover the costs from users.

- 6.13 In passing we note that this implies that all Eurocontrol HQ costs are recovered through en-route charges and none through TNCs. However, a number of Eurocontrol activities are associated with terminal navigation services, rather than en-route, implying some cross-subsidy by the en route users.
- 6.14 The cost base of Eurocontrol does not necessarily reflect its funding needs, however. In the same way as national ANSPs, its cash needs for investment can exceed the recoverable cost base. Equally, there can be cash surpluses or deficits because of over or under-recovery. In the past this led to cash calls from Eurocontrol on the member states that were unstable, and we understand that Eurocontrol is now encouraged to borrow in the commercial markets to meet cash deficits of this kind.
- 6.15 A second and more important discrepancy between Eurocontrol's cost base and its financing needs concerns a particular feature of the way Eurocontrol, as an international organisation, pays its staff. In common with other international organisations, Eurocontrol staff are paid net of income tax. The cost base, however, includes a gross figure for the costs of employment, including a "notional income tax". To retain equitable treatment between member states, the difference is distributed to members as a rebate from their contributions.
- 6.16 The requirement to pay Eurocontrol contributions is one for the member states, and the rebate of notional income tax is intended as a benefit for member states, to compensate them for the fact that staff are working in Belgium rather than in their home countries, while retaining the same tax treatment for all employees. In many member states, the flows of funds follow this logic. Route charges are collected by the CRCO and passed to member states. Member states pass them to the ANSP (perhaps after deducting regulatory costs). ANSPs then return to the member states the Eurocontrol cost base, and the member states pass to Eurocontrol its required contribution. This flow reflects the fact that the notional income tax is intended to be a compensating benefit to the member state. The financial flows in this case, as in Belgium and France, are shown in Figure 6.1.

FIGURE 6.1 FINANCIAL FLOWS BETWEEN ANSPS AND EUROCONTROL (MODEL 1)

Notes: For clarity, any government or regulatory contribution has been omitted

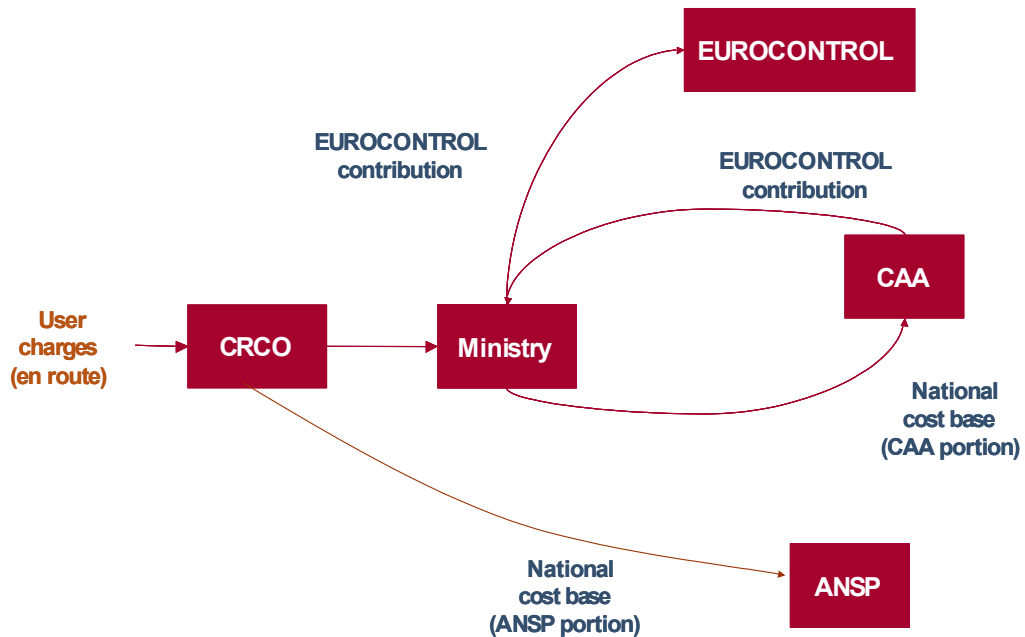
- 6.17 In a number of states, however, a different flow of funds is used. The ANSP acts as an agent for the member state's relationship with Eurocontrol. It receives the CRCO collections, and pays the Eurocontrol contribution. As a result, the notional income tax becomes an effective government subsidy for the ANSP. The financial flows in this model, which is typical of most countries, are shown in Figure 6.2.

FIGURE 6.2 FINANCIAL FLOWS BETWEEN ANSPS AND EUROCONTROL (MODEL 2)

Notes: For clarity, any government or regulatory contribution has been omitted

- 6.18 In the UK, neither of these approaches is followed. The UK has made a decision not to include the notional tax in its national cost base. Effectively, then, the UK Government is passing this benefit to users of UK airspace. Furthermore, the flows in the UK are different in that the money collected by CRCO is distributed between the ANSP (NATS) and the regulator (the CAA). The Eurocontrol portion of the cost base (in this case, uniquely, the contribution) is part of the CAA portion and is passed by them to the Department for Transport for remission to Eurocontrol.

FIGURE 6.3 FINANCIAL FLOWS BETWEEN ANSPS AND EUROCONTROL – UK MODEL



7. LIMITATIONS OF CURRENT FINANCING METHODS

Introduction

- 7.1 In this chapter, we review the perceived limitations of the existing mechanisms available to ANSPs to finance ATM in the context of the SES. We attribute views to a class of stakeholder, for example ANSPs, Airlines, Regulators, Trade Unions. These views, as described in greater detail above in Chapter 2, have been expressed in the open stakeholder workshop, working groups or through bilateral conversations.
- 7.2 The limitations are set in the context of a cost-recovery charging mechanism that is followed by all ANSPs with the exception of National Air Traffic Services Ltd in the United Kingdom.
- 7.3 The general perception of ANSPs is that they are happy with the existing financing mechanisms and do not see an urgent need for additional or adjusted financial mechanisms. While it could be envisaged that, under certain circumstances, existing cost-recovery methods could give rise to a shortage of funds, the analysis we have undertaken in Chapter 6 suggests that any such difficulties will be relatively rare.

Limitations

- 7.4 Our discussions with the stakeholder community have highlighted the following limitations with the existing financing mechanism under current circumstances:
- There are currently **limited (or no) incentives for international co-operation** to improve multinational ATM system efficiency as opposed to national ATM system efficiency. The existing system provides for protection of the national interest (all stakeholder groups). National economic regulation may exacerbate this problem.
 - The **adverse impact on users and ANSPs of short term downturn in traffic** on revenues recovered to finance their operations (ANSP stakeholders)
 - Capital investment that has a **long lead time in the course of its construction** leading to significant financing requirements (ANSP stakeholders).
 - **Inadequate consultation** between ANSPs and users (Airline stakeholders).
 - A **lack of commitment for the ANSP community to deliver financial benefits** to users in return for the financing of up-front investment (Airline stakeholders).
 - **No strong incentive for cost efficiency improvements**, as a result of the cost-recovery mechanism (Airline stakeholders, one ANSP stakeholder).
- 7.5 The majority of these limitations are not directly related to financing, but indirectly through the incentives and form of consultation that underpin the charging mechanism of ATM in the SES.

Country-specific limitations

- 7.6 The following country-specific limitation in DFS Germany has been raised through consultation: the current taxation system causes a problem with persistent under-recoveries. Over-recoveries are shown as a liability on the balance sheet; however under-recoveries are prevented by tax law and cannot therefore be shown as an asset.

Moreover over-recoveries are taxed, whereas under-recoveries cannot be used to offset tax liabilities.

Late payments and bad debts

- 7.7 A number of ANSP stakeholders have raised the issue of suffering from the cash flow difficulties of late payments or non-payment from bad debts. We have not reviewed the performance of Eurocontrol in this matter, but understand that only a minor percentage of revenues go bad. Therefore, this is not considered to be a significant issue in terms of financing mechanisms and we have therefore not investigated it further.

What are the implications of a different charging mechanism?

- 7.8 The lack of significant limitations on ANSP's existing ability to finance their operations is a consequence of the cost-recovery mechanism, coupled with the relatively low capital intensity of the services and the relatively smooth profile of capital expenditures relative to total turnover. However, some ANSPs' have highlighted that if and when amendments are made to the existing charging arrangements as a part of the SES arrangements, the constraints and limitations on their financing may increase. Furthermore, SES implementation may result in higher required levels of capital expenditure, which may impose a further strain on existing financing systems.
- 7.9 Eurocontrol has been provided with a mandate to develop the implementation rules for a common charging scheme for air navigation services. These rules, which will permit a move towards incentive-based charging, may thereby increase income variability and therefore the risk to ANSPs of financing their activities if Member States exercise the option to move away from guaranteed full cost recovery. However, we understand that cost recovery will remain an option under the rules and there will be no mandatory requirement to use an alternative mechanism.

8. FRAMEWORK FOR ASSESSING FINANCIAL MECHANISMS

Introduction

- 8.1 This chapter provides a framework for the assessment of the requirements for additional or alternative financial mechanisms to support ATM in the context of the SES. Chapter 9 sets out our assessment of additional or alternative financial mechanisms at the ANSP and country level. We then go on to review existing Community financial instruments and suggest the structure of a new Community financial instrument that might be used to support the implementation of the SES in Chapters 10 and 11. In Chapter 12, we review the options and financial implications of greater separation between infrastructure and ANS provision.

The key factors influencing the financing requirements of ANS in the SES

- 8.2 In Chapter 3, we quantified the potential financial impacts from the SES legislation and identified the different phases of financial costs and benefits (from development through implementation to operation). Each type of project has a pattern of cash flows that will influence the financing requirements resulting.
- 8.3 In Chapters 4-7, we identified – with the input of stakeholders – the constraints and limitations of the existing financing mechanisms in the context of the existing charging and economic regulatory framework.
- 8.4 This chapter outlines a framework for assessing the application of the additional or alternative financial mechanisms discussed in later chapters. We set out:
- The main phases of financial costs and benefits;
 - The type of projects and associated cashflows identified in Chapter 3;
 - The limitations and constraints identified in Chapters 4-7;
 - The main stakeholders involved in financing decisions of the SES;
 - How could and how ANSPs do raise their finance;
 - What would happen in the absence of new financial mechanisms; and
 - A summary of our framework for assessing financing mechanisms.

Phases of financial costs and benefits

- 8.5 The appropriate financial instruments to support the implementation of the SES will be influenced by the phases of financial cash flows.

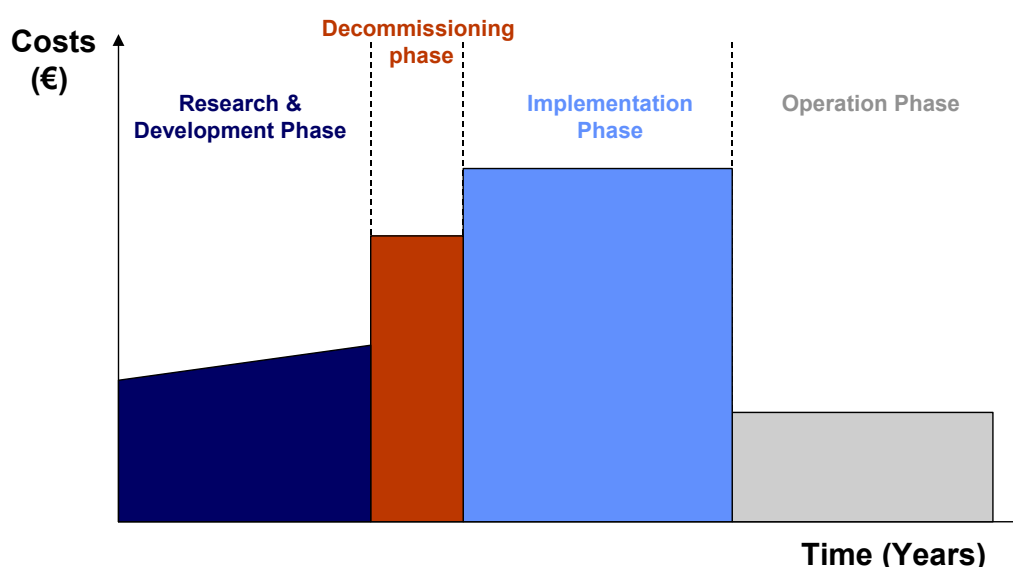
Phases of financial costs

- 8.6 Implementation of the SES will give rise to the following phases of costs:
- **Research and development phase:** financial costs incurred to enable the future implementation of systems and projects, often with long lead times. These costs enable the long term financial benefits associated with implementation to be achieved, but there is no guarantee of success and financing cannot be secured on the stream of potential benefits;

- **Decommissioning phase:** associated with the retirement of a particular asset ahead of the end of its economic life, or dislocation or redundancy of staff. On some occasions, the premature retirement of the asset may lead to stranded costs. The timing of the decommissioning can often be concurrent with implementation or at the beginning of the operation phase and hence financing can sometimes be bundled into wider implementation projects;
- **Implementation phase:** primarily, incremental one-off capital financial costs incurred to implement a systems or infrastructure upgrade. Upon completion, usually associated with a stream of specific financial benefits; and
- **Operation phase:** primarily the operating costs of staff or processes introduced as a part of the implementation process, required to achieve the on-going implementation of the new equipment, systems, procedures or standards.

The phases of financial costs are illustrated in Figure 8.1. Not all these costs will be incurred on every project, and therefore the phasing depicted is an illustration.

FIGURE 8.1 MAIN CATEGORIES OF FINANCIAL COSTS AND THEIR TIMING



Categories of financial benefits

8.7 The main categories of financial benefits achieved through the SES are:

- **Procurement benefits:** achieved through improved standards and specification; and
- **Operational benefits:** for example arising from improvements in co-ordination and airspace efficiency – flight routing and elapsed time.

8.8 The procurement benefits are achieved during the implementation phase, however the larger, operational benefits, are only achieved after implementation.

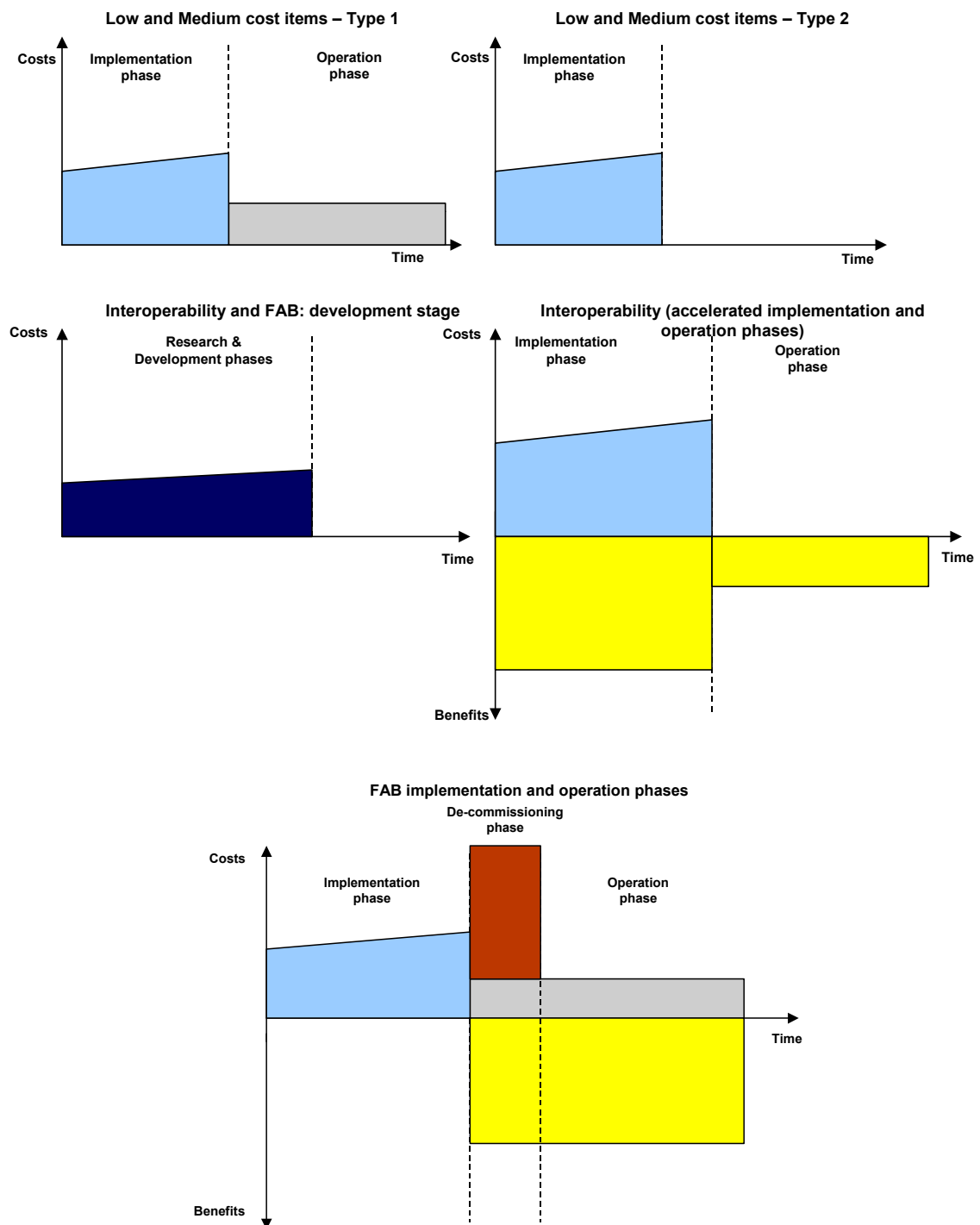
Patterns of financial cash flows associated with SES projects

8.9 In Chapter 3 we estimated the incremental financial impact of the SES legislation. We separated these impacts into low, medium and high financial impacts. Of these

impacts, there are a number of patterns of financial flows, that will influence the requirement and timing of the financing requirements:

- **Low and medium cost items – type 1:** with both one-off implementation costs (usually over three years) and on-going costs into perpetuity. In both cases, they are primarily operating costs (however ANSPs may choose to capitalise some of them for accounting purposes);
- **Low and medium cost items – type 2:** with one-off implementation costs of between one to three years only, with no on-going costs;
- **Interoperability – Development phase:** significant financial costs associated with systems architecture, operational, functional and technical requirements and product development and standardisation;
- **Interoperability – Implementation and operation phase:** financial capital costs associated with large financial procurement and operational benefits (only in the accelerated scenario);
- **Functional Airspace blocks – Development phase:** incorporating costs associated with project definition; and
- **Functional Airspace blocks – Implementation and operation phase:** incorporating implementation and de-commissioning costs associated with significant financial operational benefits.

8.10 The patterns of project financial cash flows are illustrated in Figure 8.2.

FIGURE 8.2 ILLUSTRATION OF PROJECT FINANCIAL FLOWS – SES

Limitations and constraints identified

8.11 Our discussions with stakeholders revealed the following key limitations and constraints:

- The limited (or no) incentives for international co-operation to promote system efficiency;

- The adverse impacts on users and ANSPs of short term market downturns in traffic;
- The long lead time of assets in the course of construction and links to financing;
- The inadequate (and inconsistent) consultation between ANSPs and users;
- The lack of commitment by the ANSP community to deliver financial benefits;
- The lack of a strong incentive for cost efficiency improvements;
- The inability of German commercial entities to show under-recovery of revenues as an asset on their balance sheet;
- The availability of financing is limited by competing requirements for funding within the same company (some ANSPs);
- The Government / State imposed budget and borrowing limits;
- The existing covenants imposed by commercial providers of finance; and
- The access to certain types of financial instruments (mainly a function of size).

8.12 In addition, there has been hitherto relatively limited use by ANSPs of existing Community financial instruments – which are addressed in greater detail in Chapter 10. The European Commission has also identified limitations through its work on the SES:

- Investments with only long term benefits and high up front cost are difficult to finance; and
- There are some schemes that require synchronisation of investment across different stakeholders which is often difficult in practice.

Stakeholders involved

8.13 The financial flows estimated in Chapter 3 demonstrate that the majority of costs and benefits in value terms will be incurred by ANSPs. However, the responsibility for managing a large proportion of the medium and low cost items will be placed on:

- National Supervisory Authorities;
- Eurocontrol; and
- European Commission.

8.14 Moreover, the civil and military users and manufacturers will play a key role in delivering the high cost items.

How do, and how could, ANSPs raise their finance?

8.15 ANSPs currently finance their operations primarily from air navigation charges collected for the provision of services at a national level. This is complemented by additional financial instruments, primarily government or commercial loans, used to support each ANSP's own operations. However, for implementing SES in future, depending upon the cash flows and constraints and limitations placed on financing options, the financing could be provided on:

- an ANSP specific basis;
- a country specific basis;

- a project or initiative (e.g. FAB) specific basis; or
- a Single European Sky Community basis.

8.16 Chapters 10 and 11 examine the options for financing instruments on a SES Community basis, while Chapter 9 looks at other financial instruments that may be useful to support the ATM industry in the context of the SES.

What would happen in the absence of new mechanisms?

8.17 Our consultation with stakeholders indicated that, on the whole, they have so far been comfortable with the existing financing arrangements available to them – primarily “pay as you go” user charges, supplemented by Government and commercially provided loans.

8.18 However, in the absence of adjustments or new financial mechanisms, the constraints and limitations on financing are likely to be more important in the context of SES implementation in future. This may lead to:

- Some countries / ANSPs implementing the “prescriptive” parts of the SES more slowly than if alternative financing arrangements were available;
- Some countries / ANSPs not implementing the “permissive” parts of the SES.

8.19 During consultation we have also come across resistance from users to pay the high up-front costs indicated by the Phase 1 cost analysis because of the lack of commitment to the sharing of benefits, and the expectation that benefits will not materialise for a significant period after the initial costs are incurred.

8.20 The danger might be that this leads to a two-tier SES. The ease of access to finance for ANSPs will therefore be a key factor in influencing the speed of progress in implementing the SES and achieving the system economic and financial benefits.

8.21 Therefore, a motivation for contemplating new financing mechanisms is the European Commission’s desire to promote the benefits of the SES, by providing incentives to encourage its implementation.

A framework for addressing the financing requirements of ATM in the SES

8.22 In the next chapters we explore various potential amendments to existing financing mechanisms and new financing mechanisms. We assess their introduction with regard to the factors introduced in this chapter and summarised in Table 8.1.

TABLE 8.1 A SUMMARY OF FACTORS AFFECTING FINANCING MECHANISMS

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints
Research & Development	Low and medium – Type 1	System, not ANSP specific benefits	Competing uses of finance
Decommissioning	Low and medium – Type 2	Downturn in traffic	Government budget and borrowing limits
Implementation	Interoperability – Development	Lead time of assets in the course of construction	Covenants from financial providers
Operation	FAB – Development	Inadequate user consultation	Size constrained access to finance
	Interoperability – Implementation & operation	Lack of commitment to benefits	
	FAB Implementation and Operation	No strong ANSP incentive to efficiency	

9. ADDITIONAL OR ALTERNATIVE MECHANISMS AT NATIONAL, ANSP OR PROJECT LEVEL

Introduction

- 9.1 In this chapter we use the framework introduced in Chapter 8 to assess the introduction of additional or alternative financing mechanisms at the national, ANSP or project level. This chapter does not examine the financing mechanisms based at the SES Community level, which are discussed in Chapters 10 and 11.

Alternatives to financing mechanisms

- 9.2 A number of the constraints and limitations identified as a part of the study and referred to in Chapter 7 are not best resolved through financing mechanisms. These issues may be more directly addressed through a combination of amendments to:

- the Governance and management arrangements of ANSPs; and
- the charges and economic regulatory framework.

Governance and management arrangements of ANSPs

- 9.3 Certain limitations and constraints cannot be directly addressed through financing mechanisms. Examples are:

- inadequate and inconsistent consultation between ANSPs and users, and
- Government or State-imposed budgets.

The management arrangements of the ANSPs will influence these factors.

- 9.4 The current lack of a standardised approach to user consultation could be addressed as a constructive promotion of the SES, with airlines and ANSPs – perhaps under the auspices of Eurocontrol, working together to agree mutually acceptable approach to consultation and information provision. This may be facilitated and encouraged through the Industry Consultation Body formed as a part of the SES. However, at this time, the practical efficacy of these arrangements has not yet been demonstrated.
- 9.5 Experience from ANSPs within and outside the SES member states demonstrates that having key stakeholders on the board of the provider (users, trade unions, government); and a defined process for consultation – e.g. through Partnership agreements - can promote a system of co-operation, and internalise issues related to inadequate consultation.
- 9.6 Some member states, through corporatisation and, in the case of the United Kingdom, a Public Private Partnership, have directly addressed budgetary constraints imposed by government.
- 9.7 The organisational structure for ANSPs is the choice of the member state, and therefore it is likely that some ANSPs will remain subject to some form of budgetary control or constraint on, particularly, their capital expenditures within the SES.

The charges and economic regulatory framework

- 9.8 The en-route and terminal navigation charges frameworks are under review as a part of the SES implementation rules being developed by Eurocontrol on behalf of the European Commission. However, we understand that any movement away from the existing cost recovery mechanism will not be mandatory.
- 9.9 If, as the industry expects, individual countries continue to use a cost recovery approach to charges with little or no formal economic regulatory overview of the underlying costs, the identified limitations of a lack of strong incentives for cost efficiency improvements and a lack of commitment of the ANSP community to deliver financial benefits, are unlikely to be addressed via new financing mechanisms alone.
- 9.10 Nevertheless there may be the case for tying the introduction of economic regulatory controls – such as formal efficiency targets or price controls, monetary performance regimes, and service level agreements with users - to the introduction of any European Commission based financial support mechanism.
- 9.11 We suggest the users should also take a proactive approach to encouraging ANSPs to be more responsive to their customers, in any event.
- 9.12 Some of these elements may therefore be introduced as a part of financial or governance arrangements that recognise the importance of users in the financing arrangements for ATM in the SES.

Options for additional or alternative financial instruments

- 9.13 In this section, we discuss options for six additional financial mechanisms that may be used to finance a part of the emerging costs of the SES:
- Manufacturer financing of up-front capital investment;
 - Intra-ANSP financing;
 - Consolidated bond;
 - Joint venture between ANSPs and airlines;
 - SES consolidated equity fund; and
 - Direct passenger fees.
- 9.14 At the end of discussion about each instrument, we provide a summary table describing its key features.

Manufacturer financing for up-front capital investment

- 9.15 The financial impacts assessed in Phase 1 and reported in Chapter 3 imply large costs across the SES associated with the implementation of the interoperability regulation. Manufacturers may be less constrained in their access to finance, and be able to provide a better pattern of cash flows to ANSPs through these arrangements. The current range of financing used by the manufacturing industry includes:
- Grants

- Loans
- Leases
- Supplier credits
- Export financing.

- 9.16 Moreover, manufacturers offering finance may ease the up-front burden of capital costs on users, enabling greater concurrency between the benefits obtained and the costs incurred.

Specification of the option

- 9.17 Although, as noted above, manufacturers could contribute to financing through a variety of instruments, we have chosen to specify the option that offers systems and equipment on the basis of long-term financial lease arrangements. Leasing arrangements have become increasingly popular, for example where United States taxation arrangements incentivise the provision of capital equipment through leasing.

- 9.18 The leasing would take the form of a long-term financial lease for certain specific dedicated assets (systems and equipment) which are necessary for a given ANSP to comply with the interoperability requirements in the SES package. The presumption here would be that such new requirements would cause asset renewal/upgrades to be undertaken on a different scope and timescale than implied by the ANSP's pre-existing capital investment plans.

Likely applicability

- 9.19 The perceived danger of involving the manufacturing industry in the financing of the interoperable ANSP systems is the tied nature of the arrangements. Interoperability, should, in theory, facilitate greater competition between providers. However, tied-financing arrangements allows particular suppliers to deepen their association with ANSPs, thus limiting the competition to which they are exposed.

- 9.20 The ANSP take-up rate for this form of funding will depend on the relative pricing and incentives provided by the manufacturers. Larger ANSPs are likely to be able to gain access to funds at a lower cost of capital than offered through the manufacturer. Others might prefer to own their assets.

Impact on cash flow and other SES Criteria

- 9.21 To illustrate the financial implications of this option, we have reviewed the costs of meeting interoperability requirements from our Phase 1 work. Aggregate costs for manufacturer-sourced assets amount to around €2.2 billion spread over an eight-year period from 2005 to 2012. A typical individual ANSP might therefore be expected to incur costs of around €100m over four years.

- 9.22 We have assumed, for illustration, that this was all incurred in a programme of new systems/equipment provided by a single prime contractor, and that a 15-year finance lease arrangement to recover the full costs is put in place, corresponding to the estimated economic lives of the assets concerned, such that there is limited residual value risk being taken by either lessor or lessee. We have assumed a 8% real return on

the lease, and constant annual payments. Additional maintenance support would hence be supplied through separate, parallel, contractual arrangements.

- 9.23 The cumulative financial impacts of this arrangement are illustrated in Figure 10.3 below. It can be seen that the ANSP replaces a requirement to fund €25m expenditure a year for four years with 15 equal payments once the relevant assets are in service (which would then be recovered from user charges via its operating cost base). After 2018, the leasing arrangements are more expensive than the buy option.

FIGURE 9.1 ILLUSTRATION OF LEASE OPTION

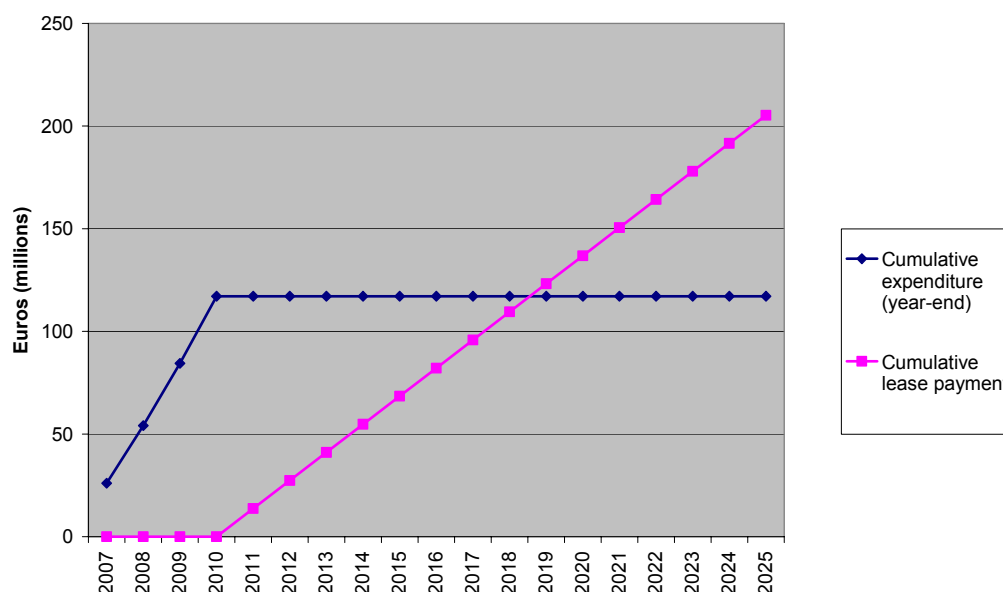


FIGURE 9.2 CHARACTERISTICS OF MANUFACTURER FINANCING FOR IMPLEMENTATION OPTION

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
Implementation	Interoperability and FAB implementation	Lead time of AICC	Government budget & borrowing limits	Manufacturers ANSPs	Country / ANSP level

Intra-ANSP financing

- 9.24 There may be the opportunity to gain from co-operation between some of the larger and smaller ANSPs in the SES. In general, the majority of the larger ANSPs are already able to gain access to all types of private financing to meet their own needs, including instruments such as corporate bonds, which are size dependent.
- 9.25 However many of the smaller ANSPs find gaining access to corporate bond markets and other advantageous long-term loan agreements difficult, and collaboration between ANSPs may therefore be more attractive in such cases to improve access to the bond markets.

Specification of the option

- 9.26 ANSP (A), which has already has full access to the capital markets, provides ANSPs (B) and (C) with back-to-back arrangements. The ANSP arranger (A) would charge a margin for administrative purposes, and for any credit risk integrated across its “client” ANSPs (B) and (C). The ANSPs (B) and (C) would, for example, pledge some of their route charge revenues to the ANSP arranger to provide security for the financing arrangements.

Likely applicability

- 9.27 There are likely to be a number of obstacles to the introduction of this type of arrangement:
- Volunteers for the “ANSP arranger” role are likely to be limited;
 - ANSPs may not be willing to cede control or ownership of revenues to other ANSPs in return for a small reduction in their funding costs.
- 9.28 Therefore, on balance, we expect that this approach is unlikely to provide a major contribution to the funding requirements of the SES.

Impact on cash flow and other SES criteria

- 9.29 The illustration of this mechanism is provided in the approach to a community bond found below, as the features and constraints it would address, and the basic cashflow impacts, are similar.

FIGURE 9.3 CHARACTERISTICS OF INTRA-ANSP FINANCING OPTION

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
All	FAB & interoperability		Size constrained access to financing	ANSPs	ANSP specific

Consolidated bond

- 9.30 As noted above, one of the key limitations of the existing financing arrangements identified in Phase 2 was that some of the smaller ANSPs in the SES could not gain access to some financial instruments because of the limited size of their financing requirements.
- 9.31 As the Phase 1 findings reported in Chapter 3 demonstrate, the payback periods for implementing the SES are likely to be long. Therefore, to match cash outflows to these expected benefit streams, it would be useful for the ANSPs to have access to long-term financial instruments. Therefore, to address the smaller ANSPs’ existing limited access to such long term financing instruments, the potential to consolidate a number of countries’ requirements into a single “consolidated bond instrument” could be investigated.

Specification of the option

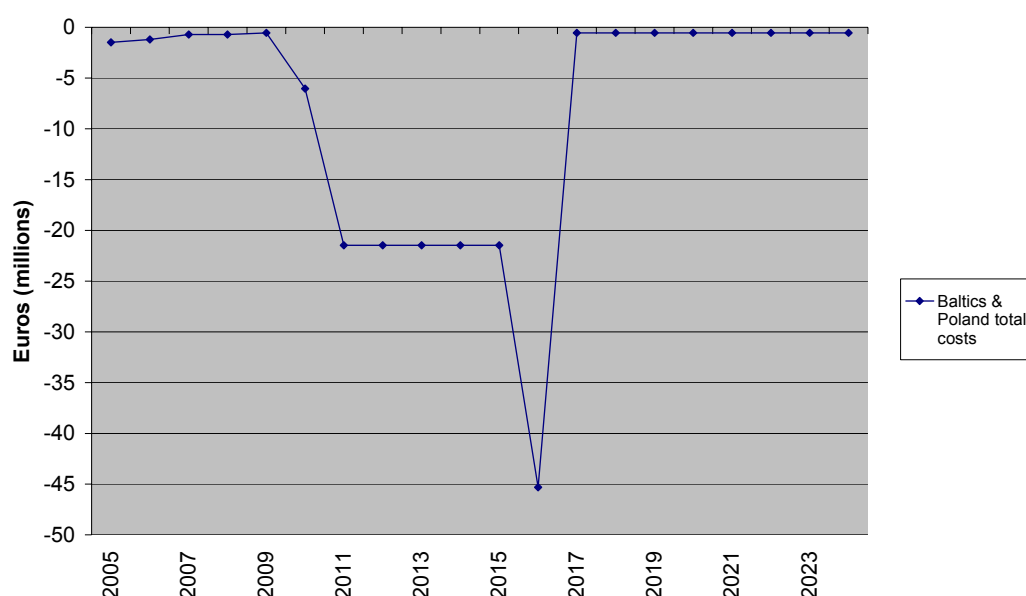
- 9.32 The consolidated bond would either be a private placement through a financial institution or could be taken out by the EIB on behalf of a number of ANSPs. The amount of financing required would meet the consolidated requirements of a number of ANSPs (for illustration, say, three or four). While the typical deal size for a public bond might need to be in excess of €200 million, €50-100 million might be the more likely minimum size required for a private placement.

Likely applicability

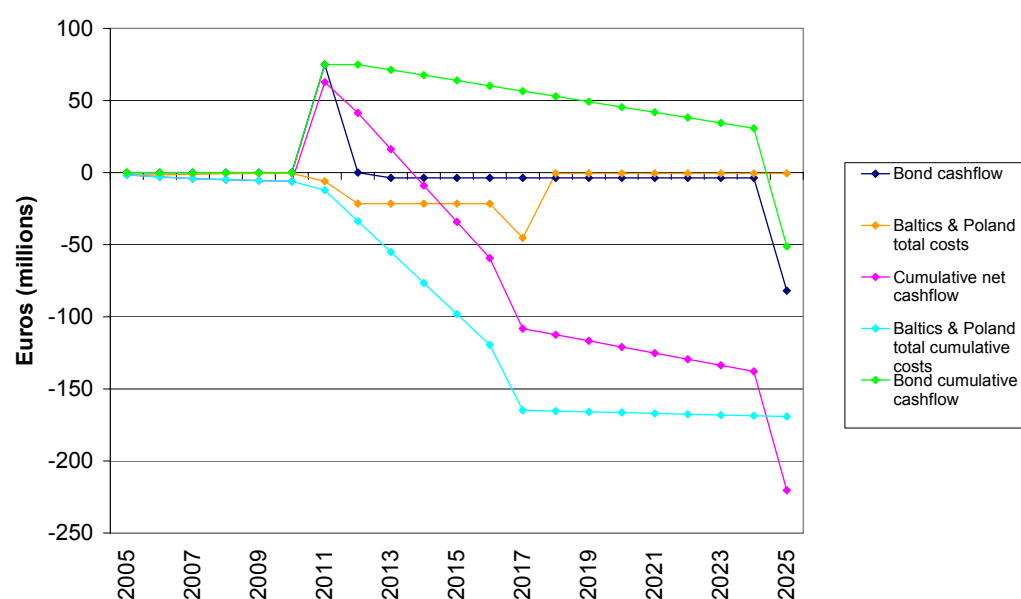
- 9.33 The applicability of this type of financing arrangement will depend upon the willingness of a number of ANSPs to work together to estimate their combined financing requirements and then to manage the joint liability of financing and principal repayments.
- 9.34 The financial institutions have indicated some interest in this type of instrument, but it would require further discussion about specific proposals and more in-depth investigation.

Impact on cash flow and other Single European Sky Criteria

- 9.35 To illustrate the potential financial impact of such a mechanism we selected a grouping of the three relatively small Baltic ANSPs and examined their total SES expenditure requirements in combination with that of Poland, using the data derived from Phase 1. (This illustration does **not** imply that a combined bond would necessarily be appropriate for these particular ANSPs; rather it serves to demonstrate the principles and potential effects using specific Phase 1 cashflows.)
- 9.36 In combination these ANSPs would have SES expenditure requirements of around €170m, but those of the three Baltic ANSPs would each be below €30m, implying that individual access to bond markets to fund them in isolation could be difficult. Our Phase 1 assumptions implied that the expenditures concerned would be focused on the 2011-2017 period. This is illustrated in Figure 9.4 below.

FIGURE 9.4 ILLUSTRATIVE SES EXPENDITURE PROFILE FOR FOUR ANSPs

9.37 We therefore posited that a bond of €75m, to fund around half of the total incremental SES spend, could be issued in 2011, with a real interest rate of 4.5%, a two year interest repayment holiday, and a total term of 14 years. This would provide up-front cash to the ANSPs concerned during the high-expenditure period, as shown in Figure 9.5 below, and give rise to debt service of under €4m a year (to be shared between the ANSPs and recovered in their respective user charges). The bond would need to be repaid (if not refinanced) in 2025, by which time benefits from the SES and reserves should have accumulated (from the depreciation components of the corresponding user charges).

FIGURE 9.5 IMPACT OF CONSOLIDATED BOND

- 9.38 It can be seen that such an instrument could in principle meet the SES objectives of facilitating strategic investment for the longer-term, using access to financial markets enabled by collaboration between ANSPs for mutual benefit. The profiles of user benefits, financing costs and user charges would be better matched over the long pay-back periods involved.
- 9.39 Nevertheless we do not underestimate the practical difficulties presented by such an instrument – in particular the need for the ANSPs involved to agree on mutual liability for debt service contributions in proportion to their shares of the drawdown. In reality such arrangements can potentially be more easily effected through the framework of a dedicated Special Purpose Vehicle (SPV), such as might be put in place to fund investment in a FAB operated on behalf of the contributing ANSPs.

FIGURE 9.6 CHARACTERISTICS OF CONSOLIDATED BOND OPTION

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
All	FAB & interoperability		Size constrained access to financing	ANSPs	ANSP specific

Joint venture between ANSPs and Airlines

- 9.40 The user stakeholder community has identified the lack of commitment from the ANSP community to deliver the financial benefits to the users that are used to justify the investment as a key issue to be addressed during the implementation of SES. One approach to securing a closer and longer-term partnership between users and service providers would be to create a joint venture between them.
- 9.41 Moreover, the design of FABs is expected to achieve system benefits. However, it is inevitable that the costs and benefits associated with FABs defined on this basis are likely to be incurred unevenly across the member states' airspace forming the FAB. Without a FAB-specific financial architecture to align longer term costs and benefits, ongoing tensions between participants may be inevitable.
- 9.42 To address these issues, the creation of a Special Purpose Vehicle (SPV), formed from a joint venture between the ANSPs and key users, may be appropriate for the funding and operation of some FABs. The debt financing required for the implementation of the FAB could then be taken out by the SPV on a commercial basis. A simpler variant on this principle would be an ANSP-only SPV, which undertook its own user dialogue in parallel with the established user dialogue mechanisms of the constituent individual ANSPs.
- 9.43 Community financial instruments could be used to encourage the initial definition and creation of these SPVs. The design of their governance, contractual, charging and performance arrangements would be designed to address the constraints identified above, in particular to ensure that financial contributions and responsibilities were matched to the expected financial benefits arising from the FAB.

Specification of the option

- 9.44 To illustrate the principle involved, we have posited that a FAB would be created and operated by a SPV, with shareholding inputs from (say) four ANSPs, and two individual airlines comprising the main users of the FAB's airspace. However the Board and governance of the FAB might involve broader stakeholder inputs⁴⁶. In particular, for some potential FABs, there might be a danger of geographical monopoly behaviours emerging between the national ANSPs and the main airline users (who would have the greatest financial interest in being involved in the SPV as equity partners).
- 9.45 This potential difficulty might be addressed through representation from appropriate airline community representatives such as the International Air Traffic Association (IATA), the European Regional Airline Association (ERAA), the Association of European Airlines (AEA) or the European Low Fares Airline Association (ELFAA). In this way the governance arrangements would be based on ensuring the SPV Board had representation from both the shareholding and any non-shareholding organisations involved.
- 9.46 The debt financing would then be raised by the SPV using project specific instruments to fund the FAB capital expenditures; depending on the charging framework in place, these instruments could either be underwritten by the user charge revenue from the operation of the FAB or by the contributing ANSPs themselves. Securing FAB funding on FAB charge revenue will require the existing user charge framework to be adapted via the SES implementation rules.
- 9.47 The existence of the SPV could allow it to enter into specific contractual arrangements with its users in parallel with the route charges framework and consistent with ICAO non-discrimination requirements for service provision. For example, the arrangements between the SPV and relevant airlines could include a monetary performance incentive regime, providing rebates to users if delay, airspace availability and speed of routing targets were not delivered. The same arrangements could also allow volume discounts (effectively replacing average-cost charging by fixed base payments plus marginal cost charges) if the JV users agreed.

Likely applicability

- 9.48 The creation of the SPV would potentially involve significant transaction costs. However, the user community may be willing to contribute to the investment in such vehicles if they were perceived to offer good chances of achieving better and more cost-effective service delivery. In this respect the user community would need to be committed to the concept and be prepared to commit senior management time.
- 9.49 The cost of financing the SPV might be more expensive than for lower risk financing raised by the participating ANSPs, although the revenue risk may be mitigated through the contractual relationships between the airlines and the ANSPs participating

⁴⁶ The aviation industry has agreed similar representation arrangements for the NATS PPP and NavCanada.

in the SPV. For example, as indicated above, the structuring could include fixed minimum “take or pay” payments.

- 9.50 Following the failure of Enron, there is understandable suspicion in the broader stakeholder community in respect of some forms of “off-balance-sheet” SPV financing. Reasonable transparency as to the FAB’s financing arrangements, and their purpose and effect, would be required. In addition, some ANSP counter-guarantees may be required, although the respective roles of lenders and the shareholding ANSPs in the event of the financial failure of the FAB’s SPV (to ensure the seamless continuation of safe and efficient service provision to users) would need to be clearly defined in advance.

Impact on cash flow and other Single European Sky criteria

- 9.51 The promotion of FABs is a core element of the SES criteria, and the FAB-specific SPV would be a powerful instrument to focus the creation of viable and commercially responsive FABs to meet user requirements. In that respect, the concept is entirely consistent with the SES vision.
- 9.52 Nevertheless, the associated governance, charging and financing arrangements would potentially mark a radical step away from the current arrangements. The new arrangements would need to be consistent with, and enabled by, the SES implementing rules.
- 9.53 The private finance options available to a FAB SPV could be very wide. The financing would however be relatively long-term in nature (with repayments over a 10-20 year period). We have therefore illustrated the impact with equal repayments of a project loan over 12 years, with a 6% real interest rate, with the repayments starting from commissioning of the FAB. From our Phase 1 work, we identified the FAB creation costs for a Nordic UAC would amount to around €270m, incurred over a six-year period from 2007-2013. As with our consolidated bond illustration, this provides the basis for illustrating the potential financial impacts on a (purely notional) FAB (excluding operating costs).
- 9.54 The cashflows funding the bulk of these capital costs (after a two-year initial implementation period) with a commercial loan facility of up to €218m are illustrated in Figure 2.8 below (the remainder could be funded through equity and working capital contributions from participant ANSPs and, potentially, users). Once the FAB became operational, user charges (here estimated as the interest and depreciation over 15 years on the commissioned book value) would be sufficient both to repay the loan and remunerate equity contributions. Figure 9.7 shows the financial cash flow associated with the FAB SPV following the initial equity injection. It shows early equity contributions with significant loan drawdowns in early years followed by equity return and loan interest and principal payments in the medium term (to 2025).

- 9.55 The loan would substantially smooth the aggregate cashflows arising over the economic lives of the main FAB assets, such that the SPV could earn sufficient revenue from relatively stable annual charges levied on the participating ANSPs (which would in turn be recovered from user charges via their respective cost bases).

FIGURE 9.7 ILLUSTRATIVE FINANCING FOR A FAB SPV

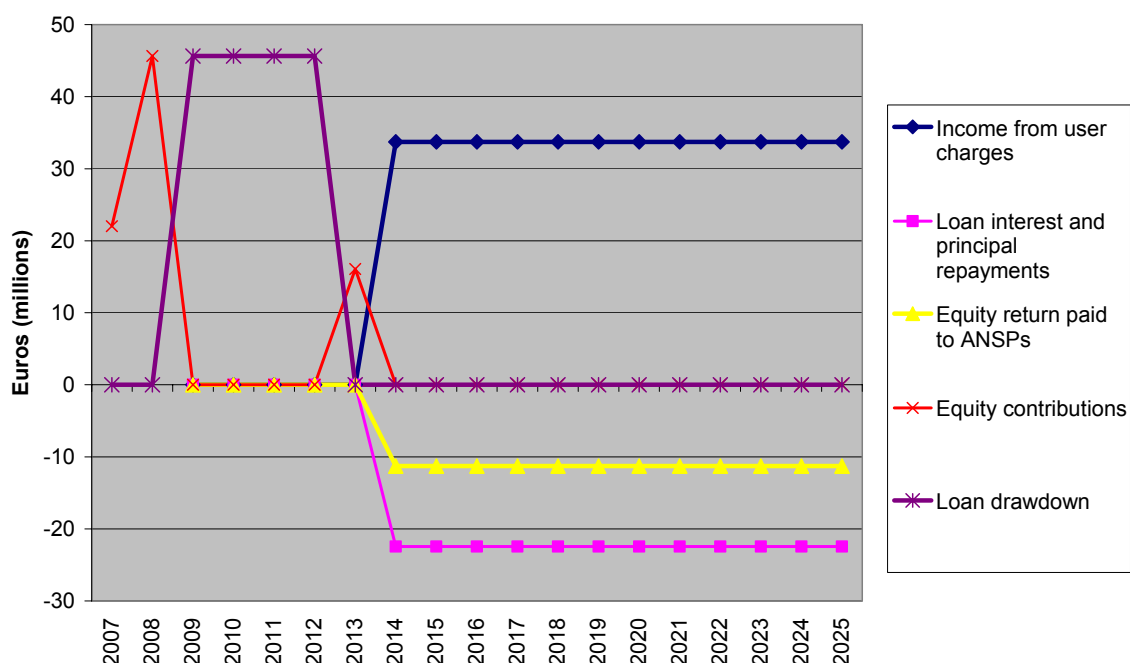


FIGURE 9.8 CHARACTERISTICS OF JV FOR ANSP AND USERS OPTION

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
Implementation & Operation	FAB Implementation & Operation	System Benefits Lack of consultation Lack of commitment to benefits		ANSPs Civil Users	Project or initiative specific

SES Consolidated equity fund

- 9.56 The cashflow estimates of Phase 1 demonstrated the large cash outflows that are expected in the early years of the SES, and the longer-term benefit streams, that will only lead to pay-back and the achievement of discounted net benefits typically some twenty years into the SES. Therefore the SES requires a long term commitment to finance, as the financing costs and their rewards require a long term perspective.
- 9.57 We have examined in this chapter a variety of debt or pseudo-debt instruments for providing finance to the ATM industry in the context of the SES. An alternative would be a consolidated equity fund that might be placed to provide financing across a number of ANSPs.

Specification of the option

- 9.58 A separate equity fund, with the purpose of promoting the achievement of the SES, would be set up. The proceeds would be used to finance all aspects of SES implementation. The financing requirements would be estimated from the consolidated requirements of a number of ANSPs (in a similar way to the consolidated bond), but would not require the security demanded by commercial debt providers over specific SES expenditures.
- 9.59 The dividend payments (and any associated capital return) would be the responsibility of the ANSPs (in proportion to their drawdown of equity from the fund).

Likely applicability

- 9.60 The corporate governance difficulties arising from equity in a single fund provided to a number of ANSPs are likely to be very significant. Moreover, without direct ownership it is difficult to see how the relevant equity providers could be assured of any capital growth elements to their returns. Without capital growth potential, it is likely that dividend-only type arrangements will prove to be a more expensive form of funding than equity.

Impact on cash flow and other Single European Sky Criteria

- 9.61 We have not provided a quantified illustration of this option, as it does not readily relate to specific expenditures identified in Phase 1 of the study. Rather, such a fund may evolve in future to address gaps that could not be filled by the debt-based mechanisms discussed to date, or by Community-based instruments discussed in subsequent chapters. In that respect, the scale and character of such a fund would emerge from ANSPs' individual residual funding needs.

FIGURE 9.9 CONSOLIDATED EQUITY FUND

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
Operation	Low and medium – Type 2			National supervisory Authorities	Project or initiative specific

Direct passenger fees

- 9.62 There could be a case for the introduction of direct user fees (placed on passengers and cargo shippers rather than aircraft). The fee could be used to finance certain services that benefit the user community in general, rather than airlines and aircraft operators specifically. The safety, environmental and potentially economic regulation services can be argued to benefit passengers and the general community of **national** airspace, rather than say over-flying airlines and therefore it is more equitable to levy the costs of this service at this level.
- 9.63 Direct fees could also provide greater transparency to all users as to the costs of regulation, allowing comparative benchmarking across the SES member states to be undertaken.

- 9.64 Existing arrangements in the member states of the SES are varied. Most SES countries recover regulatory costs of all ATM services through the general ANS user charges. Exceptions to this include France, where some regulatory costs and some costs of exemptions are recovered through a civil aviation tax. In some member states there is no or only partial specific recovery of regulatory costs and they are paid for out of general taxation.

Specification of the option

- 9.65 The introduction of a separate fee on final users (passengers and cargo shippers) for the costs incurred in the provision of safety, environmental and economic regulation of the Air Traffic Management industry. Note, this concept could be extended to the whole of the air transport industry as allocation of ATM-related costs may provide an obstacle to the implementation and administrative burden caused by the introduction of the new fee. However, the SES would be an unusual vehicle by which to introduce such a policy across the air transport industry.
- 9.66 The fee would be charged, at a national level, on the basis of departing passengers or Work Load Units -WLU (equating one terminal passenger to 100 kg of freight or mail to one WLU). The proceeds would be paid directly to the National Supervisory Authority (or separate regulatory bodies if appropriate).
- 9.67 The proceeds of the fees would be designed to recover the full costs of the provision of the regulatory services at a national level. Any under or over recovery of costs would be subject to a recovery mechanism incorporated into the calculation of the next year's prices.
- 9.68 The incremental regulatory costs of the SES are unlikely to be sufficiently large to justify the introduction of a new charge. A wider scope would cover all ATM regulatory costs or air transport regulatory costs.

Assessment of likely applicability

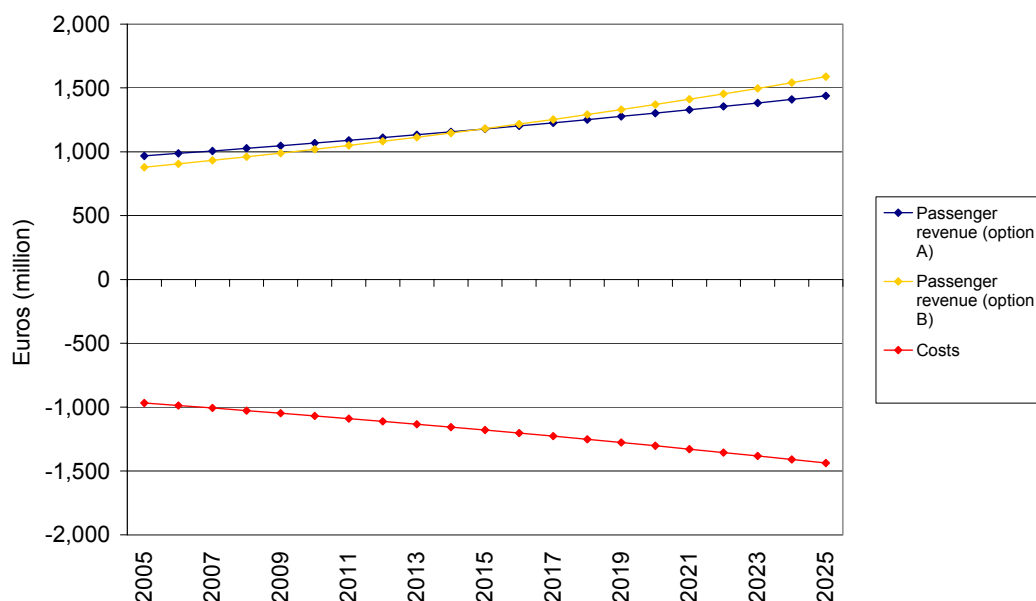
- 9.69 There are likely to be significant transactions costs associated with a different form of raising monies directly from air carriers' customers. Moreover, the approach tends to lead to the cross-subsidisation of regulatory activities by users who are departing from a location within national airspace to the benefit of users overflying (and not landing or departing from an airport in) the national airspace.
- 9.70 The additional administrative burden required for separation of regulation costs of ATM from other air transport regulation costs may prove onerous (although Denmark and the United Kingdom have been successful in achieving this).
- 9.71 Establishing boundaries for the implementation of the fee may also prove difficult. There could be significant debate over how the fee should be levied: passengers travelling on commercial aircraft could be easily included in the scope of a new charges, but there may be significant logistical problems associated with including cargo shippers, general aviation and military users.
- 9.72 The dispersal of user power is likely to lead to a lessening of influence on the regulators' behaviour, as compared to the more concentrated power of airlines and

their representative associations. Therefore, some complementary oversight and benchmarking - perhaps from the Eurocontrol Performance Review Commission to compare the costs of national regulators across SES member states, and to encourage efficient costs of provision (say through efficiency targets) - might be appropriate.

Impact on cash flow and other SES criteria

- 9.73 The approach is consistent with the separation of service provision from regulatory oversight and standards that underpin the Single European Sky. The incremental cash flows created by the Single European Sky for regulatory oversight and standards were estimated from Phase 1 to be are estimated to be of the order of €17-18 million a year.
- 9.74 However, these incremental costs would form only a small proportion of the total costs of ATM safety, environmental and economic regulation. To illustrate the order of magnitude difference, we derived an indicative unit regulatory cost from the UK CAA's accounts (where these costs are separately identified) of around €13/service unit. In reality, many of these costs are incurred in the regulation of non-ATM aviation activities such as airworthiness and airports. Extrapolating at the same unit rate would imply total regulatory costs of €970m a year across the SES area. Accordingly the incremental SES regulatory costs would potentially amount to less than 2% of the total existing cost base. In reality, ATM-specific levies, recovered via ANSPs, would be more likely, but an ATM/non-ATM regulatory cost split is not readily available.
- 9.75 To illustrate the recovery of both the incremental SES and total economic and safety regulatory costs from a passenger-based levy we identified an estimated chargeable base of 690m passenger departures in 2003 from Eurostat.
- 9.76 Assuming the regulatory costs grow at 2% p.a. in real terms, and passenger departures at 3% p.a. (the relevant costs will have some fixed components), a levy of around €0.02 per departure would be needed to recover the incremental SES costs concerned, falling to around €0.01 by 2020.
- 9.77 In contrast, if these costs were recovered within a levy for the **total** economic and safety regulatory costs concerned, such a levy could be of the order of €1.30/departing passenger now, falling to around €1.10 by 2020.
- 9.78 In both cases, annual fluctuations in levy rates (as costs varied from year to year) could be smoothed through appropriate cash balance mechanisms; the corresponding smoothed rate for total cost recovery would be around €1.20 (with a 3% real cost of capital).
- 9.79 The longer-term impact of such smoothing on revenue streams can be seen can be seen in Figure 9.10, which indicates that the smoothed rate would initially under-recover the relevant regulatory costs (in practice smoothing would typically occur over much shorter time periods).

FIGURE 9.10 ILLUSTRATION OF PASSENGER LEVY FOR TOTAL REGULATORY COSTS (OPTION A: ANNUAL COSTS, OPTION B: SMOOTHED)



- 9.80 To overcome this timing issue, and other potential governance issues associated with the administration of such levies (which, if raised directly from passengers, could be regarded as taxes), regulatory independence is typically preserved by requiring licensed industry bodies (such as ANSPs) to include levies as an add-on and pass-through element of their own user charges.

FIGURE 9.11 CHARACTERISATION OF THE PASSENGER FEES OPTION

Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
Regulatory costs	Small & medium costs			NSAs	National

Summary and conclusions

- 9.81 Changes to the pre-existing governance, charging and economic regulatory frameworks applied to ANSPs would more directly address some of the limitations and constraints to financing identified by stakeholders in Phase 2 than new financing mechanisms *per se*.
- 9.82 Of the additional financial mechanisms we have explored in this section we understand that users are in practice unlikely to favour joint venture arrangements, at least in the short term. Likewise, the administrative hurdles and significant transaction costs of instituting new passenger fee structures to recover incremental SES regulatory costs are likely to preclude their introduction specifically to deal with SES issues, or at

all. The design of the consolidated equity fund raises significant challenges in respect of the shareholders' effective control and management of the attendant risks, which may prove to be an insurmountable obstacle.

- 9.83 Of the mechanisms examined, we therefore believe that the **consolidated bond** and **manufacturer financing** may therefore be most fruitful for further investigation with relevant stakeholders.

FIGURE 9.12 SUMMARY OF CHARACTERISTICS OF OPTIONS

	Categories of Financial cost	Pattern of financial cash flows	Limitations	Constraints	Stakeholders	Financing level
Joint venture (ANSP / Users)	Implementation & Operation	FAB Implementation & Operation	System Benefits Lack of consultation Lack of commitment to benefits		ANSPs Civil Users	Project or initiative specific
Small user Consolidated bond	All	FAB & Interoperability		Size constrained access to financing	ANSPs	ANSP specific
Intra-ANSP financing	All	FAB & Interoperability		Size constrained access to financing	ANSPs	ANSP specific
Manufacturer financing	Implementation	Interoperability and FAB implementation	Lead time of AICC	Government budget & borrowing limits	Manufacturers ANSPs	Country / ANSP level
Consolidated SES Equity fund	All but R&D	All but R&D		Government budget and borrowing	ANSPs Financial investors	ANSP Specific
Passenger / Cargo User fee	Regulatory costs	Small & medium costs			NSAs	National

10. EXISTING COMMUNITY FINANCIAL INSTRUMENTS

Introduction

- 10.1 Phase 1 identified the principal financial costs of the SES, delineating the main categories of expenditures according to the type of action to be undertaken and the size and nature of the costs.
- 10.2 This chapter analyses the existing Community financial instruments, and matches these mechanisms to the types of costs they could be used to finance. The main mechanisms studied are:
- European Investment Bank, European Investment Fund and European Bank for Reconstruction and Development funding;
 - Trans-European Network for Transport (TEN-T) funding;
 - Research funding; and
 - Regional funding instruments.
- 10.3 In this chapter, we first describe the key institutional arrangements awarding mechanisms and constraints of these four types of mechanism. We then go on to list the previous use of these sources of finance for ATM projects, and analyse why their uptake has been relatively limited. Finally, we present our views on likely future use of these mechanisms, and our policy recommendations for facilitating their greater use for financing SES projects, reflecting the European Commission's latest proposals in this area.

Institutional and financial features of Community financial instruments

European Investment Bank (EIB)

- 10.4 The European Investment Bank (EIB) provides loans to public and private sector bodies and enterprises for specific projects, and is a source of finance used by some ANSPs. In 2002, the EIB signed loans totalling €39.6 billion.
- 10.5 The EIB normally lends up to 50% of the capital needed for a project, and terms vary from between 4 to over 20 years. The EIB normally directly finances large projects (over €25 million), while it supports smaller investments (€40,000 to €25 million) via its Global Loans, under which the EIB gives a domestic partner bank a credit line, and mandates it to use the credits for projects eligible for EIB financing.
- 10.6 The EIB provides finance on competitive terms, and requires both that projects to be economically viable, and that they be backed by security, which can include government guarantees, strong private sector guarantees, or possibly assets. However, unlike a commercial bank, the EIB requires that the projects it finances must further a European Union economic policy objective, assist candidate countries in preparing for EU membership, or make a contribution to EU development policy regarding third countries. The award of finance is dependent on an EIB appraisal of a project, which considers financial, economic, technical and environmental aspects.

European Investment Fund (EIF)

- 10.7 The EIF provides venture capital and guarantees, primarily to Small and Medium Enterprises (SMEs). While it has in the past made some contribution to transport projects, we do not consider it to be likely to be a significant source of funds for ATM in the context of the Single European Sky, with the exception of possible input to research projects. Most entities involved in the SES would be too large to qualify for the receipt of EIF funding.

European Bank for Reconstruction and Development (EBRD) Funding

- 10.8 The EBRD has provided €68 million of funding for ATM in Croatia, Macedonia, Ukraine and Azerbaijan. However, no countries currently in the SES are eligible for support.

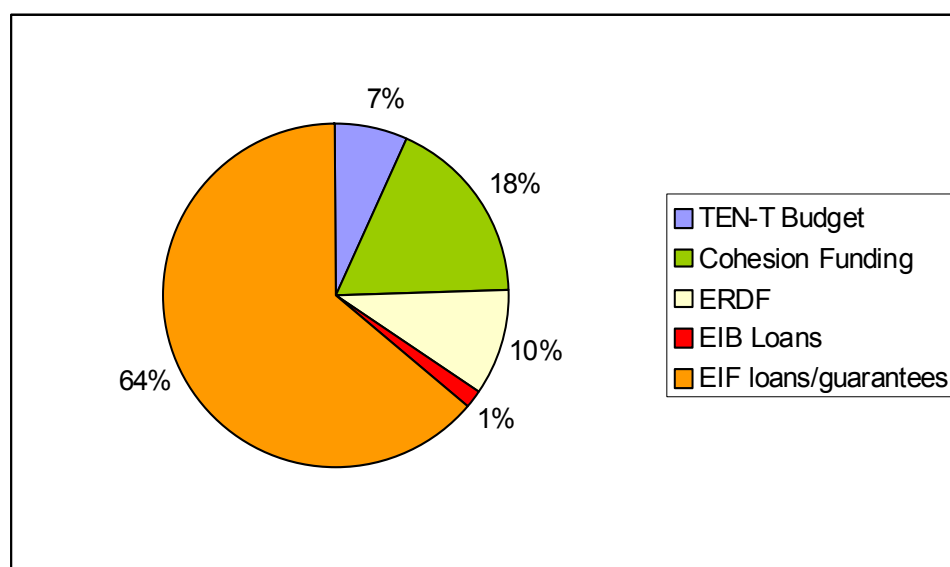
Trans-European Network in Transport

- 10.9 Council Regulation EC No 2236/95, as amended by Regulation EC 1655/1999, sets out the general rules for the granting of Community financial aid in the field of trans-European networks (TEN). Transport project guidelines are set out in Decision No 1692/96/EC which identify the characteristics of the TEN in transport (TEN-T) and draws up a list of priority projects.
- 10.10 Transport is specifically identified to be encouraged by TEN, with the aim of promoting interoperability and interconnection of national networks. The aim of TEN-T funding is to promote co-operation between the public and private provision of financing. The operators are required to run services in the public interest.
- 10.11 The TEN-T funding provided by the European Commission may take the form of:
- i. Feasibility studies, evaluation (generally should not exceed 50% of the costs);
 - ii. Contribution to fees for loan guarantees (from EIF or other financial institutions);
 - iii. Interest rate subsidies (in particular in relation to financial support provided by the EIB or other public or private financial bodies) – in general these should not exceed five years in duration;
 - iv. Direct grants (in exceptional circumstances);
 - v. Risk capital participation for investment funds (not to exceed 1% of the budgetary allocation); and
 - vi. A combination of (i) to (v), where appropriate.
- 10.12 TEN-T funding is primarily targeted at overcoming financial constraints during the start-up phase of projects. In determining the value of these projects, their direct and indirect socioeconomic effects, as well as their financial profitability, are examined. Other selection criteria include the environmental consequences, the maturity of the project and the soundness of the financial package. TEN-T funding should avoid distorting competition in the sector concerned. The funding should be used to encourage public-private partnerships where possible. The projects can be multi-annual and are required to be monitored and appraised against their objectives and business plans.

- 10.13 The Community aid, under the existing Regulation, may not cover more than 10% of the total investment cost. Ex-post funding cannot be provided for activities undertaken before the application.
- 10.14 The 1999 Regulation prescribed that at least 55% of funding should be devoted to railways (including combined transport) and a maximum of 25% should be spent on roads. These allocations limit the funds available for other transport modes.
- 10.15 Community funding for TEN-T projects comes from a variety of sources, as illustrated in the figure and table below. These sources include funds from EIB, EIF, EBRD, as well as a budget component which is raised specifically as TEN-T funding. The latter (7%) is the only specific funding source not discussed elsewhere in this section.

TABLE 10.1 SOURCES OF CONTRIBUTIONS TO TEN-T BUDGET, 1998-2001

Source	Amount (€ million)
EIB loans	19,563
EIF loans/guarantees	455
Cohesion Funding	5,465
European Regional Development Fund structural Funding (approximate)	3,000
TEN-T Budget	2,114
Total	30,597

FIGURE 10.1 SOURCES OF TEN-T FUNDING, 1998-2001

ERDF = European Regional Development Fund

- 10.16 TEN-T support in the area of ATM has concentrated on two main areas: upgrading current systems to remove or relieve major bottlenecks, operating mainly at a national level; and developing the future European system, which has a more multinational focus.

Research funding

10.17 The European Commission provides funds to support research programmes which address the priority themes of the Sixth Framework Programme. The instruments available are:

- Integrated projects;
- Networks of excellence;
- Article 169 (for the joint implementation of national programmes);
- Specific targeted research projects;
- Coordination actions; and
- Specific support actions.

Integrated projects

10.18 These are multipartner projects whose main goal is the generation of knowledge to implement thematic research priorities, and are designed for projects of an ambitious scale. A grant can be made to the budget, as a contribution to the eligible costs incurred (as defined under guidelines by the Commission).

10.19 The cost models used for support of the projects include a full-cost model (all direct and indirect costs); a variant full cost model comprising direct costs and a 20% margin to cover indirect costs; and an additional cost model covering all direct costs (in addition to recurring costs of the participant) plus a 20% margin to cover indirect expenses.

10.20 There are maximum levels of support set at:

- 50% for research and technological development
- 35% for demonstration activities
- 100% for training activities
- 100% for the management of the consortium undertaking the project

Networks of excellence

10.21 Networks of excellence aim to provide excellence across Europe in resource and expertise, and to tackle the fragmentation of European research, by creating a critical mass of expertise and resources. The key deliverable from eligible projects is structural change, in order to achieve international integration of research capacities. The funding is, in general, through direct grants to participants.

Programmes jointly implemented by several Member States (Article 169)

10.22 Requiring co-operation at Member State level, this instrument aims at the integration of national research programmes which explore a given topic.

Specific targeted research projects

10.23 These projects aim to improve European competitiveness or to meet the needs of society or Community policies. The projects tend to be research and demonstration in

nature. The funding is governed in a similar way to the integrated projects, but for activities of more limited scope.

Co-ordination actions

- 10.24 Co-ordination actions aim to promote and support networking and co-ordination of research and innovation activities. A grant up to the maximum 100% of the budget is available for the costs of co-ordination, although not of the research.

Specific support actions

- 10.25 Specific support actions aim to support the implementation of framework programmes and to prepare for future Community research policy activities. Costs eligible for funding are as for integrated projects, and a grant is available up to a maximum of 100% of the relevant costs.

Regional Funding instruments

- 10.26 The European Commission has provided a number of sources of regional funding to support less prosperous areas through:

- Structural funds;
- The Cohesion Fund; and
- ISPA and PHARE.

Structural funds

- 10.27 There are four Structural Funds, one of which, the European Regional Development Fund (ERDF), has been used for transport projects. These projects have included the Spata airport in Greece and the Portuguese Vasco da Gama bridge. The responsibility for choosing individual measures and practical projects is the responsibility of the Member States alone, although the broad priorities of a given programme are identified in cooperation with the European Commission.

- 10.28 The ERDF has two objectives:

- Objective 1 – development of poorer regions (those whose GNP is below 75% of the Community average), remote regions and sparsely populated areas; and
- Objective 2 – development of areas with structural problems, assigned to four categories: industrial; rural; urban; and fishery-dependent.

- 10.29 The Structural Funds do not fully finance projects, but rather supplement national or regional financing from either the public or the private sector as co-financing in the form of grants. The level of co-financing varies by region and by measure within a programme. For Objective 1 projects, up to 75% of total costs can be met by Structural Funds, increasing to 80% or 85% for states eligible for Cohesion funding or outermost regions and outlying Greek islands. There are also different funding ceilings for particular programmes. In particular, for investments in firms, the ceilings for Objective 1 and Objective 2 projects are 35% and 15% respectively. For investments in infrastructure that generates substantial revenue (defined as at least

25% of the total cost of the investment), the ceilings are 40% (increasing to 50% for States covered by the Cohesion Fund) and 25% respectively.

Cohesion Fund

- 10.30 The Cohesion Fund finances projects designed to improve the environment and develop transport infrastructure in Member States whose per capita GNP is below 90% of the Community average. The Member States qualifying for the period 2000-2006 are Greece, Spain, Ireland and Portugal (this membership will be widened following the accession of new members in May 2004). The Cohesion Fund allocates funds in a similar way to Structural funds, although instead of being allocated to the poorest regions, they are allocated to the poorest countries. Projects are selected and implemented by each country, which is also responsible for both management and financial monitoring, with additional monitoring by the Commission.

Instrument for Structural Policies for Pre-Accession (IPSA)

- 10.31 Transport infrastructure provision is, in some countries, well below the average levels in the Union. ISPA was developed by the European Commission to help the central and eastern European countries to comply with community transport standards.

PHARE

- 10.32 The PHARE programme over the period 1990-1998 in the ten candidate member states in Central and Eastern Europe was used to undertake a financial commitment of more than EURO 900 million, or nearly 10 per cent of the cumulative PHARE budget over that period, of which nearly 60% was contracted by the end of 1998. A small amount of PHARE funding was allocated to ATM, but with the phasing out of PHARE funding for countries joining the EU this is unlikely to be a source of funds for the SES.

Use of Community financial instruments and analysis of constraints

EIB

- 10.33 The use of EIB financing by ANSPs over the last five years has been relatively limited as compared to other transport modes. The projects are presented in Table 10.2. Before 1999, EIB provided funds to the Netherlands, Portugal, Estonia, Slovak Republic, Malta, Hungary, Belgium and Greece to support ATM provision. It also signed €5.8 billion of transport infrastructure loans for the Accession Countries over the period 1990-1999, of which 6% or €350 million was for air transport (no specific breakdown is available for ATM). In addition it has been in discussion with Eurocontrol about the financing of CEATS.

TABLE 10.2 ATM PROJECTS SUPPORTED BY EIB, 1999-2003

Project	Description	EIB contribution (€ million)
Zagreb ATC, Croatia	Modernisation	66.1
Cyprus ATC	Expansion & modernisation	128.6
Serbia & Montenegro ATC	No description	167.0
NAV, Portugal	Modernisation	28.4
Total		390.1

- 10.34 The EIB has the potential to provide access to financing on competitive terms. However, for many of the larger ANSPs with an investment grade credit rating, there is currently little benefit from using EIB as they can obtain commercial money at a similar price without the constraints of EIB financing, in particular the administrative application, and the requirement to be consistent with European policy (although the latter is not a relevant constraint in respect of SES implementation).
- 10.35 For the smaller and medium-sized ANSPs, a number of **additional** constraints and limitations may be an explanation for the relatively small number of ATM projects currently financed by EIB:
- the funding must be provided for a project not a corporate entity (although SES and its requirements would qualify under this description);
 - EIB can only finance up to a maximum of 50% of the costs;
 - the loans are subject to scrutiny in relation to the financial and economic viability of projects;
 - EIB requires loan guarantees, preferably through sovereign guarantees from the government, although guarantees are also available through income and asset securitisation; and
 - the resulting project has to be procured on an open tender basis consistent with EC rules.
- 10.36 The EIB has indicated that, for existing ATM projects, it has placed conditions on changing the borrowers' corporate structure and internal processes as a proviso for receiving the loan. These have included formal separation between regulation and service provision, separation between airport and ATM, and the requirement to introduce improved financial systems and comply with the International Accounting standards. While these conditions may impose some burden on ANSPs, they are very much in the spirit of the SES.

EIF, EBRD

- 10.37 There has been limited use of EIF and EBRD funding by the ATM industry over the last five years and we do not expect it to be a source of funding for the SES.

TEN-T

- 10.38 The bulk of TEN-T funding is accounted for by rail and road spending, with these two sectors accounting for over 85% of spending. Table 10.3 gives an indication of the

breakdown by sector of the distribution of two of the sources of community grant funding, the TEN-T Budget and Cohesion Funding.

TABLE 10.3 MODAL SHARE OF COMMUNITY FINANCIAL SUPPORT, 1998-2001: TEN-T BUDGET AND COHESION FUNDING

Mode	Amount (€ million)	Share (%)
Road	1,880	25%
Rail	4,639	61%
Inland waterways	54	1%
Seaports	258	3%
Airports	366	5%
Intelligent Transport Systems	341	4%
Combined and multimodal transport	43	1%
Total	7,581	100%

- 10.39 While the exact proportion of ATM spending is not available for Cohesion funding, we have been able to explicitly calculate the share of ATM spending in the dedicated TEN-T Budget for the years 2000-2002. Table 10.4 and Table 10.5 show that the shares have been rather low such that TEN-T Budget spend on ATM is less than €15 million a year.

TABLE 10.4 ATM SPENDING AS A PROPORTION OF DEDICATED TEN-T BUDGET

	Spending on ATM Projects (€ million)	Total Spending on all projects (€ million)	Percentage ATM share
2000	14.7	592	2.5%
2001	11.0	552	2.0%
2002	14.3	563	2.5%

- 10.40 We provide below a detailed breakdown of ATM projects in receipt of TEN-T funding:

TABLE 10.5 AIR TRAFFIC MANAGEMENT – TEN-T FUNDING 2000-2003

Year	Project	Amount (€ million)
2003	European ATM Reference Validation Platform – EVR	1.6
2003	Eurocontrol ADS Programme Stages 1 and 2	1.2
2003	NUP Phase II	6.0
2002	CNS / ATM Integrated Programme “Mediterranean Free Flight” (MFF)	7.7
2002	Study on ADS Mediterranean Upgrade Programme (ADS MEDUP) EU/IT	2.4
2002	ITEC-FDP Interoperability through European Collaboration – FDP	2.5
2002	European ATM Reference Validation platform – EVF	1.65
2001	Eurocontrol ADS Programme Stages 1 and 2	0.8
2001	North European ADS Broadcast Network Update Programme, NUPII, Phase II	2.5
2001	CNS/ATM Integrated Programme “Mediterranean Free Flight” (MFF)	2.5
2001	Study on advanced airport approach procedures	2.5
2001	Development of pre-operational implementation critical design studies	0.84
2001	COMOS Common Mode S	1.83
2000	Mediterranean Free Flight – Comprehensive programme of studies	3.5
2000	ADS – MEDUP Study on the development of an experimental network	2.5
2000	Programme ARTEMIS	1.4
2000	Programme Operational Display System (ODS)	1.0
2000	Implementation of the Enhanced Tactical Flow Management System	2.5
2000	Installation of new Voice Control System	2.5
2000	ISIS Improved speech integrated system	1.3

- 10.41 In addition to TEN-T Budget funding for ANS, a proportion of the much more substantial Global Navigation Satellite System (GNSS) TEN-T funding can be attributed to the benefit of the ANS community; this is detailed below.

TABLE 10.6 GNSS – TEN-T FUNDING 2000-2003

Year	Project	Amount (€ million)
2002	TransEuropean Satellite Navigation System	170
2002	EGNOS AOC Pre-Operational Implementation Critical Design Studies	25
2001	EGNOS AOC Pre-Operational Implementation Critical Design Studies	10
2001	TransEuropean Satellite Navigation System (GALILEO) – development and validation	70
2001	TransEuropean Satellite Navigation System (GALILEO) – Definition phase	30

Research Funding

- 10.42 Under the Fifth Framework Program lasting four years from 1998 to 2002, EC funding for ATM projects amounted to €20.8 million, a significant contribution to the total costs of these projects, which amounted to €35.7 million.
- 10.43 The Sixth Framework Program, which runs from for five years from 2002-2006, allocates €1,057 million to its “Aeronautics and Space” category. In the first call, €6.7 million was allocated to ATM, and it is anticipated that in the second and third calls a total of €60 million will be used for ATM projects.
- 10.44 In addition to these sources of funding directly from the European Commission, Eurocontrol is funded by users to provide a very large research and development function. Eurocontrol spend approximately €150-200 million per year on Research and Development in the ATM sector.

Regional Funds*Structural funds*

- 10.45 During the previous financing period (1994/1999), around €15 billion in ERDF funds were spent on developing transport in Europe. In this period, airports accounted for 5%, and 11% was spent on ‘other’ projects, a small proportion of which may have been for ATM. During this period, ERDF spending was largely (94%) concentrated in Spain, Portugal, Greece, Italy, Germany and Ireland. While we do not have exact figures for ERDF spending on ATM during the 1994-1999 period, the amounts were certainly small. There are two reasons why this may be the case, both related to the motivations behind the use of the funds. First, Structural funds are generally channelled to poorer regions, which may well not be regions containing ATM centres. Second, ATM may be perceived as a national activity, and as such inappropriate for regional funding, because of the perception that any benefits of ATM improvement will tend to accrue in a spatially diverse manner, rather than acting as a catalyst for growth in under-developed region.
- 10.46 For the years 2000-2002, we have been unable to find any evidence of further ATM spending from this source, although we note that there may have been some spend on modernisation of air traffic control in Greece.

Cohesion Fund

- 10.47 The Cohesion Fund invested some €8 billion in transport in the period 1994-1999, although the majority was used for surface transport. The amount spent on airports over this period was €496 million euro, 6% of the total transport spend. Again, we have been unable to find exact figures for ATM projects.
- 10.48 In 2001, Greece's Strategic Reference Framework (SRF) for the transport sector was approved. This framework, which provides for assistance together with part-financing by the ERDF, included completing the modernisation of the air traffic control system in Greece, although we have been unable to find any detailed financial information on this or other ATM spending under the Cohesion Fund.
- 10.49 Cohesion funding, like Structural funding, has not been a major source of financing for ATM. One reason for this may again be that ATM is not seen as a class of project that particularly favours regeneration, although it may be a potential source of funding for new members.

IPSA

- 10.50 For projects decided during the period 2000-2003, €2.1 billion was committed for transport, of which €0.7 billion has been spent. Transport makes up 50% of IPSA funding. It is unclear exactly how much of transport spending is ATM-related, but given that the priorities have been development of the road and rail networks, we have reason to believe that the numbers involved were relatively small.
- 10.51 The ISPA fund will no longer be available for countries which have acceded to the European Union, only leaving Romania and Bulgaria eligible to receive funds. The acceding countries will, as a transition measure, receive funding from the Cohesion Fund, amounting to €2.8 billion per year over the period 2004-6, as a form of compensation for no longer receiving IPSA funding. Allocations under the Cohesion Fund after this period are unclear.

Future use of financial instruments and policy recommendations

EIB

- 10.52 There is scope for EIB funding to support a number of the financing requirements of the SES. These fall broadly into two categories. The first is the funding of low-and medium-cost items; the second is funding higher cost items such as development and implementation related to interoperability and FAB establishment.

Lower cost items

- 10.53 Three possible ways in which the EIB might be able to increase its lending for low and medium-cost items are:
- Facilitating the provision of guarantee requirements through securitising loans against an income stream;
 - Alleviating the burden of compliance costs; and
 - Issuing a consolidated bond to a number of smaller ANSPs.

We consider each of these instruments in turn below.

- 10.54 Some relatively small, country-level, projects in theory currently have access to EIB funding via a Global Loan. However, in practice uptake of this instrument has so far not been significant. In the case of smaller ANSPs, one of the reasons may be the difficulty imposed by the requirement to provide security, as they might find it difficult to obtain the necessary government financial guarantees. However, the EIB believes that the SES will be an eligible project for funding, and that there is an opportunity for securitising loans against an income stream, probably through the CRCO process (for example, in line with similar arrangements for airlines with IATA under Escrow arrangements).
- 10.55 An alternative suggestion for facilitating financing of smaller projects could be to alleviate the burden of compliance costs. This could be achieved by organising a process within the EIB to take special account of the SES, and allow some fast-tracking of projects within a framework. This process could also take account of the obligation that funding is for a specific project.
- 10.56 For those ANSPs which are too small to obtain commercial bond facilities, the EIB could issue a Consolidated Bond on behalf of several organisations (as discussed in Chapter 9). While smaller ANSPs do currently have the facility to borrow from the EIB via the Global Loans instrument, it may be that a Consolidated Bond facility would offer more efficient financing arrangements, both by capturing the efficiencies of bond financing and through the economies of scale resulting from the consolidated nature of the bond.

Higher cost items

- 10.57 The EIB might also participate in lending to support some higher cost items relating to interoperability and FABs. This could include funding for both development and implementation phases.
- 10.58 Development work for interoperability and FABs is characterised by high levels of up-front spending and a significant degree of risk, or perceived risk, as to the future return on the investment. The EIB would in this context be able to offer finance in a similar manner to commercial banks, or perhaps in co-operation with providers. It might also be appropriate for the EIB to relax its requirements that projects be procured by open tender in such cases.
- 10.59 The implementation phases of FABs will be characterised by large expenditures, and a possible need to encourage expenditure by certain stakeholders in cases where desirable system benefits may not be shared by all. This sort of expenditure may best be facilitated by a dedicated Community Financial Instrument (CFI) as reviewed further in Chapter 11.
- 10.60 A CFI project would of its nature involve more than one ANSP, and would need to address complex issues surrounding allocation of financial and economic costs and benefits, and distribution of risks. The role of the EIB within such a structure could be as one of several potential financial contributors, with the others potentially including

national governments, the private sector, or alternative European level financing mechanisms. While the role of the EIB would not thus be as an active manager of the Instrument, it would nonetheless need to be sufficiently involved to be confident that its investment contribution would be viable, and that it had sufficient security for its loan.

EIB views

- 10.61 In general the EIB believes that any investment undertaken for the SES should be placed in the context of a policy that aims to promote efficient and necessary investment required by ANSPs, and which results in cost efficiency improvements for users. They fear that evidence from their loan applications and monitoring of the industry suggests that some ANSPs are aiming to use SES as a lever for higher investment, which may neither be necessary nor lead to a more efficient industry. This, of course, runs counter to one of the key rationales behind the development of the SES.

TEN-T

- 10.62 We consider a number of issues surrounding the use of TEN-T funding for ATM projects. As it is important to understand the broader institutional framework for TEN-T, and proposed changes to it, we first review the context, before going on to discuss the specific issues surrounding future TEN-T funding of ATM projects. We also review the latest proposals adopted by the European Commission for amendments to the TEN-T framework.

Proposed changes to legislation

- 10.63 There has been concern in many quarters about the slow progress made in developing TEN-T. In order to address these concerns, a proposal for amendments to both the Guidelines and the Financial Regulation was tabled by the Commission in October 2003. The Commission's Proposal was based on the results of a review by a High-Level Group, chaired by Karel Van Miert. The background to the review was a belief that there is insufficient budgetary allocation to the funding of transport, and that the allowed 10% of the total investment costs is, on many occasions, insufficient incentive to undertake the project.
- 10.64 The main proposed changes to the existing legislation were:
- A revised list of priority projects;
 - Creation of a Declaration of European interest for priority projects – entailing inter alia a concentration of EU financial resources, encouragement that Member States stick to agreed timetables, and co-ordinated evaluation and public consultation procedures;
 - Financing based on a multi-annual legal commitment, for projects declared to be of European interest, providing project promoters a guarantee they will receive funding throughout the implementation phase;
 - An increase in the maximum aid of TEN-T funding for the cross-border sections of certain priority projects to 30% of the total costs – namely cross border sections of projects of European interest, promoting interoperability;

- Contribution of up to 20% of investment costs for projects concerning satellite positioning and navigation systems; and
 - Funding for cross-border projects of €15 billion over the period 2007-2013 (including aid from the Cohesion Fund).
- 10.65 The new Guidelines were adopted by the European Parliament and the European Council in April 2004. The Guidelines update the list of priority projects, expanding it to include a total of 30 projects. They also create the Declaration of European interest, and allow for the Commission to appoint European Coordinators for projects to increase international cooperation. New rules are also due to enter into force which will increase the co-funding rate from 10% to 20% for those sections of priority projects which cross natural barriers or borders.
- 10.66 In addition to this, the Commission in July 2004 adopted a proposal for a Regulation (2004/0154 (COD)) to determine the general rules for the granting of Community Financial aid in the field of the trans-European transport networks and energy (amending Council regulation EC No 2236/95).
- 10.67 This regulation provided for specific support for the provision of the interoperability Regulation of the Single European Sky.
- 10.68 In addition the proposed Regulation provides for:
- An approved budget for TEN-T funding of more than €600 billion to 2020 (as was approved by the Council and Parliament on 29th April 2004;
 - Recognition that the 10 new Member States of the Union will increase pressure on transport networks;
 - An increase in the potential rate of Community participation in projects, as shown in Table 10.7;

TABLE 10.7 REVISED MAXIMUM RATES OF TEN-T AID FOR TRANSPORT PROJECTS

Maximum rates		
	Nation	Construction
Priority projects	50%	Up to 30%
Of which cross border	50%	Up to 50%
Other projects (including interoperability, security and safety)	50%	Up to 50%
Other projects of the common interest	50%	Up to 15%

- Proposed changes based on the principles of:
 - Simplification (desisions based on comitology - a single decision making body- rather than co-decision making);
 - Conditionality (aid provided on condition of compliance with Common transport and energy policy);

- Selection and concentration (greater selectivity of projects allowing greater concentration of limited resources into two types of project: priority projects and those of the common interest);
- Proportionality (increasing co-financing to a maximum of 30% and in exceptional cases 50%);
- Types of aid (as wide a range as possible); and
- Management (The Commission is considering the case for designating responsibility to an executive agency).

Commentary

- 10.69 The latest set of proposals for TEN-T, and in particular the singling out of the interoperability regulation of the SES as an appropriate area to which funding should be applied, seek to address a number of the existing shortcomings in the TEN-T funding. Although these Commission proposals have not yet been approved by the European Parliament, it is reasonable to expect the ATM sector, and SES projects in particular, to receive greater funding from TEN-T in future.

Research Funding

- 10.70 ATM research projects funded by Framework Programs have in the past included projects with a focus on SES issues, and therefore there is good reason to think that more such funding may be available in this area; the Commission's current view of the need for further support to implement the R&D element of SES implementation supports this.
- 10.71 The strongest candidates from among the different SES cost categories to receive research funding would be the development work needed for system interoperability and FABs. The case for these could be made particularly strongly if it could be shown that such funding would provide significant incremental benefits, by encouraging development which might not otherwise occur, due to uncertainty perceived on the part of manufacturers over the high development costs and a lack of certainty about the future market for their products.
- 10.72 One area which would need to be carefully addressed would be the requirements surrounding the nationality of participating entities. There could potentially be a large pool of expertise available to be drawn upon from countries outside the European Union that have had experience in developing interoperable systems connecting centres operating over larger regions, such as the USA or Australia.
- 10.73 However, there are some limitations upon the use of existing Community funding for countries outside the Union. While there is little limitation on *participation* of individuals or institutions from other countries, there is a restriction on the *funding* that they can receive, as follows: "Other third country participants can also be funded in those areas where the relevant part of this work programme makes reference to this possibility or if it is essential for carrying out the research activity"⁴⁷. Only €7 million

⁴⁷ http://www.cordis.lu/fp6/inco_focus.htm

of funding under the Aeronautics & Space heading is specifically indicated to be available in this way in the work programme, and even this is not specifically focused on ATM. Thus the more likely avenue would be to demonstrate that extra-EU participation was essential, which may prove to be difficult given the structure of the industry.

Regional funding instruments

- 10.74 The factors driving the probable low uptake of regional funding instruments for ATM projects, namely the relatively poor fit between the goals of regional funding and ATM projects, seem unlikely to change in future. A possible exception could be if industry reorganisation to facilitate FABs resulted in some social spending being needed to mitigate restructuring costs.
- 10.75 There is also a lack of clarity as to the future of Cohesion Funding: in the past, it has been targeted at the poorer countries, but it is unclear how disbursements will start to change following the entry of the new Member States into the EU in May 2004.

Summary

- 10.76 Having reviewed the existing use of Community financial instruments in the ATM sector, and assessed whether the existing rules could be amended to encourage the greater use of existing financing mechanisms and sources, it would appear that there are real opportunities for greater support from EIB, TEN-T and research funding. In particular, the Commission's proposal to place particular support behind the achievement of interoperability requirements of the SES within the TEN-T framework provides a significant potential source of funding.

TABLE 10.8 FUNDING LIKELY TO COME FROM EXISTING COMMUNITY FINANCIAL INSTRUMENTS

Name	Amount (€ million)	Dependency
EIB	Project dependent - could be significant	Highly speculative, dependent on greater flexibility in administration and other existing constraints
TEN-T	Could be significant depending on the Commission's proposed Regulation being passed into law	Could be greater if the proposed Regulation is passed
Research	Currently limited to €20-30 million pa, but could be more depending on proposed changes	Dependent on the success of ATM projects in securing research framework funding

11. NEW COMMUNITY FINANCIAL INSTRUMENT

Introduction

11.1 This chapter examines the case for the introduction of a new Community financial instrument to help, alongside existing instruments, to support the achievement of the SES. Depending upon the funding available from the extensions of existing funding instruments proposed by the European Commission, the need new financial instruments at Community level may be more limited.

11.2 The remainder of this chapter is organised in the following sections:

- A review of the conclusions of the economic regulation study⁴⁸;
- Options for introducing a new community financial instrument;
- Why do we need a new community financial instrument?
- The specification of a new community financial instrument.

A review of conclusions in the economic regulation study

11.3 The study discusses the creation of a new ATM “solidarity fund” to be used for the financing of infrastructure projects. The report discusses how the fund might be financed through either: a re-allocation of user charges; member state financing or private financing arrangements.

11.4 The study concluded that: “...the creation of a European infrastructure fund through either a surcharge on users or through contributions from Member States, is likely to be unpopular not least because of the danger of the potential inefficiency it introduces, and because it potentially detaches the funding of collective projects from the beneficiaries of the projects...”.

11.5 The study also briefly discussed the European Commission’s and European Investment Bank’s potential funding of investment programmes. It concluded that the involvement of a new European ATFM network manager would be an essential precondition for the success of a new “solidarity infrastructure fund”. In short, without a new network management body, the study did not consider a new solidarity infrastructure fund as being likely.

Options for introducing a new Community financial instrument

11.6 A new Community financial instrument could take a number of forms. The main dimensions of the instrument would be:

- The source of its funds (and how they are collected);
- Its governance;
- How its funds were disbursed and used; and
- How its performance was monitored.

⁴⁸ Economic regulation within the framework of the Single European Sky, Regulatory Policy Institute

- 11.7 Each dimension is discussed in turn below, but first we outline stakeholders' views about the potential introduction of a new Community financial instrument.

Stakeholder views

- 11.8 The introduction of any new Community financial instrument will need to be well presented and targeted at those areas of the SES that require support from Community level sources of finance, and meet requirements that existing Community sources cannot fulfil.

- 11.9 Stakeholders expressed a number of views about the potential introduction of a new community financial instrument:

- Some are concerned that the introduction of such a mechanism would cede some economic control of the industry to the European Commission;
- Some see it as essential to support the introduction of the SES, given the high up-front costs and lack of commitment to financial benefits under the existing charging arrangements;
- Some have cautioned that any new mechanism should not lead to discrimination between those countries and ANSPs that have already been, or are in the process of, implementing the SES requirements under existing funding frameworks, and those that have not and require additional support from a new financing framework to do so;
- Some have requested that any introduction of additional Community financial instruments be supported by appropriate checks and balances to ensure the monies are targeted and ensure real operational benefits to the user community;
- Some have welcomed the opportunity for aviation to be granted some support (if funded by taxpayers via the European Commission budget) where hitherto the sector's share of Community funds has been small compared to other transport modes; and
- Some have reserved judgement until more specific proposals are put forward, but welcome the introduction of such an instrument in principle.

- 11.10 We took these stakeholders' views into active consideration when developing our recommendations for a new community financial instrument.

Sources of funds

- 11.11 The main alternatives for providing the resources for a new community financial instrument are:

- **User charges:** re-allocated revenues collected through the user charging mechanism (as permitted by the SES regulation);
- **National taxation:** collected through SES member states' general taxation and pooled at a SES level; and
- **European Community funds:** collected from European Union Member States' contributions (however, the difference in membership of the SES and European Union would be a factor in the collection and distribution of these funds).

Governance

- 11.12 The application of any new Community financial instrument will need to be determined through appropriate governance arrangements. Potential entities that could be responsible for the governance of a new Community financial instrument include:
- i. **Eurocontrol:** as the existing pan-European, non-governmental ANS organisation, it is able to identify areas for expenditure relatively easily. However, not all stakeholders would support an extended role for Eurocontrol in this area;
 - ii. **The European Commission:** the Commission does not currently have a role in the financial governance of the ANS sector. However, it could create a new executive agency for these purposes.
 - iii. **A new pan-SES committee:** incorporating representatives from key stakeholders including ANSPs, users, labour representatives, regulators and government organisations;
 - iv. **A new independent financial entity:** with no links to existing organisations, but provided with a specific terms of reference and responsibilities; and
 - v. **A new European ATFM network manager:** as suggested in the economic regulation study.

How the new Community financial instrument might be used

- 11.13 The new Community financial instrument could be used to implement or incentivise a number of policy goals consistent with the SES legislative framework. These could either be specific or more general including:

Specific

- Assistance with the research and development costs of the systems required to promote interoperability and implement FABs; and/or
- Assistance to enable the implementation of SES requirements that do not yield tangible financial benefits; and/or
- Assistance in the implementation of pan-member state projects, in particular the implementation of FABs with common infrastructure or the social costs of restructuring associated with the project.

General

- Assistance to promote the SES.

How performance could be monitored

- 11.14 Sufficient checks and balances would need to be put in place to ensure that any new Community financial instrument was being used effectively and efficiently. This might be facilitated through:
- Economic cost-benefit analysis for those projects seeking funding from the common fund;

- The monitoring of costs and benefits throughout the project, ensuring that the benefits of the project are in line with the economic case supporting the funding application, and that defined financial returns are made to the user or entity responsible for providing funds to the instrument; and
- Specific service level agreements between the operators of the project and the entity managing the new community financial instrument.

Why do we need a new Community financial instrument?

- 11.15 Table 11.1 shows how new ANSP / project financial instruments and existing Community financial instruments can be applied to meet the different financing requirements of the SES. It also demonstrates the extent to which such instruments address the limitations and constraints identified in Phase 2 of the study. It can be seen that most of the funding requirements of the SES are partially already covered by the existing financial instruments outlined in previous chapters. However, the coverage of existing mechanisms is incomplete, particularly for research and development and low and medium cost items. The new community financial instrument could therefore be designed to address these limitations, and to provide for incentives to promote the objectives of the SES.

The specification of a new Community financial instrument

Policy objectives

- 11.16 We believe that policy objectives set for a new Community financial instrument should be **specific**, and should focus on addressing the financing requirements of the SES.
- 11.17 Our analysis of existing community financial instruments and our discussions with stakeholders leads us to recommend that explicit policy objectives should be set, including:
- assistance with the research and development costs required to develop, in particular, interoperability;
 - assistance for the implementation of “small” and “medium” cost SES impacts – that do not yield any immediate and direct financial benefits to users; and
 - assistance in providing incentives for the identification, development and implementation of FABs (potentially including the social costs incurred through the restructuring resulting from the FAB).
- 11.18 For clarity we have assumed that these three objectives would best be supported respectively by:
- a Research and Development Fund;
 - a Single Sky Compliance Fund; and
 - an Airspace Restructuring Support Fund.
- 11.19 The financial cash flows that these instruments would address are highlighted at the bottom of Table 11.1.

11.20 These specific objectives would provide the Commission with a framework to “kick-start” the implementation of the SES in areas where this was needed. Moreover, they addresses some of the specific limitations and constraints identified in Phase 2:

- The promotion of SES-wide, rather national airspace, benefits; and
- Government budget or borrowing limits (and pressures brought about through user resistance to increases in charges).

TABLE 11.1 FINANCIAL INSTRUMENTS CONSIDERED IN THE STUDY - FEATURES

SES requirements	Low & medium Cost Items	R&D	FAB Implement	Interop. Implement	Limitations and constraints addressed
New ANSP and Project Specific Financial Instruments					
New direct user fees	✓				None
Manufacturer financing			✓✓✓	✓✓	Government budget & borrowing
Consolidated bond / Intra-ANSP	✓✓		✓✓	✓✓	Size constrained access to funds
Joint venture		✓	✓✓	✓✓	SES-wide benefits, lack of consultation, commitment to benefits
Consolidated equity fund			✓	✓	Government budget & borrowing
Existing Community Financial Instruments					
European Investment Bank			✓✓	✓	
TEN-T	✓		✓✓	✓✓	
Research Funding		✓✓			
New Community Financial Instruments					
Research & Development fund		✓✓✓			Government budget & borrowing
Compliance Fund	✓✓✓				User resistance to charges
Airspace restructuring support Fund			✓✓✓		SES- wide benefits

Key: ✓✓✓ = Fully applicable; ✓✓ = partially applicable; ✓ = some application

Who should contribute funds to the instrument?

- 11.21 The options available are funding from user charges or through general national or community taxation.
- 11.22 We suggest that:
- For specific assistance with research and development costs with diffuse and uncertain benefits to users, the financing **should be redirected from Eurocontrol's EATMP, EEC and associated support costs budget to a specific SES research and development fund** (i.e. paid for out of en-route user charges under existing arrangements).
 - For specific assistance to implement SES measures with little or no immediate and direct financial benefits to users, the financing **should be provided by the European Commission.**
 - Specific assistance in providing incentives for the identification, development and implementation of FABs, with SES wide benefits **should be provided through the research and development fund above, and soft loans (with the difference between, say, soft and commercial loan arrangements funded by the European Commission).** A further potential option is for the European Commission to provide direct support for social restructuring costs.

Who should govern the instrument?

- 11.23 We believe that an independent agency (separate for Eurocontrol and the European Commission), acting on a terms of reference and objectives set by the European Commission, is potentially the most effective form of governance for any new Community financial instrument. This new agency would be advised by a representative committee comprising key stakeholders: Eurocontrol, users, ANSPs, manufacturers and the European Commission.
- 11.24 Applications for funding would be made to this agency, which would allocate funds according to a clear set of objectives set out in its terms of reference. The skills required by the agency would depend on the type of funding allocated. For FABs, an understanding of the operational benefits to be achieved would be a pre-requisite, and the decisions for allocating funding are likely to take place on an occasional basis. However, direction of ongoing research and development funds would require a day-to-day work programme and an understanding of the objectives of the interoperability directive.

Checks and balances on the new Community financial instrument

- 11.25 The independent agency would be responsible for monitoring the success of the policy, and suggesting amendments to the rules and form of community financial support to the European Commission.
- 11.26 The agency would also be responsible for designing specific checks and balances in support of the financial support provided. These might include:
- for the Research & Development Fund: to achieve the implementation of the interoperability directives by certain key dates;

- for the Compliance Fund: to achieve the standards required by SES, with compliance capable of independent audit; and
- for the Airspace Restructuring Support Fund: Any soft loan arrangements would require some commitments to the achievement of system benefits and proposals, to be approved, as to how to share these benefits with users. Any support for social restructuring costs would need specific measurable objectives such as retraining and numbers of persons assisted.

Assessment of the likely applicability

11.27 The introduction of such a new community financial instrument would require consensus support from key stakeholders including:

- Member states;
- The European Commission; and
- The ANSP and user communities.

11.28 From the discussions undertaken as a part of this project, we would expect there to be some resistance to the introduction of new Community financial instruments from some parts of the stakeholder community, particularly from certain member states who have expressed opposition to the concept and some ANSPs who believe that any interference of the European Commission in the financing of the ATM is undesirable. Moreover, there have been specific comments made on the introduction of a compliance support fund that rewards laggards at the expense of “first movers” in meeting the requirement of the SES.

11.29 However, after having sight of the emerging findings from Phase 1, other stakeholders recognised the potential role for such a community instrument in easing the burden of up-front costs, ahead of the stream of substantial financial and economic benefits that should then accrue to stakeholders across the Community in the longer term.

11.30 Assuming that the concerns of some stakeholders can be overcome, a new community financial instrument of the form sketched out above would require the introduction of European legislation to establish its legal identity and governance. The potential for delay in introducing the instrument, from stakeholder opposition, will be a key factor in determining its likely applicability and usefulness: many of the potential “kick-start” benefits of a new instrument could be dissipated by such delay of more than, say, one-two years.

Financial impact illustration

11.31 In this section, we illustrate how each of the funds might work in practice as applied to specific cash flows identified in Phase 1 and summarised in Chapter 3. We also indicate the potential size of the total fund, and the period over which we believe such a fund might be needed.

Research & Development Fund

11.32 Our Phase 1 cost estimates indicated that in order to implement the interoperability directive there may be some €40-80 million per annum of research and development cost over the period to 2010. AECMA has estimated re-development costs of €200-

300 million per annum. It is also likely that research and development associated with FABs will be significant (up to €50 million per annum).

- 11.33 The existing Eurocontrol budget for the provision of ATM research and development is in the region of €150-200 per annum (based on the share of EATMP, EEC and associated support costs). This could be supplemented with research funding available from the 6th Framework agreement as a source of a specific SES Research and Development funding.
- 11.34 Given the substantial amount of R&D funding available to ATM through national funding, funding from the European Commission and from the existing Eurocontrol budget, we suggest that no **supplementary funding is supplied from additional sources**; rather **existing funding should be redirected where appropriate to the specific requirements of the SES**.
- 11.35 Some of the funding provided to Eurocontrol by users, through the charging mechanism, should remain under its control. However a proportion of it should be redirected to meet the specific requirements of the SES. The precise allocation of the available funding would require further work. However, we would suggest that, at least in the initial five years some €75-125 million of R&D funding should be earmarked for the SES, and governed and allocated by an independent body set up under terms of reference set by the European Commission.

Compliance Fund

- 11.36 Our Phase 1 estimates indicated that the sum of low and medium cost items is in the range of €25-60 million per annum. We would expect any such fund provided by the European Commission to cover a high proportion of these costs for at least the first three to five years of the SES (to incentivise prompt compliance).

Airspace Restructuring Support Fund

- 11.37 The Research and Development fund would provide an allocation of funds to support the development of identification and development of FAB proposals.
- 11.38 For the incentivisation of FAB implementation, we have suggested that soft loans could be provided through the European Commission, with the Commission responsible for funding the difference between commercial terms and the “soft loan terms”. We would expect these arrangements to be of greatest benefit during the initial stages of the implementation of the FABs, where benefits have not yet materialised and where users will therefore be understandably reluctant to pay ahead of “proof of concept”.
- 11.39 Therefore, an estimate of the level of funding that might be required to incentivise such development is based on the implementation costs identified in Phase 1, and an annual holiday of interest and principal repayments for the first five years of the project. The estimate is based on the assumption that a maximum of three FABs would be supported on this basis at any one time, with an average implementation cost of €200 million and an average interest rate of 8%. Therefore the support costs would

be some €48 million per annum. We would expect this support to be provided over a ten year period.

- 11.40 A summary of the financial cost of the potential support from the new mechanisms is provided in Table 11.2. The amount of support required at a European level would be up to some €110 million per annum, in combination with up to €125 per annum of redirected user charges.
- 11.41 In addition to these specific areas that we have identified through our analysis, the European Commission has also identified the following areas where it believes there is a strong case for additional community support:
- To incentivise airline investments both on board and on the ground; and
 - To enable greater synchronisation of investments that have mutual dependency and benefits.
- 11.42 These are issues that have not been raised specifically by stakeholders or the study team during the study and therefore have not been analysed in any detail.

TABLE 11.2 SUMMARY OF SUPPORT FOR NEW COMMUNITY INSTRUMENTS

Name	Source	€ Million Amount per annum	Duration	€ Million Gross total
R&D Fund	Eurocontrol user charges 6 th framework	75-125	5 years	375-625
Compliance Fund	Community taxation	25-60	3 years	75-180
FAB incentive Fund	Community taxation	40-50	10 years	400-500
TOTAL		140-235		850-1,305

12. SEPARATION BETWEEN ANS INFRASTRUCTURE AND SERVICE PROVISION

Introduction

12.1 In this chapter we examine the options for greater separation of infrastructure from service provision and suggest a framework for assessing the case for it in the context of the wider SES process..

12.2 The remainder of this chapter provides:

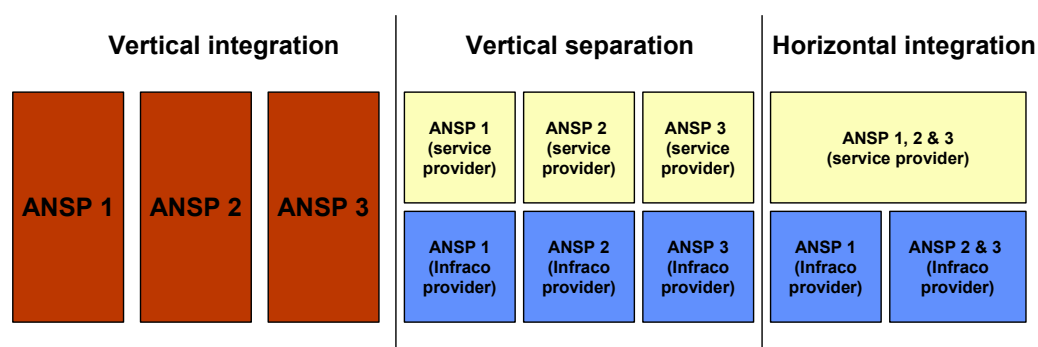
- A conceptual introduction to the issues;
- A review of previous studies of organisational separation in ANS;
- A review of the experience from other modes of transport;
- Vertical separation and industry consolidation in ANS;
- Alternative approaches to vertical separation in ANS;
- Commercial arrangements;
- The case for and against greater separation;
- A review of stakeholders views; and
- Our views and conclusions.

Conceptual introduction to the issues

Organisation structure

12.3 The current Air Traffic Management (ATM) industry under the Single European Sky (SES) is organised on the basis of national, vertically integrated ANSPs. Vertical separation of these organisations would split the “Infrastructure Provider” from the “Service Provider”. Over time, in an unconstrained industry, this vertical separation could be expected to lead to opportunities for horizontal integration. These concepts are illustrated in Figure 12.1.

FIGURE 12.1 CONCEPTUAL ORGANISATION STRUCTURE



Other factors influencing the provision of ANS

12.4 In addition to the ANSP’s own individual organisation structures, there are two other factors that influence the organisation of ANS provision:

- The **geography** of the service provision, within or across national boundaries – upper or lower airspace - underpinning the Functional Airspace Block concept of the SES; and
- The type of **ANS services** provided by the organisation – ATM, CNS, ancillary services, etc.

The future structural organisation of the industry is likely to be influenced by the interaction of these three factors.

The costs and benefits of industry restructuring

- 12.5 The net benefits of any industry restructuring, involving organisational separation, will result from the trade-off between the benefits of economies of scale through consolidation and efficiencies resulting from increased contestability and competition for the market on the one hand, and dis-benefits from diseconomies of scope and the transaction costs associated with the restructuring on the other.
- 12.6 Any judgement of the case for introducing industry restructuring should be based on an assessment of the incremental **net** benefits of the change.
- 12.7 In relation to the main factors influencing ANS service provision, then:
- There would certainly be significant **transaction costs** associated with industry (inputs) or service (outputs) re-organisation;
 - There are currently significant **economies of scope** enjoyed through the joint provision of different services; but
 - There are likely to be significant geographical **scale economies**; and
 - There are in principle **allocative and productive efficiency** benefits from increased competition and contestability for the market.
- 12.8 Accordingly, there is no clear *a priori* case for or against some vertical separation: the relative magnitude of these factors needs to be evaluated.

A review of previous studies of organisation separation in ANS

Consultation over the private sector participation in National Air Traffic Services (October 1998)

- 12.9 In October 1998, the United Kingdom Government issued a consultation paper on its preferred option for a Public Private Partnership (PPP) agreement for National Air Traffic Services (NATS). One of the key consultation questions raised was the future organisational structure of NATS.
- 12.10 The consultation asked respondents to consider whether NATS should continue to be treated as a single entity or whether the PPP should provide for:
- A separation by service business unit (e.g. airport ATC, En-route ATC, etc.); or
 - A separation of “operations” from the provision and maintenance of “infrastructure” (the idea being that the “operations” company would be responsible for the provision of ANS to customers, leasing the use of the assets provided by the “infrastructure” company).

- 12.11 The respondents to the consultation who answered this question, were close to unanimous in arguing against the separation of NATS.
- 12.12 In terms of horizontal separation, it was argued that dividing NATS Airport ATC from other activities might cause difficulties with the provision of a seamless gate-to-gate service and might have capacity implications at the busiest airports.
- 12.13 In terms of vertical separation, at the time, users were concerned that precious management time would be spent on implementing organisation separation at the expense of further delay to the opening of the New En-Route Centre at Swanwick. This short-term issue meant that the long-term merits of vertical separation did not feature in discussion during the consultation.
- 12.14 The United Kingdom Government decided that NATS would remain as a single entity. However, the contractual and licence structure of the PPP ensured that monopoly activities (NATS En-route Ltd - NERL– including en-route oceanic services) are ring-fenced from the competitive business (NATS Services Ltd NSL) to ensure that cross subsidy between monopoly and competitive (or potentially competitive) markets does not take place.

Study on Air Traffic Management market organisation (May 2001)

- 12.15 Booz Allen & Hamilton Ltd produced a study in 2001 for the Directorate-General Energy & Transport (DG TREN) that examined the potential for reorganisation of the ATM sector. The study examined the case for greater unbundling of services (ancillary, approach, airport) – rather than vertical separation between infrastructure and service provision.
- 12.16 The study concluded that: *“forced unbundling can result in over complexity and inefficiency. Therefore, unbundling should be facilitated not mandatory”*. The study concluded that, although unbundling may result in benefits, the bundling and unbundling should be the decision of the service provider: no firm conclusions over desirability in particular circumstances were reached.

Implementation rules for economic regulation in context of SES (October 2003)

- 12.17 The Regulatory Policy Institute (RPI) undertook a study for DG TREN on the implementation rules of economic regulation within the framework of the implementation of the Single European Sky in 2003. The report did not directly address the case for greater separation of ANS infrastructure from service provision. However, the issue was discussed indirectly in the context of:
- The potential benefits of a single European Air Traffic Flow Management (ATFM) network manager; and
 - The most effective way of co-ordinating infrastructure management (in the context of an interoperable system/infrastructure environment).
- 12.18 In the report, RPI discuss the case for a “European ATFM network manager” undertaking the tasks ranging from information collection and provision to active management of constraints in airspace, involving the reallocation of responsibility from national ANSPs to a European level.

12.19 They also discuss the potential to introduce a European infrastructure oversight body or manager. They suggest the oversight body might be responsible for:

- An analytical function at the European level;
- An identification function – for projects that provide benefits to the system; and
- A compliance function – ensuring infrastructure development is undertaken.

This would be consistent with a relatively decentralised approach to the provision of infrastructure by individual member states. The oversight body could play a role in co-ordinating finance for a number of ANSPs – particularly on cross-border projects.

12.20 They suggest that the option for the introduction of an infrastructure manager could extend to the contracting of investment projects, responsible for financing and potentially owning infrastructure.

12.21 RPI conclude by proposing the introduction of a European infrastructure **oversight** manager allied with common standards of interoperability, implicitly seeing the merits of infrastructure management being **provided** at a national (not SES) level.

Overview

12.22 There has not been much documented discussion in recent times of the merits of vertical separation between the infrastructure provider and entity responsible for ANS service provision. The majority of previous discussion has centred on the horizontal unbundling of different categories of service (airports, en-route, ancillary).

A review of the experience of vertical separation in other modes of transport

Heavy rail sector

12.23 The European Commission's White Paper on Transport believes that encouraging railway competition for the market and between railway companies is essential to revitalising the sector. This is aimed at addressing the gradual decline in market share of rail as compared to both road and air transport alternatives. The structural changes in the rail sector are seen as essential to facilitating this progress.

12.24 The passage of the first rail "open access" directive (91/440) in 1991 provided for the first time a measure of separation between the monopoly infrastructure and contestable rail operations functions to be imposed on Member States' (then) largely vertically integrated railways. In common with other "network" industries – such as the electricity and gas sectors – in the Union, such separation was viewed as a necessary (if far from sufficient) condition for the emergence of competition in the provision of rail services. At the same time, the Directive required non-discriminatory charges for access to infrastructure.

12.25 In the succeeding years, different Member States reacted to this Directive in varying ways to adjust their national legal and industry frameworks accordingly. In some cases, such as the United Kingdom and Sweden, domestic policy considerations prompted rapid action that went far beyond the European legal requirements. In other cases, full compliance was only achieved years after the Directive had envisaged.

- 12.26 In response to the perceived limitations of the earlier legislative initiatives, two further packages have sought to strengthen the basis for contestable access to the railways and achieve greater technical integration across Europe:
- The “Infrastructure Package” of Directives (2001/12/EC, 2001/13/EC, and 2001/14/EC) defined the roles and responsibilities of infrastructure managers, railway undertakings and supervisory authorities more clearly, and set out minimum requirements for access, charging, capacity allocation and information provision; and
 - The “Interoperability” Directives (96/48/EC and 2001/16/EC) specified a new regime for European wide technical specifications, underpinning the ability of the railway equipment to be procured and deployed flexibly across the Single Market.
- 12.27 The Infrastructure Package was due to be brought into effect at the national level by March 2003, and in contrast to 91/440, many Member States made vigorous efforts to achieve this deadline. Subsequently a Second Package, that amongst other things provides for open access in freight and the creation of a European Rail Agency has been brought into European law, and proposals for a Third Package have been adopted by the Commission. Taken together, these reforms underpin the movement towards greater vertical separation of organisation of the railway industry.
- 12.28 However, while strict legal compliance with the minimum requirements for liberalisation has been increasingly observed by Member States, the full liberalisation of markets is still a long way off in most. The approach to industry restructuring has been varied. Some (including the UK, Sweden and Spain) have determined that only fundamental industry restructuring can remove barriers to greater liberalisation. Others, including France, Germany and Italy, have retained service provision and infrastructure maintenance under common corporate control; in part, this form of structure can avoid the destruction of “wheel/rail” synergies and efficiencies, but such vertical integration creates concerns from new entrants.
- 12.29 The pace of liberalisation in the freight and particularly passenger rail service provision (railway undertaking) market has been particularly slow. Political desire and a liberalisation policy is required to achieve real increases in the contestability of the market.
- 12.30 The experience of the rail sector shows that institutional separation on its own will not guarantee greater efficiency in service provision at a pan-European level.

Mass Transit and Light Rail sector

- 12.31 The United Kingdom’s London Underground Ltd’s Public Private Partnership introduces an element of separation between infrastructure provision and operations. The Infrastructure Managers (Tubelines – for the Jubilee, Northern and Piccadilly lines and Metrolink – for the Bakerloo, Central, Victoria, Circle, District, Metropolitan, East London, and Hammersmith & City lines) are responsible for the management, maintenance and purchase of all fixed assets including station, track, signalling and rolling stock. The core provision of operations remains the responsibility of London Underground Ltd staff, including the manning of stations,

ticket offices and operating train services. Moreover, the management of the network assets and provision of slots on the network is also retained as the responsibility of London Underground Ltd.

- 12.32 In contrast, most competitively let light rail services are provided on the basis of vertically integrated provision. The bidding consortium often contains a construction company, a rail operator and a manufacturer of the rolling stock / equipment. For example, for Nottingham the Arrow Light Rail Ltd consortium comprises: Bombardier (provider of rail systems and rolling stock); Carillion a construction firm, Transdev an experienced integrated urban transport operator and Nottingham City Transport (the leading bus transport provider in the city). Hence the infrastructure / operations skills and activities are contractually bound together within a single entity.

Bus sector

- 12.33 The road network infrastructure is usually owned and operated by national or local government. In a number of cases, and increasingly for new infrastructure, it is operated by a private company and financed through tolls and road pricing. Bus operators pay such tolls along with other road users.
- 12.34 The main issues arising in the bus sector have therefore revolved around the assets that are specific to the provision of the service, namely the buses, garages and depots. Buses, the main assets, are movable and valued in the secondary market, such that they stay with the operator (e.g. if a public service contract is lost). This contrasts to the ATM market, where assets are less easily transferable.

Sea ferry sector

- 12.35 In a similar way to the bus sector, the core port and sea network infrastructure is shared by its many users. The main infrastructure specific to the operations are the ferries and the linkspans between the ferry and port. The secondary market and available leasing market for ferries facilitate competition and relatively low barriers to entry. However, the customised linkspan and associated port assets are not transferable, and the risk allocation between the port and ferry operator is negotiated.

Vertical separation and industry consolidation in ANS

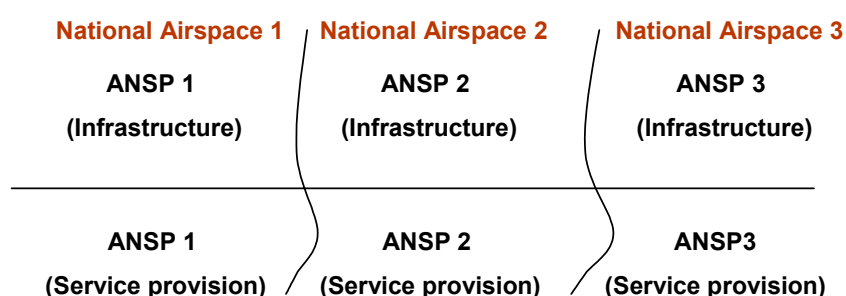
- 12.36 The existing Air Traffic Management industry in the member states of the SES is based on vertically integrated ANSPs, at a national level. There is a limited amount of national airspace where control is delegated to neighbouring countries under bilateral and multilateral arrangements where the vertically integrated ANSP provides service across a national boundary. The SES framework encourages the creation of Functional Airspace Blocks where upper, and perhaps lower, airspace is controlled, where appropriate, across national boundaries.
- 12.37 The applicable geography of any mandatory separation, potentially required as a future “package” of the SES, is likely to be at the national level, driven by the existing Eurocontrol convention and nations’ desire to retain responsibility for their national airspace. This type of national vertical separation would encourage the move towards horizontal integration by geography. However, any consolidation would be driven by

the policy of individual nation states and the political will to accept the social and economic impacts of restructuring in return for any perceived benefits.

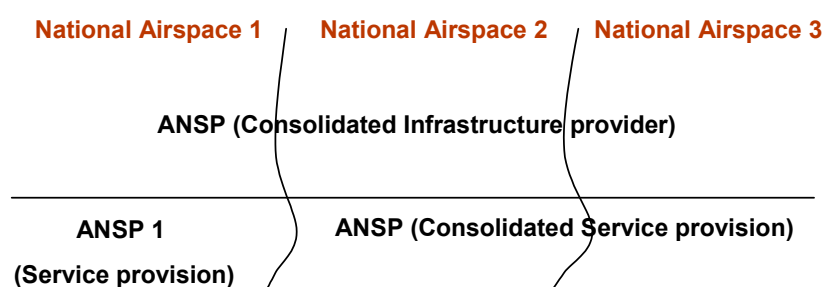
- 12.38 Vertical organisation separation would provide the framework to encourage horizontal integration to benefit from geographical scale and allocative efficiencies. There are likely to be significant allocative and scale economies from the provision of interoperable infrastructure, and similar scale economies from service provision (see Figure 12.2).

FIGURE 12.2 ARRANGEMENTS WITH VERTICAL SEPARATION

Vertical separation within vertical boundaries



Vertical separation with horizontal integration



Alternative approaches to vertical separation in ANS

- 12.39 There are a number of potential options for introducing greater separation between ANS infrastructure provision and ANS service provision, including those illustrated in Figure 12.3:
- The provision of all infrastructure (ATM and CNS) could be separated from the front-line costs of service provision – principally ATCO employment and administrative costs; or
 - The separation of CNS (infrastructure) costs from ATM (infrastructure and service provision) costs; or
 - A three way split between “Infraco CNS” (the non-customer facing assets such as radar, headquarters, offices, etc.), “Infraco ATM” (customer-facing assets such as control centres, airport control towers, etc.), and the service provider.

FIGURE 12.3 ILLUSTRATION OF ALTERNATIVE APPROACHES TO ANS VERTICAL SEPARATION

Option i	Infrastructure provider	Service provider	
	All assets and systems Engineering and support staff	ATCOs and ATC support	
Option ii	Infrastructure provider	Service provider	
	CNS assets and systems Engineering and support staff	ATM asset and systems, engineering and support staff ATCOs and ATC support	
Option iii	Infraco CNS	Infraco ATM	Service provider
	Non-customer facing assets (radar, headquarters) and systems , engineering and support staff	Customer facing (ACC, control tower) asset and systems, engineering and support staff	ATCOs and ATC Support

- 12.40 Option (i) creates a structural environment that lends itself to concession or contract award of service provision, and ease of consolidation and interoperability for infrastructure provision. CNS and ATM infrastructure are consolidated into a single entity.
- 12.41 Option (ii) reflects a belief that CNS infrastructure could be more readily shared between service providers, outsourced or made contestable than ATM. It is consistent with the FAB structure of the SES. However, the proportion of the total ANS value chain covered by CNS is relatively limited (perhaps 20-25%).
- 12.42 Option (iii) is closest to the approach that has been applied to the liberalised rail markets, distinguishing between INFRACO CNS (Infrastructure Manager), from INFRACO ATM (Rolling Stock provider / lessor) and service provider (Railway Undertaking). The structure retains the benefits of the industry's preferred approach to service separation on the basis of CNS and ATM, while also achieving separation of the service provider from infrastructure. However, the many interfaces between different organisations and users may lead to significant losses of scope economies, and the transaction costs associated with setting up and running this type of structure are also likely to be significant.

Commercial arrangements

Legislative requirements

- 12.43 Any structural changes that were mandated at a European level would require the introduction of legislation under a further "package" to extend the legislative framework of the SES. The experience from the rail industry shows that any

legislation would need to be carefully drafted in order to encourage the policy objectives that the restructuring was desired to achieve.

Charging, financial and regulatory consequences

- 12.44 An organisational separation between infrastructure and service provision would require a charging and financial structure consistent with it. Moreover, a regulatory framework to oversee compliance and consistency with charging principles and legislation would be required. This would probably require additional functions to be undertaken by the National Supervisory Authorities (NSAs) established under the SES legislation.

Regulatory framework

- 12.45 The existing SES legislation provides that NSAs are responsible for compliance and oversight with the requirements of the SES legislation. Amendments to the organisation of the industry would require additional functions to be undertaken by the NSAs, including:

- Compliance with the functional boundaries between “Infrastructure Provider” and “Service Provider”;
- Compliance with the cost allocation between the providers; and
- Compliance with any charging principles applied to each organisation.

Charging

- 12.46 The then-prevailing Eurocontrol Route Charging System could be retained as the underpinning for the charging structure for the en-route services of the “Service Provider”. However, the “Infrastructure Provider” would be provided with greater freedom in its charging and remuneration structure. This would be a price mechanism for allocating risks between the two parties. Following the Commission’s White Paper and the EU directives on infrastructure charging, social marginal costs should be reflected (with perhaps up-front fixed payments been made to cover remuneration of existing assets). However, the new organisational structure would potentially provide the infrastructure provider(s) with greater freedom to introduce innovative and efficient charging structures for the use of the infrastructure.
- 12.47 For example, in the case of the European AIS Database (EAD), there is separation of the infrastructure provider from the ANSP service provider and a performance-based remuneration framework for the infrastructure provider. Hence the commercial relationship is governed by a monetary performance regime and service level agreements. We would expect benefits from similar arrangements in the event of any vertical separation for the wider ATM industry.

Financial requirements

- 12.48 Even if the existing Eurocontrol cost recovery mechanism continues to be used for en-route charges, the impact of organisation restructuring may still be significant if the benefits of scale economies are significant.

- 12.49 The risk allocation between the “Infrastructure Provider” (IP) and “Service Provider” (SP) will be influenced by who is best able to bear and manage the risk. Performance and revenue risk could be transferred from the SP to the IP through an appropriate monetary performance regime and service level agreements, as indicated above.
- 12.50 However, the IP will be responsible for the majority of capital investment. It is likely to have a proportion of its assets in the course of construction (and therefore not remunerated), and will therefore be the organisation requiring external financing (through up front financing remunerated through long term charging proceeds).
- 12.51 The SP, in the absence of substantive capital expenditure requirements, will continue to require cash and near cash reserves to facilitate changes in working capital and under estimation of volumes, but would have less need of major external sources of finance.
- 12.52 The change in the risk profile of the organisations would have impact both on the costs and the efficient use of financial instruments to fund these costs.

The case for and against vertical separation

- 12.53 A number of arguments can be made for and against the vertical separation of infrastructure from service provision in the ANS sector.

For

- 12.54 The main arguments for greater separation between infrastructure provision and service provision are:
- The structure promotes **new entry to service provision**, by reducing significant infrastructure cost barriers to service provider entry and encouraging the creation of new companies;
 - The structure would **facilitate greater consolidation of infrastructure**, where the interoperability directive might dovetail with greater co-operation between IPs and ultimately the consolidation of responsibility for provision;
 - The structure would **facilitate greater consolidation of service provision**, where economies of scale and scope would be potentially enjoyed through the consolidation of controlled airspace, in appropriate areas;
 - Under a nation based vertical separation, **each state could retain ultimate control of the assets** of the provision of ANS (even if that responsibility was then franchised or leased to a third party);
 - The structure may facilitate and promote **partnerships** and financial arrangements between the public and private sectors (through increasing new entrants);
 - The structure promotes **specialisation** of functions and staff between the two organisations;
 - The **procurement economies**, resulting from any consolidation, could reduce the total costs of the supply chain and hence reduce any “bulge” in total industry cash costs to be financed;

- The structure would potentially **dovetail with the objectives of the Interoperability and Airspace Regulations** of the SES, facilitating their implementation;
- If the infrastructure company was not subject to cost-recovery charging rules, it would be able to structure the time profile of its capital cost recovery with each of its client ANSPs, who would each then recover the infrastructure charges within their respective cost bases for user charging.

Against

12.55 The experience of the rail industry provides one of the main arguments against mandating greater separation between infrastructure and service provision. Although the legislation has, on the whole, been implemented by Member States, the practical impact on increasing the amount of on-rail competition or competition for the market has been limited. National rail policy has remained the main driver of liberalisation of the markets concerned. However, a key difference between rail and Air Traffic Management is that rail continues to be largely financed by national government, whereas ATM is largely financed by its users, and has international systems and asset manufacturers as key stakeholders with influence in shaping the future organisation of the industry.

12.56 Arguments against vertical separation include:

- At a national level, moving from one corporate entity (ANSP) to two (or three) corporate entities (Infrastructure ANS and Service ANS) may **lead to an increase in costs**, resulting from a requirement for separation and duplication of headquarters, administration or other management and support functions;
- Obstacles from national policy and labour unions could mean that efficient **consolidation would not take place**, diminishing the scale economies and efficiency benefits achievable from the policy;
- There are likely to be some synergies in the development of systems and information technology between the “Service Provider” and the “Infrastructure Provider” responsible for system architecture and development. There may be significant **costs associated with the loss of synergies**;
- There will be **significant transaction costs** associated with the multiple industry participants and the contractual matrix supporting the restructuring;
- The safety case, as a result of greater separation, may be more difficult to sustain without additional frameworks and safeguards. The **perception** of rail restructuring in the United Kingdom (incorporating separation between infrastructure, operator and rolling stock supplier) is that it led to a reduction in observed safety levels, even though the factual statistical evidence does not support this supposition.

A review of stakeholders’ views

12.57 In the first round of consultation that fed into our interim reporting to the Commission, we highlighted that ANSPs had found it difficult to provide cost information that could be used to illustrate the affects of separation between infrastructure and service provision.

- 12.58 In the second round of consultation we asked users and ANSPs whether they saw any attraction in the introduction of this type of vertical separation of infrastructure from service provision. Most of the ANSPs and airline users found the subject interesting and asked what the potential cost and benefits of such a reorganisation might be. A quantification of the cost-benefit trade-off is beyond the scope of the study, but is something the Commission may therefore wish to consider further as the SES develops, to help inform the debate.

Our views and conclusions

- 12.59 Any mandatory separation would need to have clear policy objectives, which might include some or all of:
- Promotion of efficient cost service provision;
 - Promotion of competition for the market; and
 - Promotion of industry co-operation and consolidation.
- 12.60 The existing SES legislation promotes efficient cost service provision and industry provision. However, it is largely silent on competition and consolidation.
- 12.61 The relative costs and benefits of the effects of any restructuring would need to be assessed at a national level to take an analytical view of this question. However, given the existing SES objectives and actions already underway, the scale and other economies achievable would need to be set against the likely significant transaction costs and loss of scope economies.
- 12.62 Accordingly, any industry restructuring might best be created through groups of ANSPs investigating and developing their own optimal organisational structures as a part of the development of FABs in the first instance, rather than defining and mandating a common European-wide restructuring in early new legislation.

APPENDIX A

The Single European Sky Legislation

The legislation

A.1.1 As described in Chapter 1, the Single European Sky legislation comprises four Regulations:

- Reg(EC) No 549/2004 laying down the **framework** for the creation of the SES;
- Reg(EC) No 550/2004 on the **provision of air navigation services** in the SES;
- Reg(EC) No 551/2004 on the organisation and use of airspace in the SES; and
- Reg(EC) No 552/2004 on the **interoperability of the European Air Traffic Management network**.

The text of the legislation may be found on the European Commission website⁴⁹.

The framework regulation

A1.2 The framework regulation establishes a harmonised institutional and regulatory framework for the creation of the SES by 31 December 2004. It underpins the objectives of the SES, namely: to enhance current safety standards and overall efficiency for general air traffic in Europe; to optimise capacity meeting the requirements of all airspace users; and to minimise delays⁵⁰. Military issues are mainly outside of the scope of the SES. However, in reaching agreement on the regulations Member States supported enhancements to civil-military cooperation.

A1.3 The framework regulation requires Member States to nominate 'National Supervisory Authorities', separate from service providers. It creates a 'Single Sky Committee' and defines how implementing rules are to be developed through mandates to Eurocontrol. The framework regulation also states that sanctions are to be applied in case of infringements of the Single Sky Regulation.

A1.4 The framework regulation recognises the importance of evaluating ATM performance and identifying and promoting best practice. It also ensures that stakeholders are fully engaged in the implementation of the SES, through consultation mechanisms established by Member States and the European Commission. Such consultation will cover, in particular, the development and introduction of new concepts and technologies in the European Air Traffic Management Network. There will be a specific body to advise the Commission on technical aspects of the SES implementation, known as the 'Industry Consultation Body'.

A1.5 The Commission will monitor the implementation of the SES through regular reports from Member States. These reports will contain an evaluation of the results achieved by the SES, information about developments in the sector, as well as about quality of service in the light of the original objectives and with a view to future needs.

⁴⁹ http://europa.eu.int/comm/transport/air/single_sky/legislation_en.htm

⁵⁰ The practical implications of the legislative objectives are reviewed in Chapter 3.

- A1.6 The regulation aims at supporting the extension of the SES to countries which are not members of the European Union, either through existing Community agreements or Eurocontrol.

The service provision regulation

- A1.7 The objective of the service provision regulation is to establish common requirements for the safe and efficient provision of air navigation services in the European Union. It sets out the tasks of the National Supervisory Authorities (NSAs) and mandates the adoption of Eurocontrol Safety Regulatory Requirements (ESARRs). The national supervisory authorities are required to ensure the appropriate supervision of the application of the SES, in particular with regard to the safe and efficient operation of air navigation service providers. The NSAs must also ensure close cooperation with each other.
- A1.8 It establishes the common requirements, which address, among other things, safety, quality, security and accounting systems. The regulation introduces a certification and designation mechanism, requirements for mutual recognition of certification by member states, and the means of monitoring compliance. It also addresses the need for greater transparency and provides for the development of a new charging scheme for air navigation services.
- A1.9 When providing services other than air navigation services, ANSPs will need to identify, in their internal accounts, the costs and income for air navigation services, as well as keep consolidated accounts for other, non-air-navigation services. The regulations require ANSPs to have their accounts independently audited and to publish them.
- A1.10 Member States must define the rights and obligations to be met by the designated service providers and also designate a provider of meteorological services. The regulation also requires formal agreements on cooperation between air navigation service providers and between the competent civil and military authorities.
- A1.11 For general air traffic, the regulations require that relevant operational data should be available for exchange in real-time between ANSPs, airspace users and airports; to facilitate their operational needs. The regulation also requires the Commission to make a proposal to the European Parliament and Council on the licensing of controllers.
- A1.12 The Commission will carry out both ongoing and ad hoc reviews of compliance with the regulations, in cooperation with the Member States and making use of Eurocontrol expertise.

The airspace regulation

- A1.13 The SES aims to achieve a common harmonised airspace structure in terms of routes and sectors. Common general principles for route and sector design are to be introduced to ensure the safe, efficient and environmentally friendly use of airspace. Decisions regarding the establishment or modification of routes and sectors will require the approval of the Member States with responsibility for the relevant airspace.

Critically, the reconfiguration of airspace is to be based on operational requirements regardless of existing national boundaries. A single European Upper Flight Information Region will be created, with its own Aeronautical Information Publication. The framework regulation sets the division between upper and lower Flight Information Regions at Flight Level 285. The regulation on organisation and use of the airspace therefore creates the conditions and requirements for creating functional airspace blocks.

- A1.14 Furthermore, the Commission will study the application of certain concepts to the lower airspace in future: European Lower Flight Information Region, Functional Airspace Blocks, route and sector design
- A1.15 The airspace regulation encourages the “progressive harmonisation” of airspace classification, based on the simplified approach defined in the Eurocontrol airspace strategy. It also requires the uniform application of the concept of the flexible use of airspace, as described by ICAO and developed by Eurocontrol. However, where this may give rise to significant operational difficulties, a temporary suspension may be applied.

The interoperability regulation

- A1.16 Achieving interoperability of the European Air Traffic Management network (EATMN) is a key concern of both ANSPs and users. Currently, national systems are poorly integrated and new operational concepts and technologies take a long time to be implemented. The objective of the interoperability regulation is to achieve interoperability between the different systems, constituents and associated procedures of the EATMN. It also aims to expedite the introduction of new operational concepts and technology. This is to be achieved by defining essential requirements for the EATMN, its systems and their constituents and associated procedures. The regulation will be supported by implementing rules and Community specifications. The implementing rules will apply to systems, constituents and associated procedures throughout their lifecycle. The rules will take account of the estimated costs and benefits and have due regard to maintaining an agreed high level of safety.
- A1.17 ANSPs will verify that systems comply with the essential requirements when integrated into the European ATM Network. This will be achieved through an EC declaration of verification to the national supervisory authority together with a technical file; the requirements of which are set out in the regulations. In cases where the NSA ascertains non-compliance, the Member State concerned must take appropriate measures, informing the Commission. The regulations also provide for the Commission to deal with any shortcomings in the Community specifications through amendment or withdrawal. Compliance with the regulation will be assured by a manufacturers ‘declaration of conformity’, which will be monitored by notified bodies. The notified bodies must meet certain criteria provided for in the regulations, such as impartiality and technical competence.

The implementation process

- A1.18 Implementation of the SES regulations has recently begun with the formation of the Single Sky Committee, a high-level group comprising two representatives from each State, generally one civil and one military, and an observer from Eurocontrol.

APPENDIX B

Cost Structures of European ANSPs

Introduction

- B1.1 In this appendix we provide an overview of the cost structures of ANSPs in the SES and analyse the different types of cost incurred by Member States. We go on to discuss the forms of cost allocation used by ANSPs in their information disclosures.

Sources of cost data

- B1.2 There are a number of sources of cost data, each of them with different cost categorisations:

- In **annual reports** where they are available, the costs are split by accounting categories for the total operations of the company between staff, other operating, depreciation and tax costs for the total ANSP operations;
- For the en-route part of the business, from **CRCO submissions** costs are reported by “type” (between staff, operating, amortisation and other) and by “category”. The breakdown by category splits costs into a number of departments (between ATM/CNS, administration etc.) derived originally from an ICAO classification. However, our understanding is that these categories are not unambiguously defined, and have not been uniformly applied; and
- From the **PRC ACE 2001** report, costs for all ANS activities are split between en-route, terminal and other ANS. They are also broken down, for each category of service, between staff, operating costs, exceptional items, depreciation, cost of capital, meteorology costs, payments to national government, Eurocontrol costs, cost for delegation of services and cost for other services provided. Please note that for all cost data presented for NAV Portugal this refers to only the performance of Lisbon FIR.

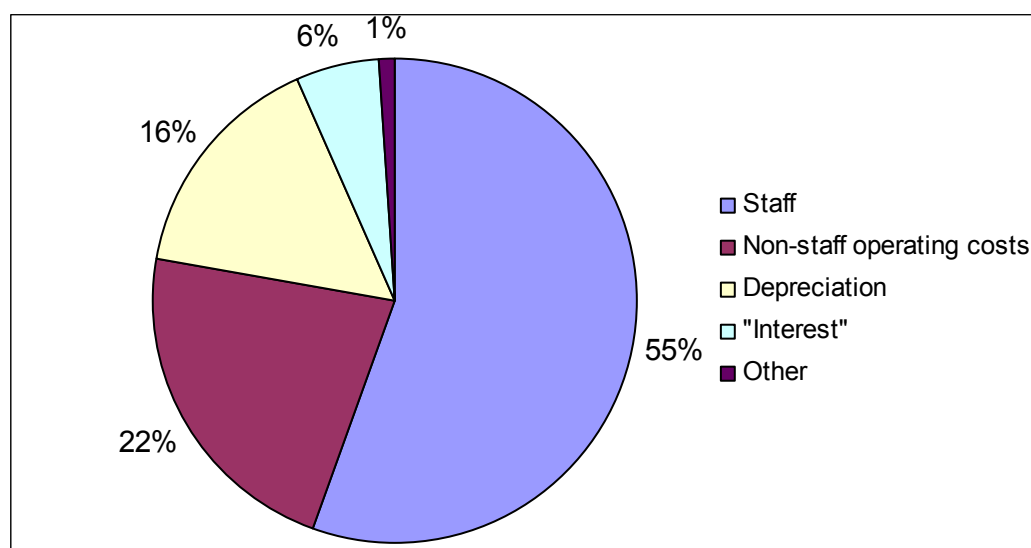
- B1.3 Little of direct relevance to this study can be inferred from this information. In the CRCO submissions, the ambiguity of interpretation, and the preponderance of one of the categories (ATM/CNS costs), limits the usefulness of the data. Any comparison between member states at a disaggregated cost level therefore needs to be treated with caution.

Cost structures of the en-route business from CRCO data

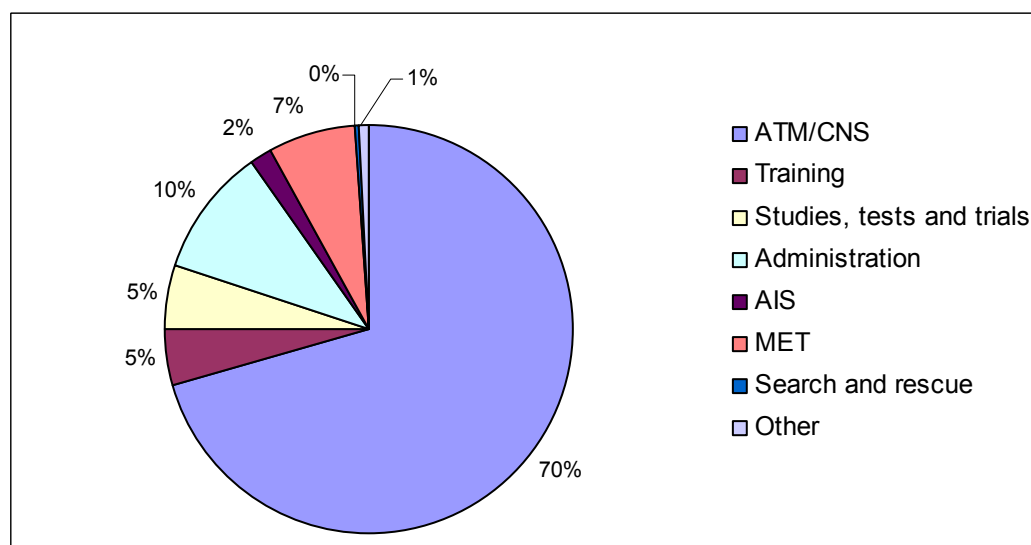
- B1.4 CRCO submissions include two separate breakdowns of en-route costs. The breakdown by **type** splits costs into labour costs (referred to as “staff costs”), non-staff operating costs (referred to as “operating costs”), depreciation, and a cost referred to as “interest”. The latter is in most cases a notional cost calculated as the total net assets of the ANSP allocated to en-route ANS multiplied by a rate of interest generally relating to low-risk debt. However, in some cases, the actual interest costs of the ANSP are used.
- B1.5 The cost submissions provided to the CRCO also contain information on the breakdown of costs for ANSP’s en-route business by **category**. Appendix Figure B1 and Appendix Figure B2 show the breakdowns of costs for all ANSPs for 2001 by both “Type”, and “Category” respectively. As Estonia, Latvia, Lithuania and Poland do not report data to CRCO, they are not included in these aggregate analyses. Staff costs dominate total cost by type, with depreciation / amortisation charges providing

less than one-fifth of all costs. ATM/CNS dominates total costs by category, with significant contributions from administration and meteorology costs.

APPENDIX FIGURE B1 PROPORTION OF SES EN-ROUTE COSTS SPLIT BY TYPE 2001



APPENDIX FIGURE B2 PROPORTION OF SES EN-ROUTE COSTS SPLIT BY CATEGORY 2001

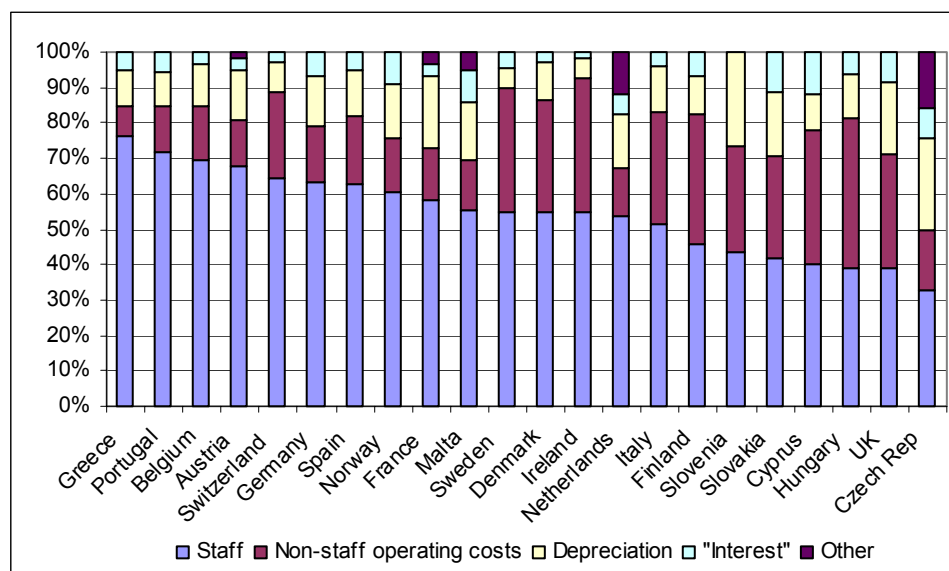


B1.6 We also present, in Appendix Figure B3 and Appendix Figure B4 equivalent splits for each country in the Single European Sky, again for 2001⁵¹. The figure shows a large variation in the proportion of total costs by type, with the level of amortisation highly variable as a proportion of total costs.

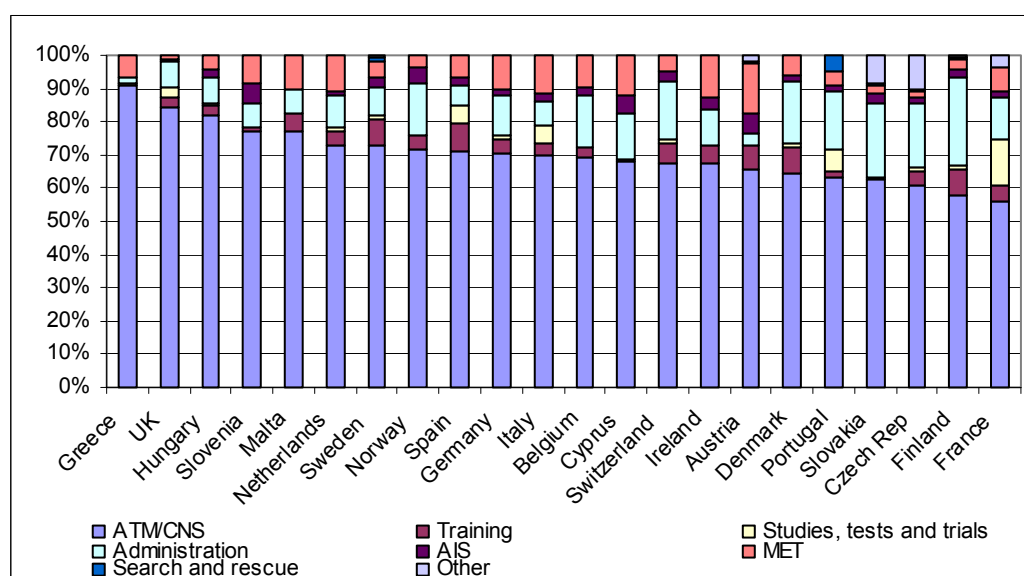
⁵¹ Because CRCO data is collected country by country, these data do not necessarily reflect individual ANSPs. For example, the UK and Denmark figures include the costs of the national CAAs, and the French figure the costs of the airspace where control is delegated to Skyguide.

- B1.7 Similarly, the proportion of costs by category is highly variable across countries, with administration, meteorology costs and training costs particularly variable.

APPENDIX FIGURE B3 PROPORTION OF SES EN-ROUTE COSTS, BY COUNTRY, BY TYPE, 2001



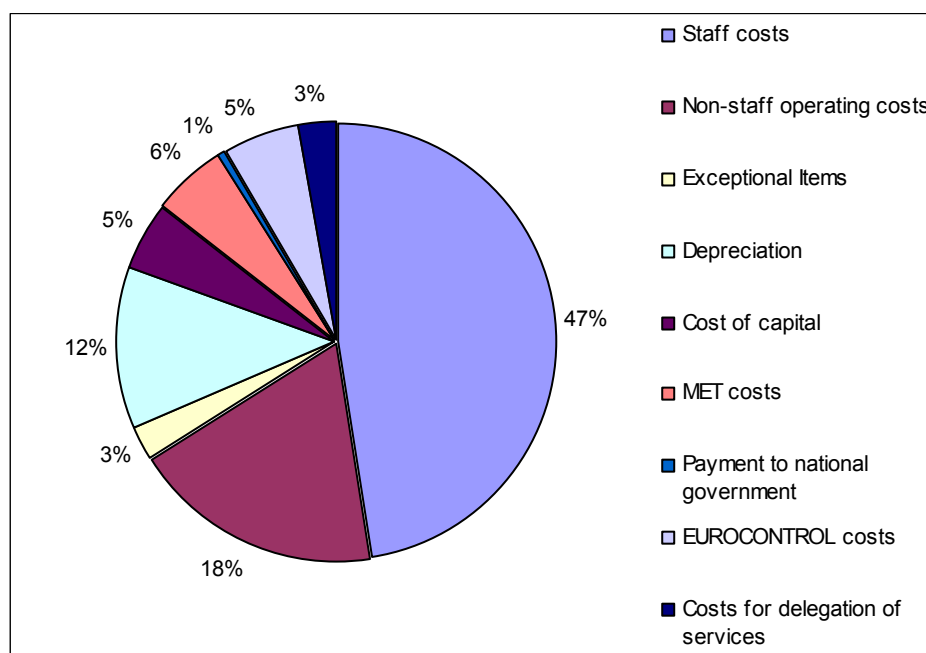
APPENDIX FIGURE B4 PROPORTION OF SES EN-ROUTE COSTS SPLIT, BY COUNTRY, BY CATEGORY, 2001



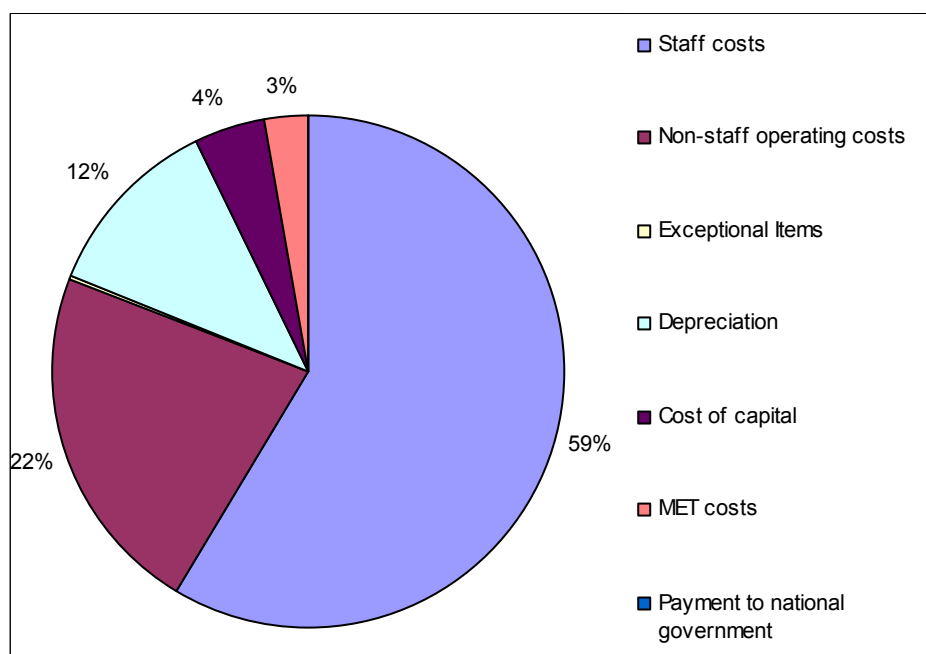
Cost structures of the ANS business from ACE 2001

- B1.8 Appendix Figures B5, B6 and B7 show the breakdown of costs for that portion of the SES system covered by ACE 2001 (that is, excluding Greece, Cyprus and Poland). Appendix Figure B8 gives costs for each national ANSP. The figures demonstrate the high degree of variability between cost categories across the ANSPs.

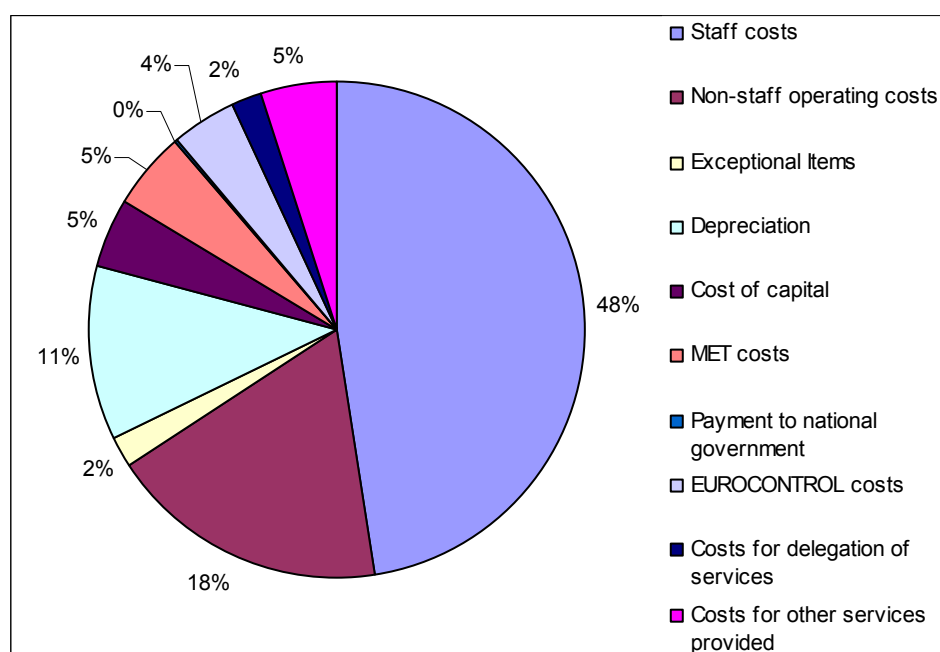
APPENDIX FIGURE B5 BREAKDOWN OF EN-ROUTE COSTS, ACE 2001



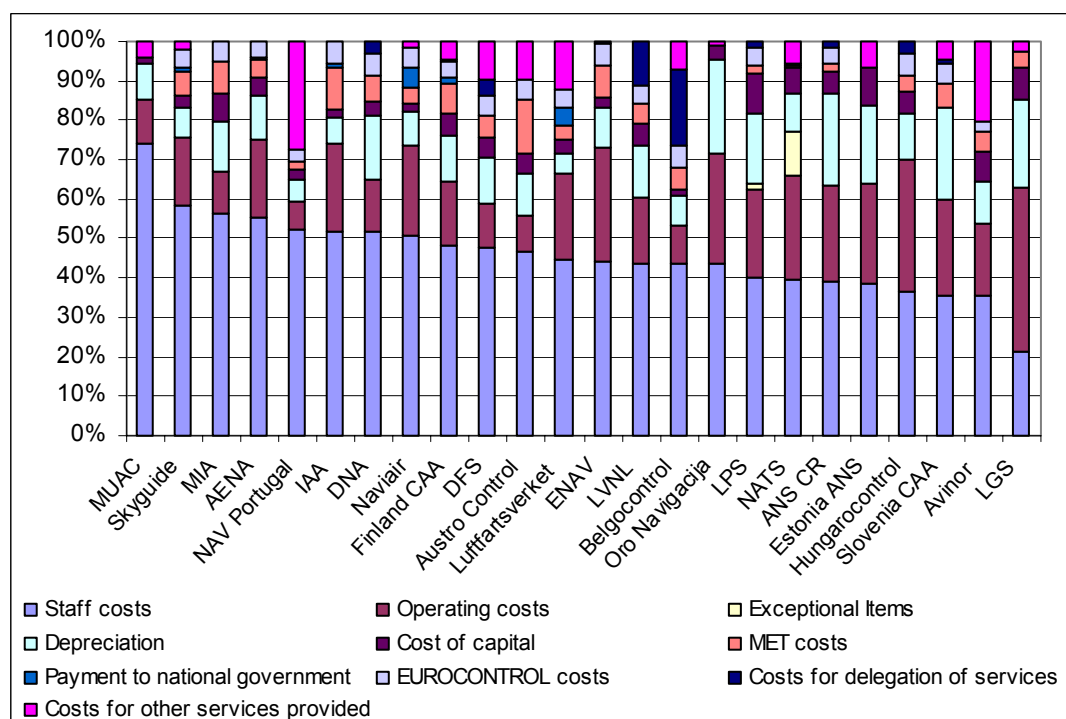
APPENDIX FIGURE B6 BREAKDOWN OF TERMINAL COSTS, ACE 2001



APPENDIX FIGURE B7 BREAKDOWN OF GATE-TO-GATE COSTS, ACE 2001



APPENDIX FIGURE B8 BREAKDOWN OF COSTS FOR INDIVIDUAL ANSPs, ACE 2001



Note: NAV Portugal data only includes Lisbon FIR

Approaches to cost allocation

B1.9 CRCO costs by type are generally well defined. Even so, few significant conclusions concerning cost structures or performance can be inferred from the breakdown, as the

distinction – between “staff” costs and “operating” costs – is sensitive to factors such as ANSPs’ outsourcing strategy for various support functions, which varies widely across the SES.

- B1.10 In addition, the “interest” element of this classification may be defined, as discussed above, in two different ways.
- B1.11 The breakdown by category is potentially more useful. However, the categories as used by the CRCO do not represent a classification along a single dimension. While some of the divisions - that between ATM/CNS, AIS, MET and SAR could be used to reflect the costs of providing different **services** – other categories (Admin, Training, “Studies, test and trials”) reflect activities that cross over all lines of service.
- B1.12 In practice, we have found that the most usual approach to the classification by category is as follows. The costs of providing the individual services - ATM/CNS MET, AIS and SAR - are assessed. Usually, training is not included in these, but training for all categories of service is included in “Training”. Sometimes general management and office training is also included. “Administration” is often the cost of a directorate or department that is responsible for central functions such as finance, human resources, safety management, and the chief executive’s office, supporting all the user services. However, this practice is not universally applied, and in some cases such costs are allocated between the services. The “Studies, tests and trials” category is sometimes used to record research and development activity. Other ANSPs do not use it, and any development activity is allocated to the user services concerned.
- B1.13 We recommend that the opportunity is taken, in designing the “common charging system” foreseen under the SES, to rationalise and devise more useful and uniform categories for cost recording.

Infrastructure versus service provision

- B1.14 We were asked to explore whether costs could be divided between infrastructure provision and service provision. Such a split is not uniquely defined in SES ANSPs’ existing cost recording systems. We consider that at least two definitions of the split could be useful for the Commission to consider for the purpose of this study:
- The provision of CNS infrastructure could be more readily shared between service providers, outsourced, or made more contestable. If Functional Airspace Blocks are formed, and charged for separately, as is under consideration, rules will have to be found for sharing the costs of ground CNS infrastructure, provided by individual states. This argues for the separation of CNS (infrastructure) costs from ATM (service provision) costs; and
 - The provision of all infrastructure (ATM and CNS) could be separated from the front-line costs of service provision – principally ATCO employment costs. This split is similar to that required by the Railways Directorate between the “Infrastructure Provider” and “Railway Undertaking” (however rolling stock assets remain with the undertaking) and would facilitate the consideration of awarding “concessions” for the provision of services in a given area.
- B1.15 We have asked ANSPs whether they are able to provide a breakdown between the costs of infrastructure provision and service provision, and where lines might usefully

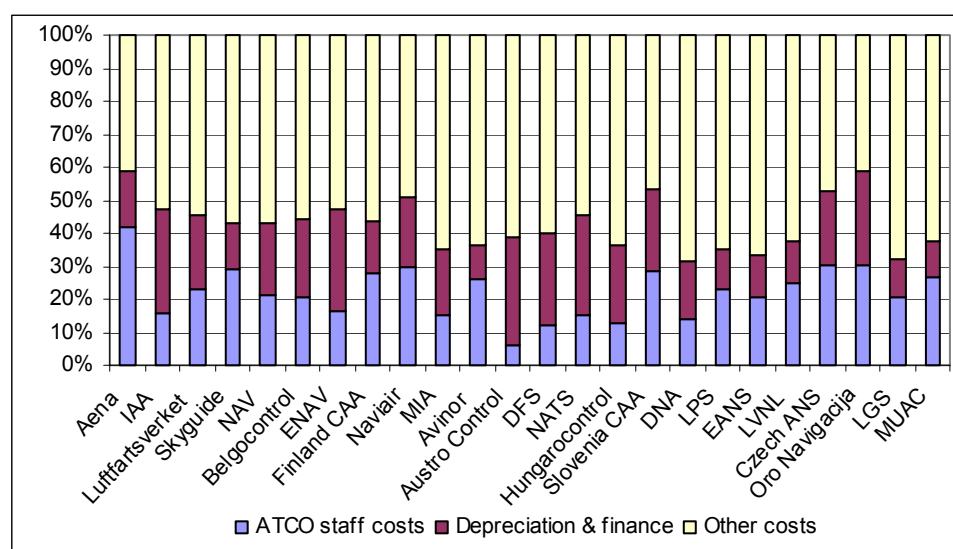
be drawn. In general, ANSPs have not been able to provide this breakdown. This is because, under their existing cost analysis systems, ANSPs do not readily have information available for either of these splits and the cost recovery system has not provided them with an incentive to pursue corporate restructuring. However a small number of ANSPs provide some information in this area:

- LFV Sweden has a special unit within its organisation that is responsible for en-route infrastructure. The cost of this, including depreciation, accounts for 16% of the total operating costs; and
- Skyguide estimates that 52% of total costs would be dedicated to ATM/AIS and 48% to CNS.

B1.16 An approach relating to the second purpose described above, that allows us to go some way towards estimating the relevant splits with information readily available, is as follows. The ACE 2001 exercise splits out the employment costs of ATCOs. This is unequivocally service provision under the first and second definitions. The depreciation costs are unequivocally infrastructure, and it would be reasonable to add the finance costs to this as, in ANSPs, the value of fixed assets generally greatly exceeds that of working capital. The area in between comprises the costs of “support” staff – that is, staff other than ATCOs – and the operating costs of the infrastructure.

B1.17 Appendix Figure B9 provides this breakdown of costs for each of the ANSPs reporting in ACE 2001⁵². Only some 30% to 60% of costs can be allocated between infrastructure and service provision using this information.

APPENDIX FIGURE B9 ATCO, CAPITAL-RELATED AND OTHER COSTS, ACE 2001



⁵² The costs include only those costs identified in ACE 2001 as “ATM/CNS” costs; for the purposes of their analysis this excluded MET, payments to national governments, payments for delegated services and payments for Eurocontrol, but included AIS and SAR. Note NAV data only includes Lisbon FIR.

Studies, tests and trials, and training costs

- B1.18 The Terms of Reference asked us specifically to examine the costs of “studies, tests and trials”, which, as we have seen above generally relates to research and development, and of training. From the CRCO cost data by category we are able to quantify the total costs spent by ANSPs in the SES on studies, tests and trials and on training over the period 2000-2002, for the en-route business.
- B1.19 The proportion of total costs for each of training, and studies, tests & trials is presented in Appendix Table B1. By country, they are highly variable: for training ranging from 0.3% to 9% around an average of 5% of total costs, and for studies, tests & trial from 0% to 13% around a mean of 5% of total costs. It can also be seen that the costs of training are in most cases greater than the costs of studies, tests and trials. However, there are notable exceptions, in particular France, which spends considerably more money on studies, tests and trials. The range undoubtedly reflects both the different reporting approaches discussed above, as well as different views taken on research and development, depending on the size of the organisation.

APPENDIX TABLE B1 TOTAL COSTS OF STUDIES, TESTS AND TRIALS, AND OF TRAINING

State	Studies, Tests and Trials		Training	
	En route cost 2000-02 € million	% of total en- route costs	En route cost 2000-02 € million	% of total en- route costs
Austria	0	0%	24	7%
Belgium	0	0%	12	4%
Cyprus	0	0%	0.5	1%
Czech	0.8	1%	5	5%
Denmark	3.5	2%	16.7	9%
Estonia	n/a	n/a	n/a	n/a
Finland	0.6	1%	4.7	7%
France	303	13%	124	5%
Germany	24	1%	71	4%
Greece	0.9	0%	1.3	0%
Hungary	0.8	1%	4.9	3%
Ireland	0	0%	12	7%
Italy	73	6%	42	3%
Latvia	n/a	n/a	n/a	n/a
Lithuania	n/a	n/a	n/a	n/a
Malta	0	0%	0.8	3%
Netherlands	4.8	2%	11.8	5%
Norway	0.7	0%	7.4	4%
Poland	n/a	n/a	n/a	n/a
Portugal	26	6%	9	2%
Slovak Republic	0	0%	0.3	0%
Slovenia	0.1	0%	0.6	2%
Spain	68	5%	101	8%
Sweden	5.1	1%	23.4	7%
Switzerland	4	1%	17	6%
UK	84	4%	78	4%
TOTAL SES	599.3	5%	567.4	5%

APPENDIX C

Sensitivity to External Shocks – The Impact of the Events of September 2001

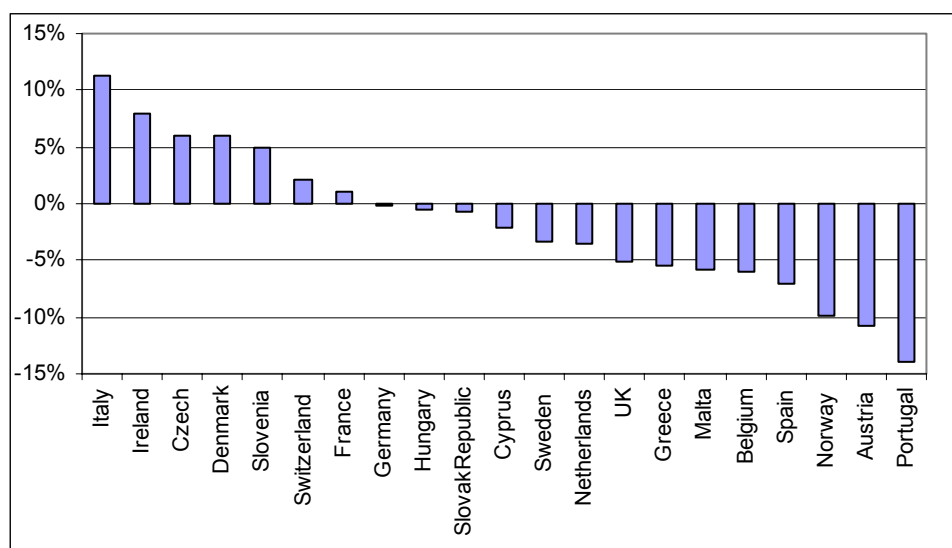
Introduction

- C1.1 The years 2001 and 2002 saw the most serious downturn in traffic European aviation has experienced for a very long period. It is therefore an excellent testbed for hypotheses about the impact of current charging and financing methods when faced with an external shock.
- C1.2 We analysed the impact of these events on ANSPs and users. Our broad conclusions are that even an extreme shock of this kind does not place intolerable pressure on the financing system.
- C1.3 We explore first whether ANSPs were faced with financial difficulties following the downturn. We next explore the extent to which the downturn was passed immediately through to users, as opposed to its mitigation by ANSPs. We explore this both by looking at what happened to unit rates, and by what happened to ANSPs' investment plans.
- C1.4 Our source of data for this analysis is CRCO submissions for 2001, 2002 and 2003. Note that the CRCO submissions for a given year are made in the course of that year; the 2001 submission was therefore made before the events of 11 September 2001 and therefore before any downturn was apparent.

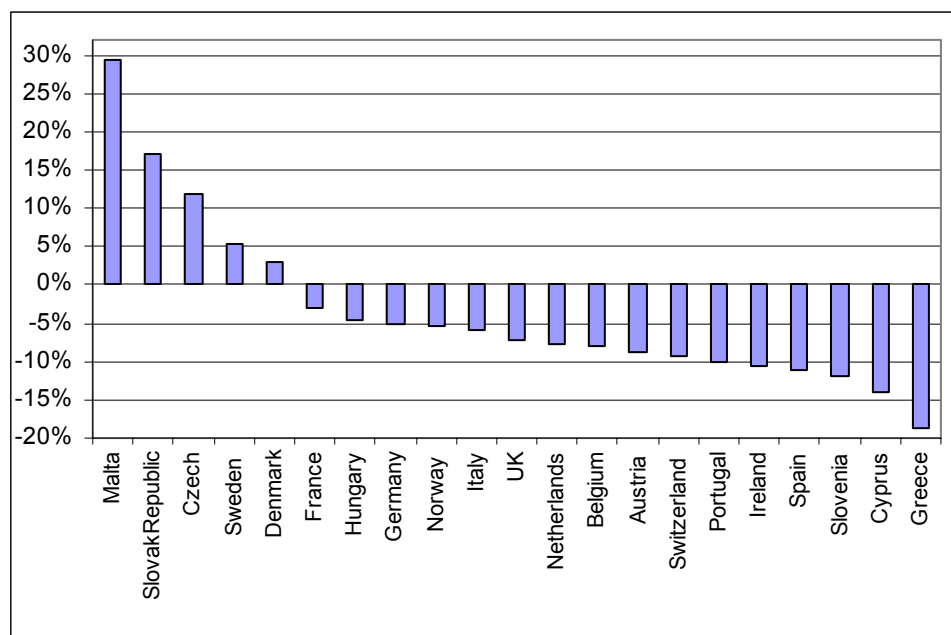
The impact on ANSPs' financial positions

- C1.5 Because of the timing of the CRCO's cycle, 2002 unit rates were set on the assumption that traffic trends would continue. The observed downturn would therefore result in a transient under-recovery for ANSPs as traffic fell, both in 2001 (reflecting the downturn in the last three months) and in 2002.
- C1.6 Using information provided in Member States' CRCO submissions and individual ANSPs responses to our questions for each of the charging years 2000, 2001 and 2002, we have compared the actual en-route revenues collected (based on actual traffic and unit rates set before 9/11) with the actual costs in those years. The aim is to examine the extent to which the under-recovery caused by the downturn might generate financial problems.
- C1.7 We first look at the results consolidated over the 22 states for which we were able to obtain data.
- C1.8 In Appendix Figures C1, C2 and C3 we summarise the over and under-recovery of en-route charges in 2000, 2001 and 2002 by SES ANSPs that are in the Route Charging System. The figures demonstrate a higher level of variability in revenues in 2001 as compared to 2000 and 2002. However, the events of 2001 and 2002 appear to have resulted in a higher proportion of countries under-recovering than the average. We understand from CRCO, that on average, there has been a tendency for countries to over-recover more than under-recover over the last 10 years.

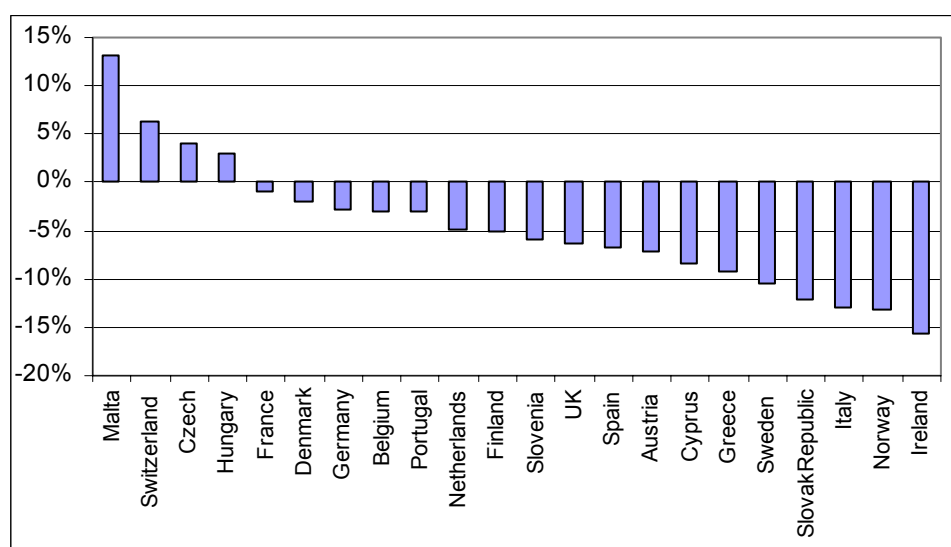
APPENDIX FIGURE C1 CRCO EN-ROUTE UNDER/OVER-RECOVERY, 2000



APPENDIX FIGURE C2 CRCO EN-ROUTE UNDER/OVER RECOVERY, 2001



APPENDIX FIGURE C3 CRCO EN-ROUTE UNDER/OVER-RECOVERY 2002



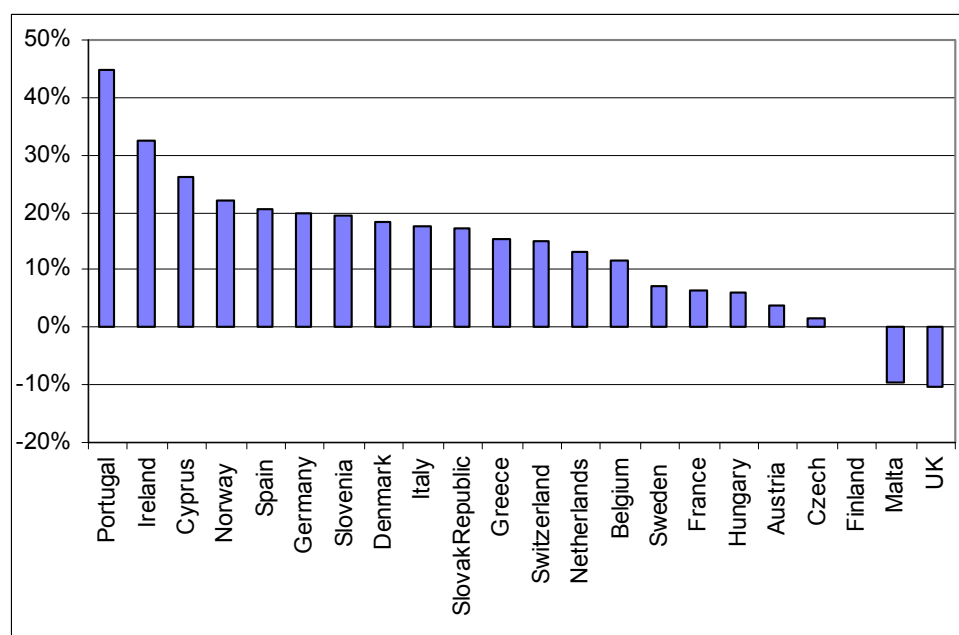
What are the implications?

- C1.9 The high level of under-recovery in 2001 and 2002 has been coped with by the existing financing mechanisms available to the ANSP community. For some, such as Italy and the Netherlands, one-off financing has been provided by the government to support the effects. In the others, they have made use of their usual sources of funding.

The impact on users

- C1.10 The impact has been a significant increase on 2003 (over 2002) unit rates as a result of under-recovery in 2001. 14 out of 21 countries increased their unit rates by more than 10%. Two states show falls in unit rates, one, the UK, is under price control rather than cost recovery, and the other, Malta, is gaining revenue from increased military traffic.

APPENDIX FIGURE C4 % INCREASE IN UNIT RATES 2002 OVER 2001



Note: the increase for Portugal is based on the weighted average of Lisbon and Santa Maria FIR

The impact on ANSPs investment plans

- C1.11 The traffic downturn should also, in principle, have had an impact on ANSPs' capital expenditure plans. Traffic levels will have been reassessed and the need for new capacity re-examined in the light of the downturn. While we have no direct information about previously planned and actual capital expenditure, some light can be shed on this by examining actual and projected depreciation figures contained in Member States' CRCO cost submissions.
- C1.12 Each of the SES ANSPs, with the exception of Poland, Latvia, Lithuania and Estonia, submit returns to CRCO to support their unit rate calculations. Contained in these submissions are medium-term projections of the level of amortisation and depreciation for a period of up to five years into the future. On the assumption that depreciation policy has not changed between submissions, an increase or decrease in planned capital expenditure between successive submissions should be reflected in a corresponding increase or decrease in depreciation.
- C1.13 We have examined the actual and projected depreciation charges by comparing:
- the 2001 CRCO submission, made before the events of 9/11, forming the basis of the 2002 unit rate (containing actual data to 2000 and projections for up to the following five years);
 - the 2002 CRCO submission forming the base of the 2003 unit rate (containing actual data to 2001 and projections for up to the following five years); and
 - the 2003 CRCO submission forming the base of the 2004 unit rate (containing actual data to 2002 and projections for up to the following five years).

C1.14 The analysis is undertaken to test the hypothesis that the downturn in traffic and revenues resulted in a reduction in planned capital expenditure, through the delaying or cancellation of capacity-enhancing projects. However, we cannot conclude the cause of such a reduction was definitely due to unexpected traffic and revenue shortfalls, as it could have been a result of:

- capital rationing, due to more limited funds being available;
- unplanned improved technology;
- unplanned capital cost efficiency provided through internal management processes; or
- a combination of the above, or any of the above combined with reduced investment from delaying or cancelling capacity enhancement.

ANSP-specific results

C1.15 Out of the 22 SES ANSPs we have CRCO data for, some thirteen showed a reduction in their long-term capital projections over the study period, whereas six showed demonstrable increases and the remainder maintained their 2001 plans. However, in discussions with ANSPs, a number of specific additional explanations have been provided for changes in projected depreciation:

- MATS Malta: The change in organisational structure and management from Malta International Airport to MATS;
- Austro Control: Reductions in projected investment are aiming to smooth the level of the unit rate by not leading to increases in depreciation charges; and
- LfV, Sweden a decision in 2002 was made to shorten the depreciation period for some assets that became fully depreciated in 2003 affecting the long-term projections.

C1.16 It should also be noted that the downturn in traffic for Skyguide in Switzerland was aggravated by the failure of the national carrier, Swissair, which followed closely on the events of 9/11.

Countries outside the Route Charging System

C1.17 Estonia experienced some decrease in the number of flights using its airspace post September 11th 2001, but this did not cause it to amend its investment plans. In 2003, a similar reduction in flight volumes led to EANS introducing a discount of 10% to encourage use of its airspace.

APPENDIX D

Review of ANSP Financing Schemes World-Wide

Introduction

- D1.1 In this appendix we review the financing mechanisms used by a sample of ANSPs throughout the world. The sample that we have chosen includes the larger and more progressive corporate structures where innovative approaches to ATM financing have been used.

Sample of countries selected

- D1.2 We have collected information from public sources and through directed questions sent to senior management from:
- Air Services Australia;
 - Air Traffic and Navigation Services company, the Republic of South Africa;
 - Airways New Zealand;
 - The Federal Aviation Administration of the United States of America; and
 - NavCanada.

Air Services Australia

Ownership structure and governance

- D1.3 The Australian Government wholly owns Air Services Australia (ASA). It is governed by a Board of Directors appointed by the Minister for Transport and Regional Services. The Board comprises a Chairman, a Chief Executive Officer and six further members. An Executive Committee comprising the Chief Executive Officer and five other Directors answer to the Board.

Financial transparency

- D1.4 ASA produces financial accounts for the year ending 30 June. Its accounts are published on its website and audited by the Australian National Audit Office.

Sources of revenue

- D1.5 The majority of ASA's revenues are collected from user charges. ASA's revenues are subject to price regulation by the Australian Competition and Consumer Commission (ACCC). Following the creation of business plans, the Corporate Financial Plan is submitted to the Board and Minister for endorsement then the ACCC is required to enforce the Prices Surveillance Act 1983 on the proposed charges. After approval, customers are given 30 days' notice of any proposed changes that are published. The ACCC has recently indicated that its preference would be for a five-year view to be taken by ASA to smooth changes in pricing.

Additional sources of finance

- D1.6 ASA receives a government subsidy in lieu of the costs incurred by general aviation flights at regional airports where price controls are maintained. It borrows from the commercial markets using bonds and loan notes. In addition to its equity, ASA holds significant cash reserves.

Constraints and limitations

- D1.7 ASA has no constraints on its borrowing provided that it meets the corporation's gearing target (the precise level of the target is confidential).

Financing the costs of restructuring

- D1.8 A contribution was provided by the Australian Government to support the restructuring of ASA.

Mitigation of over-under recovery of revenues

- D1.9 We understand that ASA has entered into partnership agreements with its main users.

Air Traffic and Navigation Services Company (South Africa)**Ownership structure and governance**

- D1.10 The Air Traffic and Navigation Services Company (ATNS) of the Republic of South Africa (RSA) is a State-owned limited liability company. Its management through the Board of Directors is subject to control from the company's State shareholder, regular meetings with the minister and its economic regulator, the Regulating Committee.

Financial transparency

- D1.11 ATNS produces financial accounts with a year-end of 31 March. Its accounts are externally audited and available on the ATNS website.

Sources of revenue

- D1.12 ATNS collects the majority of its revenues through en-route and approach charges, although it gets additional revenues from charges on AIS, maintenance and training. ATNS is subject to regulation by the Regulating Committee. ATNS submits a five-year business plan and the Committee after consideration issues a "permission" which forms the basis of the maximum tariffs that ATNS may put in place for five years.

Additional sources of finance

- D1.13 ATNS increased its borrowing in 2003, with a loan secured against investment held by ATNS. It held substantial cash reserves in 2003.

Constraints and limitations

- D1.14 The existing loan facilities are subject to various covenants (interest cover, debt/equity ratio and not to pay dividends).

Airways New Zealand**Ownership structure and governance**

- D1.15 Airways New Zealand (Airways) was established as a State-owned enterprise in 1987 and operates on a fully commercial basis. Although wholly owned by the New

Zealand Government, it is legally bound to operate to comparable private sector standards, including the requirement to make a market return for its shareholder (through its dividend payment) while maintaining its commitment to safety (as enforced through a separate safety regulatory regime).

- D1.16 Airways' Board comprises a Chairman and six additional members. Its Executive Management Team includes the Chief Executive and five other members.

Financial transparency

- D1.17 Airways Corporation produces financial accounts for the year ending 30 June. The accounts are externally audited and published on the Airways' website.

Sources of revenue

- D1.18 The majority of Airways' revenues come from user charges (with separate charges for en-route, terminal, aerodrome and approach and AIS), with the remaining revenues coming from the other activities of the corporation and its subsidiaries providing publications, and internationally providing ANS, maintenance, consultancy and training services.
- D1.19 Meteorological services are provided by a separate government authority and Airways purchases some services from them and sells them on to its customers.
- D1.20 The principle for all Airways' charging is the recovery of all costs of provision plus an acceptable rate of return.

Additional sources of finance

- D1.21 Airways Corporation receives no funding or financial guarantees from the New Zealand Government. Its principal additional source of finance is through borrowing arranged by its bankers ANZ Bank Group. At the end of June 2003, Airways had term loan and standby facility agreements allowing it to borrow up to NZ\$ 60 million (€32.6 million), of which it had drawn down NZ\$51 million (€27.7 million). The average of the floating interest rate in that financial year was 5.94%. Its financial gearing in June 2003 was 55%.
- D1.22 Airways Corporation also holds a number of operating and financial leases and a small amount of cash and cash equivalents. It has recently executed a cross-border lease facility.

Constraints and limitations

- D1.23 There are no legal constraints on Airways' use of alternative financing options. It has total independence from Government in choosing both the level and composition of its financing.

Financing the costs of restructuring

- D1.24 Airways was corporatised in 1987 and undertook a significant restructuring exercise in 1998/99. The cost of this restructuring was funded through cash flow and withholding

of dividends. No direct financial assistance was received from the Government of New Zealand.

Mitigation of over-under recovery of revenues

- D1.25 Airways has a long history of active user consultation. We understand it has entered into a Partnership Agreement with its users. However, the details of the agreement are not public, but we understand that it allows for automatic changes in charge levels if traffic is higher and lower than expected beyond an acceptable level mis-forecasting.
- D1.26 Airways is targeted with achieving a target level of Economic Value Added (EVA), and it reports its performance to this target in its annual report.

The Federal Aviation Administration

Ownership structure and governance

- D1.27 The Federal Aviation Administration (FAA) operates under the auspices of the Department of Transportation in the United States. As a Federal Government department, it is subject to budgeting and other fiduciary constraints. The FAA has an externally appointed Management Advisory Board, functioning in a similar way to a Board of Directors. In addition its activities are overseen by a number of committees, including the House of Representatives' Appropriations Committee that determines the availability of funds to FAA on an annual basis.

Financial transparency

- D1.28 Annual budgets and accounts are available on the FAA website. The financial year is to the end of September. Under a contract from the Transportation Inspector General, the financial accounts are externally audited.

Sources of revenue

- D1.29 The Air Traffic Services part of FAA (ATS) collects a very limited amount of revenue directly from its users. These revenues are collected from the sale of aeronautical charts and reimbursements for services provided to other government and private entities (for flight inspection services, engineering support, technical assistance).

Additional sources of finance

- D1.30 The majority of FAA's finance is provided by Congress through a budget, with financial limits, for operating and capital expenditures. Additional finance is provided from the Airport and Airways Trust Fund. The Fund contains revenues collected from proceeds of the international departure tax, taxes on the transportation of persons and property by air and gasoline and jet fuel taxes.
- D1.31 ATS receives a proportion of this budget funding.
- D1.32 FAA currently does not hold any debt with either the Federal Government or the commercial banking sector. The FAA is a wholly cash based operation and holds significant funding balances with the US Treasury.

Constraints and limitations

- D1.33 FAA has no access to traditional capital markets and limited ability to manage its cash flow beyond the quarterly budget allocation from the US Treasury. Congress authorises a budget and the FAA must complete its operations within these constraints.
- D1.34 A recent court ruling has resulted in the FAA withdrawing its charges for overflight fees.

NavCanada**Ownership structure and governance**

- D1.35 NavCanada is a non-share capital, private corporation that owns and operates the civil air navigation services provider in Canada. It was purchased from the Federal Government on November 1, 1996 for C\$1.5 billion (€1 billion). The company has no equity shareholders and is wholly financed through the debt markets.
- D1.36 NavCanada is governed by a Stakeholder Board of Directors. Each of the company's four founding groups has representation on the board:
- Air carriers (4 members);
 - General and business aviation (1 member);
 - Federal Government (3 members); and
 - Bargaining agents (2 members).
- D1.37 These representatives are not full time members of the stakeholders' staff, but appointed representatives. The ten directors then elect four independent directors and the Board appoints the President and Chief Executive (both posts are currently held by the same person).

Financial transparency

- D1.38 NavCanada produces its financial accounts for the year ending 31 August. The accounts are published on their website and externally audited.

Sources of revenue

- D1.39 Approximately 98% of NavCanada's revenues are received directly through user service charges. Its other sources of revenue include from the provision of training and sale of its system technology.
- D1.40 Its charges distinguish between en-route, terminal and North Atlantic (outside of Canadian Airspace). Meteorology and AIS service costs are incorporated into the en-route and terminal charges.

Additional sources of finance

- D1.41 Since its inception, NavCanada has borrowed to finance additional capital expenditure requirements. Through the debt markets it has used short and long-term revenue

bonds securitised against the total revenue stream of the business, medium term notes and a revolving credit facility.

- D1.42 At the end of 2003, NavCanada's financial gearing was close to 100%, with €1.5 billion of long-term debt and retained earnings and cash and cash equivalents of only €31 million. With a AA (Dominion), Aa2 (Moody's) and AA+ (Standard & Poor's) credit rating it benefits from competitive interest rates to service this debt.

Constraints and limitations

- D1.43 Under its Master Trust Indenture (which forms a common security and basis of common covenants for the benefit of lenders), the maximum borrowing capacity of NavCanada is €1.96 billion at the end of August 2003.
- D1.44 Under the governance structure it cannot raise equity finance; however the management does not perceive this as a constraint.

Financing the costs of restructuring

- D1.45 A major restructuring exercise of NavCanada took place after acquisition in 1996. The costs of restructuring were funded through user charges as incurred. However, during the period there were significant efficiencies introduced resulting in a reduction in headcount of approximately 20% and overhead and administrative costs have been reduced from 22% of total costs to 9% by 2003. This resulted in a period where there was a reduction in charge level.
- D1.46 The Canadian Government's policy is not to provide any ongoing support for restructuring costs.

Mitigation of over-under recovery of revenues

- D1.47 NavCanada introduced a stabilisation fund for its charges during the first year of its operations. The aim of the fund is to avoid cyclical fluctuations in charging levels. The fund target was set at €33 million (and it reached over €73 million at its peak). In the early years of its operation, annual surpluses were transferred from the rate stabilisation fund to a rate reduction fund to reduce charges. Since 2001, the stabilisation fund has been used to finance shortfalls in revenues and NavCanada now believe that there may be a case for a larger fund target to avoid similar downturns in the future (it had to increase its charge levels in 2003).

Lessons from other ANSPs

- D1.48 A range of financing options is used by non-European ANSPs. In the main, because of the ability to recover costs from users, the ANSPs are not taking a large amount of financial risk. However, in the case of NavCanada and Airways Corporation, pressure comes from the governance and user agreement arrangements, and in the case of ATNS and ASA from independent regulation, to seek a commercial and efficient approach to delivery and financing. The governance and charging control arrangement will be key in providing incentives to more efficient financing behaviour for countries in the SES.

- D1.49 The FAA is a completely different model, relying on redistribution of receipts from general and specific aviation related taxation. It is the only ANSP examined that receives the bulk of its funding directly from Government.

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