

“Study on Impediments to the Recruitment of Air Traffic Controllers.”

Final Report

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EXECUTIVE SUMMARY

The study had two main goals:

- The quantification of the shortage affecting European Air Navigation Service Providers (ANSPs), and
- A review of the means available to address the shortage.

The purpose of the work is to inform the work of the Social Partners and provide a range of options, which can be discussed by the partners.

The study team sent questionnaires to all 15 European Union (EU) Member States, covering the following groups of personnel:

- Air Navigation Service Providers,
- Trade Unions,
- Potential Recruits (school and university students),
- Operational Controllers,
- Resigned Controllers,
- Retired Controllers,
- Other Industries (other transport modes, hospitals and telecommunications companies).

As a result of the analysis of the questionnaires, interviews of some of the above groups, and independent research, the following was established:

- There is a shortage of operational controllers across the European Union – but it is not regular and varies from zero in some States to around 15% – 20% in others.
- The shortage across the Union is currently in the range 6 – 10%. This is expected to continue to 2007, with a possible minor reduction to around 5 – 8%.
- The shortage of non-operational controllers varies from 10 – 40% amongst the States declaring a shortage – amounting to somewhere in the region of 400 – 600 vacancies.
- Consideration could be given to recruiting outside the EU (in the Far East for example) where well-trained controllers are to be found in low wage economies.
- There is a lack of correlation between traffic levels and controller numbers other than at a micro-level.

Reasons for the shortage are complex:

- promotion of the Air Traffic Control (ATC) profession is lacking and recruitment and staff could be improved,
- resignations and early retirements are, except in individual cases, insignificant,
- failure rates in ab initio training are too high in all but 3 of the Members States,
- career development planning is not found to be significant at this stage.

After a quantitative analysis, the report then goes on to consider the recruitment process and concludes that the promotion of the profession and the promotion of specific recruitment campaigns need to be handled differently. Options for discussion are identified which would address these needs.

Other potential impediments to recruitment, including key legal issues, are identified and the issue of controller liability as a potential impediment is identified. Mobility issues are also looked at.

Controller training is next examined and the failure rates during ab initio training is identified as a major cause for concern. The experience of some States, achieving failure rates of around 5% is contrasted with those States with between 20 and 30% failure rates. This latter figure is considered unsustainable. The cost of such failures is identified at a general level and the study suggests that further work is needed to identify the best practice in the examples of States with very low failure rates.

The next chapter of the report examines retention strategies and includes career development planning. The report considers the approaches adopted by a number of other industries and identifies some options, which could usefully be addressed in the High Level Group. Perhaps surprisingly, the questionnaires reveal that the issue of Career Development Planning is not a major issue for many controllers, and only for a relatively small percentage of those considering joining the profession. It is likely that adoption of other retention strategies may be more effective – particularly in the short term.

Work organisations and shift patterns are depicted and a comparison of employment conditions of Air Traffic Management staff with other mainstream industries is made.

Finally, the issue of how controllers leave the profession is considered in the Exit section. It is clear from questionnaire responses that the vast majority of controllers leave the profession by normal retirement. There are relatively few resignations – except in isolated pockets. In most cases, controllers who resign go on to work in another part of the world – still within Air Traffic Management (ATM).

The report ends by providing options identified for the future and which the team considers appropriate for further consideration by the Social Partners.

INTRODUCTION

0.1 Timelines and Predecessor Work for the Single European Sky and Controller Shortages

European Commission		Others	
		Eurocontrol activities to improve Human Resources (HR) planning	1996 ↓ ↓
Commission Communication	Late 1999		2002
Formation of High Level Group	2000		6/2000
HLG ¹ identifies controller shortage of around 10%	2000	IFATCA ² reports less than 10% shortage	
Air EuroSafe (AES)/Claeys & Engels selected for this study	10/2002		

0.2 Project Methodology

- Desk research
- Questionnaires (agreed with the Commission and the Social Partners) to all 15 EU Member States, covering the following groups:
 - Air Navigation Service Providers,
 - Trade Unions,
 - Potential Recruits (school and university students),
 - Operational Controllers,
 - Resigned Controllers,
 - Retired Controllers,
 - Other Industries (other transport modes, hospitals and telecommunications companies).
- Interviews - conducted with selected and available personnel

0.2.1 This type of study can only be as good as the data made available to the study team. Unfortunately, there have been difficulties in achieving the level of co-operation expected from the industry. As a result, the study is at a less-detailed level than we would have liked.

0.3 Data

0.3.1 The ANSPs from the following countries answered the questionnaires:

Austria	Belgium	France
Italy	Finland	Greece
Spain	Sweden	

Additionally, answers were received from ab-initio students in Belgium, Italy, Greece, Sweden, Portugal, United Kingdom and Spain, with Trade Union responses from United Kingdom, Germany, Italy and Greece.

0.3.2 Additional information for those ANSP not responding (Denmark, Germany, United Kingdom, Ireland, Netherlands and Portugal) were found in the European Organisation for the Safety of Air Navigation (EUROCONTROL) publications, Internet research and public information.

0.3.3 While AES also reviewed the findings of relevant Eurocontrol studies - and attempted to confirm them during the questionnaire/interview process - this was certainly not the sole or indeed the main focus of the work. Rather we have sought to consider the following points:

¹ HLG: High Level Group.

² IFATCA: International Federation of Air Traffic Controllers' Association.

- What it is that makes the profession attractive to some people, while failing to attract others;
- What employment expectations exist in the potential workforce and what changes need to be made to the current career structure in order to answer these expectations;
- How important is the career structure to current and potential controllers;
- Why, during training, significant failure rates are experienced in some States, while not being reproduced in others;
- What factors have influenced the decisions of those resigning from the profession;
- To what degree the recruitment and retention problems are common to other similar industries;
- What opportunities exist for movement of controllers?

0.4 Interim Report

An Interim Report was submitted to the Commission and accepted at a meeting with the Social Partners. The substance of that report is not repeated here, but the key elements were:

- A review of current documents, models and existing studies,
- A review of recruiting issues and perceptions of the controller's job,
- The key positive and negative aspects of the job, as perceived by applicants.

0.5 Legal Issues

0.5.1 From a legal perspective all relevant legal measures, such as laws voted by Parliament, implementing decrees, collective bargaining agreements etc. were studied and analysed in as much detail as possible. The legal team received answers on a limited number of questions from: Belgium, Greece, Ireland, Sweden, United Kingdom, The Netherlands, Austria, Finland, Italy, France, Switzerland and Spain.

0.5.2 We note that the legal status of controllers varies significantly between Member States. In Belgium, Greece, Sweden, The Netherlands, France and Finland, controllers are civil servants. In Spain, United Kingdom and Germany the providers are separated (to a greater or lesser degree) from the civil service and, for the most part, their controllers are not civil servants.

0.5.3 In consultation with Air EuroSafe, the legal team decided to focus on 4 main topics: mobility issues, age issues, responsibility issues and the organization of the work.

0.6 The Controller's Job and Inter-Sector Comparison

0.6.1 The team were asked in the original terms of reference to compare the measures taken elsewhere (ie in other professional sectors) to address shortage of staff and identify any which may be usable in the ATC area. Increasingly, other sectors are recruiting internationally and focusing on low wage economies. This applies, at least, to the following sectors:

- telecomms – call centres, in particular, transferred to Indian sub continent,
- computers – help desks and financial transactions transferred to low wage European sites and to India etc,
- health services – nurses and doctors attracted to European locations from low wage countries (Thailand, Africa etc), intra European moves through wage structure (eg Portugal – United Kingdom (UK)),
- education – teachers and lecturers from all parts of the developing world.

0.6.2 It must be recognised, however, that only the latter cases (intra European, medical and education) involve the transfer of skilled jobs – all others are at the unskilled level. Unfortunately, there are too few such moves in the health industries to provide useful comparison at present as effective schemes have only been running for the last 12 months or so. Early indications seem to be that the experiment is a success. In education, the system is more established and undoubtedly successful.

0.6.3 For similar schemes to work for ATS, particularly for controllers moving within the EU, the common European licensing system will ease matters considerably, but providers will still need to specifically target those areas with spare controllers – by recruitment, as well as through contract agreements with current employers.

0.6.4 Other lessons garnered from the comparator industries are covered within the specific chapters on recruitment and retention etc.

PART I. QUANTITATIVE ANALYSIS

CHAPTER 1 - Context

1.1. Collected Data

Table 1: Operational Air Traffic Controllers³ in the European Union Member States

Country/Year	1998	1999	2000	2001	2002	2003	% increase 98 - 03	% Women
Belgium	258	276	294	312	338	366	42	21-22%
France	2363	2591	2713	2823	2870	2969	25	23-25%
Greece	(660)	663	663	659	647	692	5	40-50%
Germany ¹	1380	1435	1457	1467	(1525)	(1600)	16	
Ireland	227	231	245	263	275	277	22	6-13%
Italy	(1600)	1603	1589	1553	1566	1570	-1	5%
Spain	1191	1239	1305	1403	1456	1622	36	15-30%
Sweden	478	480	511	528	552	551	15	43%
U. Kingdom ²	1790	1837	1858	1868	1918	1948	8	
Austria	(210)	(217)	222	238	248	255	22	10%
Denmark ¹	210	220	230	240	250	259	23	
Finland ⁵	291	290	305	311	312	318	9	12%
Luxembourg ¹	(40)	(40)	(40)	40	(40)	(40)	-	
Netherlands ¹	197 ³	207	216	159 ⁴	(159)	(159)	-2	
Portugal ¹	316 ³	299	293			235	-2	
EU	11211	11628	11941	12134	12406	12861	4	

Sources:

- 1 Data calculated from EUROCONTROL, Performance Review Unit, Year 2000 Data Benchmarking Report and Performance Review Report PRR5.
- 2 NATS Annual Reports (2002 & 2003 graphical estimate only) – includes trainees.
- 3 This year and following years data obtained from EUROCONTROL PRR5 Report.
- 4 EUROCONTROL, Performance Review Unit, Year 2000 Data Benchmarking Report. This data is not consistent with the previous year's figures & no further data published.
- 5 Figures are calculated estimating a 12% of women, added to the figures provided in period 1998-2002 for men. For 2003, figures are those provided by the ANSP.

Note 1: Throughout this report, references to the UK are restricted to National Air Traffic Services Ltd. It is believed that the UK is virtually unique in having a significant number of different ATS providers. NATS is responsible for en route Air Traffic Services (ATS) (under licence from the Civil Aviation Authority) and for aerodrome services at 9 airports (under contract to the aerodrome operator). ATS at all other aerodromes is provided by the aerodrome operator – sometimes with their own staff and sometimes using contractors. It was unrealistic, within the timescale of this project, to include the other 30+ providers in the UK.

³ Operational Air Traffic Controllers refer to those Controllers performing operational tasks and as a consequence, holding a valid licence with a valid type rating in that particular year.

Note 2: Throughout the project, the team have been hampered by the unwillingness of some providers to release the detailed information necessary to carry out some of the analysis required. It is noted that this reluctance was most marked in the case of the 'commercialised' providers (including UK, Germany, Spain), many now believing that such information is commercially confidential. This is likely to be an increasing problem and it may be wise for Social Partners to consider an appropriate confidentiality agreement, or similar mechanism, in order to ensure the release of such information for analysis purposes.

1.1.1 The above table demonstrates the steady increase in controller numbers throughout the 1998 – 2003 period in all but 4 Member States. In general, it is the larger States, which have demonstrated a larger increase, with three of the four States registering negative growth amongst the smaller providers (the exception being Italy). Broadly, the increase fall into the following groups:

35% +	Belgium, Spain
20 – 25%	Austria, Denmark, France, Ireland
15 – 20%	Germany
5 – 15%	Finland, Greece, Sweden, United Kingdom
0 or negative growth	Italy, Luxembourg, Netherlands, Portugal

Table 2: Ab – initio Students in the European Union Member States from 1998 to 2003

	1998	1999	2000	2001	2002	2003	% Women	Failure Rate %	Average Output	% ATCO work force
Belgium	24	25	24	24	24	24	33-25%	25	15	4
France	200	200	200	200	200	200	28-33%	5	170	6
Greece						35		20	24	4
Germany					170 ²				119	7
Ireland	24	24	14	24	24		8-50%	17	16	6
Italy								10-20		-
Spain	96	96	96	96	144	144	35-40%	4	122	7
Sweden	43	46	42	39	31	0	36-28%	21	28	5
U.Kingdom ¹				144	144	144		20-25	97	5
Austria	26	25	23	11	0	12		29	12	5
Denmark		12	12	12	12	12			8	3
Finland	18	24	20	21	18		11-20%	5	17	5
Luxembourg										
Netherlands										
Portugal										

Sources: In general, the data included in the Table 2 are those provided by the ANSPs in their answers to the questionnaires, except those indicated in following references:

¹NATS Annual Reports (4 courses x 36 students).

² DFS presentation on their Selection Process 30.1.03.

Note 1 : Ab – initio students are those students starting their ab–initio training course in that particular year.

Note 2 : Average output equates to the number of students expected to complete training, given the input figure, the declared failure rate and a notional allowance of 10% failure rate in the field. The figure for Ireland uses 20% failure as the figure shown (83%) was a single year failure and was exceptional. Where no failure rate is declared, 20% is used as near average.

1.1.2 It will be seen from the table above that, despite greatly differing numbers of controllers, ANSPs in general provide around 5% of total controller numbers in successful ab initio trainees each year. This input, combined with any additional recruitment, is intended to replace all retirements and resignations etc from amongst the established controller population. The only significant variations from this norm being Germany and Spain where they are trying to recover from significant shortages.

Table 3: Retirement Age Profile of Air Traffic Controllers

	R	C	R-1	R-2	R-3	R-4	R-5	45 to R-5	40-45	25-40
Belgium	55	55	11	12	11	19	9	47	40	170
France	57	50	69	69	94	120	120	149		
Greece	60/65	50/55						243	142	270
Ireland	60	60	8	10	6	4	8	74	13	162
Italy	60		35	15	20	36	53	46	187	873
Spain	60	52	8	4	6	11	9	645	281	842
Sweden	60	60								
U.K.	60	55								
Austria	60	55	56	28						
Finland	65	55	12	5	10	5	10	21	56	174

Table 4: Current and Forecast Controller Numbers

	Current Controllers Shortage		Forecast	Comments
	Ops.	Non-Ops.		
Belgium	No	8	About 403 Controllers in 2006, Shortage will be reduced.	
France	No	No	New training facilities will operate from 2004, providing more capacity to meet shortage due to retirements.	Increased intake of ab –initio students is forecast to meet expected increase in retirements.
Greece	5% (approx. 40 controllers)	40%	Shortage expected to continue. Special action plan, including modification to recruitment and career definition, under consideration	The shortage is estimated as 20% of total controller (ops and non-ops) workforce - approximately 140 controllers.
Germany	Yes (No figures provided)	Yes (No figures provided)	No data available.	DFS is reportedly short of 200 controllers. ¹
Ireland	No	No	No shortage forecast. IAA recognises that the current failure rate for the ab – initio training course is too high and this could affect future planning.	IAA are pro-active suppliers and see ATM shortages in Europe as a business opportunity. Currently providing 17 operational controllers to DFS (Germany). No shortage estimated or expected.
Italy	10-15% (160 – 240 controllers)	40% (No figures provided)	There is a plan to increase the number of operational controllers by 150 in the period to 2006. This is insufficient if the data provided by the ANSP is accepted.	
Spain	280 ²	Yes	Previous plans for ab-initio courses have been reduced, this means that the existing shortage will remain longer.	There are discussions on the definition of needs and manpower planning.
Sweden	No	No	No shortage estimated for the next 4 years, and same number of controllers until 2006.	There is a surplus of operational controllers at this moment. Expected to be in balance by 2006 (but see Table7 (a)).
United Kingdom	Yes	Yes	No data available.	Estimated at 6% (source: UK Trade Unions Representative) Tech changes and validation difficulties mean that, currently, there is an additional, short term shortage of around 42 controllers at Swanwick ACC.
Austria	No	No	No shortage estimated for the coming years.	
Denmark	No	Yes (No figures provided)	No data available.	There is a reported surplus of operational controllers at this moment.
Finland	No	No	No shortage estimated for the coming years.	Number of Controllers will remain at 280 up to 2006.

Sources: Data provided by ANSPs in answers to the questionnaires and interviews, except:

- 1 www.clarechampion.ie/02/feb/cc20020222/sh_atc.shtml. This figure is from 2002 data and includes military resources shortage, unquantified. DFS also argue that the figure should be reduced by a further 17 as they have sourced 17 contract controllers from Ireland. Unless DFS sees this as a long term solution, then the team believes the figure to be accurate since the contract posts do not mean there is no shortage. (DFS representative advice to Social Partners; May 6th, 2003).

- 2 Calculation made by Air EuroSafe.

- 1.1.3 Table 4 shows the reported shortages by State, enabling us to see that Spain, despite major efforts to increase controller numbers, still has a significant shortage, while Belgium and all members of the Austria to Ireland group have effectively controlled their potential shortages by increasing numbers of controllers. The trend for ever-increasing numbers of controllers is likely to ease over the next few years as the effects of technological and traffic management improvement feed into the system. The providers will, instead, face the pressures brought about by retirements, as demonstrated later in this report.

CHAPTER 2 – Current Shortage

2.1 Shortage: Definitions

- 2.1.1 When analysing the shortage, it is difficult to find an absolute figure either for controllers needed or controllers available. Partly, this is due to the reticence of providers in publishing the figures, and partly it is a problem of ensuring that we are comparing like with like. Total figures can be distorted by the inclusion of, for example, trainee controllers. While ab initio controllers are easy to identify, some providers cease to class the controllers as trainees once they gain their first qualification, while others define them as trainees until they have completed all training. Similarly, differences with the definition of non-operational controllers, and the use by some States of a seasonal staffing system all lead to inaccuracies in the comparisons.

2.2 EU Shortage: Operational Controllers

- 2.2.1 Taking table 4 into account, and allowing both for extremes of definition and some forecast inaccuracies, we believe that the current total of operational controllers required across the Member States surveyed is in the order of 12,500 – 13,000. Given the various shortages identified or established, we believe that the total shortage is in the order of 750 – 1250 controllers across the Member States. Thus the EU is short of around 6 – 10% of the total, optimum controller numbers. However, we would emphasise that this figure is, we believe, of no real significance as it masks major problems in some areas and near over-supply in others.
- 2.2.2 The AES team attempted to achieve a regional, as well as a national correlation. However, apart from an apparently satisfactory situation in Scandinavia, this is impossible as there are examples of shortage and surplus relatively closely intertwined throughout the Union. This could, of course, be seen as a significant driver for cross-border provision, at least initially for adjacent States.
- 2.2.3 Finally, we briefly examined the economic situation of the States in significant surplus or shortage to see if there was a correlation here. Unfortunately, this is impossible to prove, as, again, the variations within boundaries are too great.
- 2.2.4 One very general correlation did apparently emerge – that the larger providers (with the exception of France) were the ones suffering the shortages, while the smaller suppliers were not so badly affected. It is difficult to decide why this may be, but it is clear that a shortage is more easily handled in a large organisation than in a small one. For example: most, if not all, providers have an allowance in their calculation of required numbers to permit controller absences for training, sickness, leave etc. In general this equals around 5 - 8% of staff. Thus

in a large unit, there will always be a pool of 'spare' controllers for this purpose and, in times of shortage, they can be utilised by reducing developmental training, restrictions on leave taking etc. This is clearly much more difficult in a small organisation where the numbers in the pool will be significantly less.

- 2.2.5 There have been occasional anecdotal reports regarding shortages within individual States. The study has not attempted to analyse these as little reliable information is available, and the team considers that it is for the ANSPs to take management action to resolve such problems.

2.3. EU Shortage: Non Operational Controllers

Table 5: Non – Operational Air Traffic Controllers⁴ in the European Union Member States

	1998	1999	2000	2001 ²	2002	2003	% Women	% Non-Op v Op controllers 2001
Belgium	15	15	17	18	22	25	13-18%	6
France ²	470	503	522	528	528		18-21%	16
Germany ¹				144				9
Ireland	24	22	22	20	20	20	10-25%	7
Italy				65				4
Spain	166	177	206	206	232	257	8-10%	13
Sweden ³	239	249	240	260	286	280	20-26%	33
U. Kingdom				219	c 190	c 195		10
Austria			24	24	25	26		9
Denmark				89				27
Finland				20				6
Luxembourg				0				0
Netherlands				28				15
Portugal				59				-

Sources: Data included in Table 5 provided by ANSPs, except Germany, Spain, Finland, Italy, Denmark where estimated figures - based on the theory that the increase rate has not been significant during that period and data provided by Eurocontrol PRR5 – have been used. UK data extracted from NATS published PIs.

¹ and ²: Data calculated from EUROCONTROL, Performance Review Unit, Year 2000 Data Benchmarking Report and Performance Review Report PRR5 and estimations made in this study. Data for France and Sweden include the On the Job trainees.

- 2.3.1 It will be seen from the final column of the table 5 that the relationship between non-operational and operational controller numbers varies widely across the States. This may result from difficulties with definition of the non-operational controller task. France and Sweden, for example, include part validated trainees, others do not – this probably accounts for the apparently high proportion in Sweden – but means that the proportion in France would appear unnaturally low. In other States, only certain jobs – trainers, airspace or procedure designers for example – are classed as non-operational controllers, while managers and supervisors are classed as management in some States and non-operational controllers in others.

Importance of non-operational controllers

- 2.3.2 It may, at first appearances, seem that non-operational controllers are less important in terms of shortage and safety etc than operational controllers. However, a lack of non-operational controllers – either presently or as a structural deficiency – is merely storing up problems for the future. Amongst the key roles of non-operational controllers include:

- training and ongoing competency checking,

⁴ Non-Operational Air Traffic Controllers are the rest of Controllers performing other activities like management or training activities (some of them can hold a valid licence).

- policy – for ATS (including engineering aspects), airspace, civil/military liaison,
- planning – of airspace, procedures etc,
- technical support to operational IT development and operation,
- operations, quality and safety management.

It is clear that, if jobs such as those listed above are neglected, then problems will occur with, in particular, future systems.

2.3.3 Traditionally, all the above tasks have been carried out by licensed controllers – many providers are now reviewing the need for controllers to undertake all these tasks. In some cases, it may be possible to replace non-operational controllers with other, suitably trained professionals. The jobs which are under active consideration in this way include supplementary training staff (particularly classroom lecturers who may be either specialist teachers in some subjects or partially replaced by CBT and similar technologies); IT support (where it may be more satisfactory to provide basic ATC training to an IT specialist rather than vice versa); some aspects of policy and liaison and the planning of airspace and procedures.

2.3.4 Despite the difficulty of definition referred to earlier, it is clear that countries which have a shortage of operational controllers, are also likely to have a shortage of non-operational controllers (however they define them). However, countries, which do not have a shortage of operational controllers, may, nevertheless, still have a shortage of non-operational controllers. Indeed, in Greece for example, they are moving non-operational controllers back into operations to reduce the effects of the operational shortage. It is difficult to assess the extent of the shortage due to the lack – and confusing nature of – the data provided. However, our best estimate is, given that only 5 States out of 12 responding did not report a shortage:

- that there is a shortage of non-operational controllers,
- that it varies from 10 – 40%,
- that the larger States have both a larger number of such controllers and a higher percentage shortage,
- there are between 1700 and 2300 non-operational posts in Europe,
- there are some 400 – 600 vacancies for non-operational controllers at present,
- there is no indication that, while an operational shortage continues, this number is likely to decrease, other than the discussions in progress in many States which is aimed at reducing the number of such jobs which are defined as controller's posts.

Neither does there appear to be any correlation between States having a shortage of operational controllers and those with a high proportion of non-operational controllers. Though Spain, for example, is among the higher proportions at 13%, Italy which has an almost equal shortage, only has 4% non-operational controllers.

2.3.5 In addition to the shortage of controllers generally, interviews have shown that most operational controllers are not attracted by non-operational positions – either as a job or even as a career path. The reasons vary, but can be summarised as:

- move away from the operations environment,
- reduction in earning capacity (salary and/or pension),
- less time off etc.

CHAPTER 3 – Other Factors

3.1 Annex 11 Changes and USOAP

3.1.1 The background to this issue is included within the Annex.

Recent and planned amendments to ICAO Annex 11 will require two major changes:

- the implementation of safety management systems in Air Traffic Management (ATM); and
 - the establishment of an independent regulator for ATS
- 3.1.2 The implementation of safety management, already an International Civil Aviation Organisation (ICAO) Standard, has implications for non-operational controller (and engineer) staffing as significant work is required to design and implement such systems, including the training required for all affected staff.
- 3.1.3 The ICAO Universal Safety Oversight Assessment Programme (USOAP) will, from 2004, include ATM (Annexe 11 and PANS-OPS) in the audit programme. This programme identifies, in a published Final Report, where a State is deficient in its application of the Standards.
- 3.1.4 It is also worth noting that the recent AGAS (High Level European Action Group for ATM Safety) Report: One Safe Sky for Europe found that "..... there is a general lack of leadership and commitment that has led to a dearth of properly qualified safety experts and insufficient opportunities for safety related training." As a result, the Group places the finding of safety related human resources at the head of its lists both of High Priority Items and Areas of Immediate Focus.
- 3.1.5 It is clear that one of the key points of interest to ICAO is to identify the independent regulator. Possibly, the rapid transfer of regulatory responsibility for ATM to the European Aviation Safety Agency (EASA) would be the best way forward – but there will still be a demand for staff for this new unit. It is clear, however, that there would be a much higher demand for controllers if each individual Member State were to establish its own ATM regulator.
- 3.1.6 As we said earlier, a lack of non-operational controllers – either presently or as a structural deficiency – is merely storing up problems for the future. Thus we believe that it is necessary to address this problem as a matter of some urgency. Possible solutions include:
- Sub-contracting or pooling arrangements, either with other States or with Eurocontrol for airspace and procedure planning etc.,
 - Reassignment of jobs away from controllers and to others capable (perhaps with minimal ATS training) of undertaking the tasks,
 - Outsourcing arrangements, to commercial service suppliers either in or out of country.

3.2 Management Issues

- 3.2.1 The lack of definition, in some countries, of manpower planning criteria to accurately forecast the number of controllers needed in operational posts, means shortages and over-supply are inevitable. Better planning tools are needed to identify the numbers well in advance. The new Naviar system is being developed precisely to undertake this role.
- 3.2.2 There is also a clear view from at least some of the providers that the rigidity of current work patterns and organisation are, at least in part, to blame for the shortages. They regard the attainment of more flexible working arrangements as a precursor of more efficient working – and thus the eradication of shortages. The team have been unable to identify any specific evidence to support this contention. However, in States which have a developed system of regulation of air traffic services – as required by the International Civil Aviation Organisation of all states in the near future – this rigidity can often result from regulatory requirements as much as the demands of controller trade unions.

3.3 Seasonal Shortage

- 3.3.1 In high volume tourism countries (Greece and Spain for example), the shortage is seasonal. Seasonal traffic is resolved in some cases by using non-operational controllers with a valid license at operational controllers positions, thus creating a shortage in non-operational positions. For budgetary reasons, countries with seasonal shortage appear to prefer to work with a shortage of controllers in the non-operational areas rather than fully staffing operations for the summer, leaving controllers under-employed the rest of the year. While this is a

perfectly reasonable way to deal with seasonal shortages at present, with the increasing length of the tourist season in Southern Europe, it remains to be seen how long this system can be maintained. As stated above, this is likely to remain a national measure, rather than assisting in any Europe-wide shortage.

3.3.2 There is anecdotal evidence that this seasonal shortage is also addressed by the use of overtime. The working of excessive overtime is clearly a safety issue and it is for the safety regulator to address the question of maximum hours for a controller and therefore the maximum overtime, which can be worked. Given that Spanish controllers, for example, work on average fewer hours than any other controllers in the EU, then it may be reasonable for overtime to be used in this way. In other States, where the working hours are more extensive (see table 8 at para 9.3) then the use of overtime may be inappropriate.

3.3.3 In general, the following principles would appear to be logical:

- overtime may be an appropriate tool to deal with short-term, unplanned or unexpected shortages,
- overtime is not an appropriate tool to deal with a structural shortage,
- the extent of hours worked should never impact on safety.

3.3.4 However, in general, it should not be acceptable to a regulator (or, indeed to a provider) for the proper staffing of an ATSU to depend on overtime.

3.4 Technological Developments

3.4.1 It is clear that there are going to be technological developments over the next few years which will have an effect on controller numbers. The implementation of the majority of these systems is aimed at increasing safety and the efficiency of the controller, thus allowing for the safe handling of more flights per controller and, thus, easing the pressure on numbers. Amongst these are:

- overall implementation of Communication Navigation Surveillance/Air Traffic Management (CNS/ATM) and particularly increasing use of Mode S and controller/pilot datalink communications,
- increasing use of complex airfield aids, for the structure and integration of approach patterns (cf Frankfurt and Paris CDG) and for final approach and runway control - both radar and processor based,
- developing conflict alert systems - both on aircraft and in ground systems,
- increasing integration of Air Traffic Services units (cf London Terminal Control, which combines the approach units for three airports - London Heathrow, Gatwick, Stansted - and also handles traffic for Luton, London City, Northolt and Biggin Hill. This unit has just 32 approach and approach radar control positions for the 7 airports),
- redevelopment of existing network of Area Control Centers (ACCs),
- re-assessment of responsibilities for, and technological developments for, Oceanic control.

3.4.2 These are clearly no more than some of the potential effects on ATM and controller numbers. Each, however, has a common effect. In order to introduce a new system, whether or not it will reduce controller numbers in the long term, it is likely, in the short term, to require overbearing of controllers to allow for final development, training etc. The difficulties of scheduling training to meet the need for multi-sector validations, particularly in new ACCs, should not be underestimated. When introducing its new Swanwick Centre, NATS in the UK had significant problems ensuring that controller teams had the right mix of sector validations to ensure that full staffing was possible at all times. It is estimated that a temporary 'virtual shortage' - of around 42 controllers - was created by this problem.

3.4.3 While it would be of value to be able to factor in these anticipated changes, it is not possible to do so with any accuracy at this stage. Once plans can be made for the integration of these new technological developments at specific ATS units then it will be possible to assess the overall effect on any shortage that they may have.

CHAPTER 4 – Evolution of the Shortage

4.1 Forecasts for controller numbers to 2007 are reproduced in the tables below.

Table 6: Retiring Controller Numbers

	1998	99	2000	01	02	03	04	05	06	07	Average	Average ret. per year 03 – 07
Belgium*	6	5	4	8	6	5	11	12	11	19	16%	12
France*	45	29	48	70	80	101	98	114	138	135	19%	118
Greece*	6	3	14	7	3					94	Av.	19
Ireland*	2	1	3	0	3	4	10	12	8	6	15%	8
Italy*	64	33	47	35	37	35	15	20	36	53	10%	32
Sweden*		11	11	5	14	12	13	24	12	19	15%	16
Finland*		11	9	14	12	15	8	5	6	2	12%	8
Spain*	13	13	20	18	13	16	19	17	23	22	6%	20
Germany										216	Av.	44
UK										263	Av.	53
Austria										35	Av	7
Denmark										35	Av	7
Luxembourg										6	Av	1
Netherlands										22	Av	5
Portugal										32	Av	7

Sources: *All, or partial, information provided by the ANSPs.
Others calculated using 5 year average for responding states (except high and low) 13.5% (and indicated as Av.) with total to 2007 shown in 2007 column.

Table 7: Forecast of Operational Air Traffic Controllers from 2003 to 2007

	2003	2004	2005	2006	2007	Average Increase p.a
Belgium	366	(398)	(404)	(403)	(403)	8
France	2969	3051	3101	3203	3281	63
Greece	692					
Ireland	278	283	287	290	293	3
Italy	1500	1550	1600	1650	1650	50
Spain	1700	1820	1939	2010	2100	80
Sweden	712	703	710	680	670	-9
UK	1948	(1997)	(1997)	(1997)	(1997)	10
Austria	255	255	255	255	255	0
Denmark	259	259	259	259	259	0
Finland	280	280	280	280	280	0

Sources: Provided by the ANSPs; and, in brackets, calculations made by Air EuroSafe.

Table 7(a): Input and Output Averages

	Average Retirements per annum (Table 6)	Average Increase per annum (Table 7)	Total requirement per annum (Col 1 + Col 2)	Total Input (Training Output) per annum	Total Difference To 2007 (pa x 5)
Belgium	12	8	20	15	-25
France	118	63	181	170	-55

Greece	19			24	
Ireland	8	3	11	16	+25
Italy	32	50	82		
Sweden	16	-9	7	28	+105
Finland	8	0	8	17	+45
Spain	20	80	100	122	+110
Germany	44			170	
UK	53	10	63	97	+170
Austria	7	0	7	12	+25
Denmark	7	0	7	8	+5

Note: The table takes no account of early retirements, resignations etc as these are considered to be negligible. It may, however, account for the slight planned over-recruitment in Finland and Austria. Alternatively, our estimate of 10% failure rate in the field-training phase may be too low.

- 4.1.1 The above table would appear to indicate that the majority of States for which any calculation can be made appear to be recruiting and training sufficient staff to replace current staff when they leave. The exceptions are Belgium (where there is already a shortage) and France (where there is currently no shortage, but where one may be expected during this period).
- 4.1.2 Greece appears to be training sufficient controllers to replace the expected retirements, but has only a small surplus to address both the already-acknowledged shortage in both operational and non-operational areas, coupled with the seasonal difficulties reported earlier. Therefore, a continuation of the shortage in Greece is to be expected.
- 4.1.3 The UK shortfall (estimated at 6% in Table 4) equates to 120 controllers by 2007, and with a surplus of 170 indicated in the table above, then it is clear that the shortage should be eliminated by that date. In Spain, however, where the current shortage is estimated at 280, then the surplus of 110 will not be sufficient to clear the shortage.
- 4.1.4 It is interesting to note that Ireland, currently the only State providing contract controllers within Europe, is expected to increase its surplus by 2007. This may represent concern over the recent failure rates for Irish ATC courses (up to 83% in 2002), or it may represent their commercial belief that the IAA will be able to sell significant numbers of its ATC staff on a continuing, commercial basis.
- 4.1.5 Sweden appears to be planning for over-supply of controllers in the coming period. This may be for reasons of which we are unaware, or may be that they intend to continue (and expand) the supply of ATS expertise to third countries around the world. This may well put Sweden in a position to join Ireland in offering contract controllers to other European providers within the next five years.
- 4.1.6 From Tables 4 and 7(a), it is clear that there is some States, which may, if all goes to plan, reduce their current shortages, while others will not make noticeable inroads and others will have a shortage in the future. Nevertheless, given the increasing numbers of controllers, and the implementation of new technologies which should reduce the controller requirement in the period to 2007, we believe that the shortage will remain virtually constant, with a small decline to 5 – 8% a possibility. This is partially dependent on the rate of technological change – with new technologies reaching the stage of maturity where staffing benefits may be achieved. In addition, the capability of some states (identified above) to over supply controllers, may have an effect on the overall shortage. We do not have sufficient confidence in these factors, particularly when weighed against the clearly identified negative factors (eg the requirement for more non-operational controllers in the regulatory field), to reduce the shortage significantly from its current level by 2007.

4.2 Recruitment Over the Next 10 years

- 4.2.1 It is clear, even from the restricted responses received from providers that the retirement rate will go through another 'bulge' in the next 5 – 7 years. Peak is in the period 2007 – 08 for most states, with one or two peaking a year or so earlier or later. During this period, planned

retirements increase by almost 70% compared with the previous period. States are already planning to increase training intakes and this, if it can be supported by a reduction in the failure rate (as discussed later), should be sufficient to prevent significant shortage. However, current recruitment methodologies will need to be enhanced by the methods proposed later in the report as part of the effort to ensure that the best candidates are attracted, and the training has the best chance of success.

- 4.2.2. In order for ANSPs to plan correctly for the retirement 'bulge' it is necessary for them to know about it and their trade union partners to recognise it. The team cannot confirm that this is the case in light of the shortage of responses.
- 4.2.3 What is clear is that the majority of providers will enter the period of retirement bulge little better off in terms of shortage than they are today – with some, notably France, probably having a larger shortage than currently.

4.3 Summary

- The EU's ATM system has a current shortage of controllers of some 6 – 10% (roughly 750 – 1250 posts) in its operations rooms.
- This shortage is likely to persist for the period to 2007, though plans and analysis demonstrate that it may be reduced to around 5 – 8% in the period.
- There is a current shortage, ranging from 10 – 40% of non-operational controller posts in the EU – amounting to 400 – 600 vacancies.
- The non-operational controller shortage is unlikely to reduce during the period of operational shortage. Indeed, it may increase unless the Social Partners agree to the reallocation of some controllers' jobs to other specialisms.
- There is currently little movement of controllers within Europe, though the more commercial providers, notably Ireland and, possibly, Sweden, are beginning to recognise the commercial opportunities.
- Currently, there appears to be little appetite amongst controllers to move internationally due to a number of constraints identified in the study.
- There is no significant reason why ANSPs should not recruit outside Europe, particularly in the Far East and Australasia where salaries are generally lower than Europe and where highly technologically developed systems are already in use.

PART II. QUALITATIVE ANALYSIS

CHAPTER 5 – Recruitment Practices of Air Traffic Controllers

Introduction

- 5.0.1 The conclusions summarised above indicate that there need to be a marked increase in the recruitment of controllers in the coming period, if the current shortages, combined with the expected increase in retirement in 2007 - 2008 are to be contained.
- 5.0.2 The study has identified two key issues in terms of promotion of the ATC job:
- a) The promotion of air traffic control as a profession, and
 - b) The promotion of specific recruitment activities.

5.1 Promotion of the Profession

- 5.1.1. It is clear from the studies that very little work is done in this direction – questionnaires indicate that around 90% of job applicants first heard of the profession by word of mouth from family or friends.
- 5.1.2. While some countries promote the profession itself, carrying out presentations and demonstrations for school leavers, with some success, the main promotional tool used for

this purpose is the Internet. Largely, this is done through the ANSPs web sites. However, from an Internet user's point of view – most of these web sites appear tired, unimaginative and even boring. This does not give out the right image for the profession.

- 5.1.3. As far as other industries are concerned, for example the Belgium SNCB identified a shortage of Dutch speaking train conductors in 2000-2001 and decided to devote a budget of 1,5 million EUR to communicate to the outside world the advantages of becoming a train conductor. They did this by developing a major publicity campaign, including TV ads, school visits, career forums and approaches to organisations for the unemployed. This was largely successful in reducing the shortage – though it is reasonable to expect that other issues also played a part in making this job more attractive. Examples include: September 11 and consequent 'fear of flying'; the bankruptcy of Sabena and the tendency, in times of economic uncertainty, for a drift towards 'safer' jobs in the public service. As is usually the case, it is not just one activity or event which changes things, but rather a combinations of them.
- 5.1.4. Though it can be argued that there is little need for promotion of a profession, which generally gathers at least 10 applicants for every job, it is nevertheless essential to ensure that we are reaching the right people. With a drop out rate of 15 – 20 % in many states, it is not enough to say that enough applicants come forward – we need to ensure that the right applicants come forward – and are then selected. Candidate assessment systems are in widespread use, but do not appear to be producing the desired result when drop out rates are so high. Constant promotion, even at a low level, of the profession – utilising the resources of both social partners – will be more effective than an occasional big campaign. The advantages at a European (rather than national) level include the internationality of ATC, reduced costs per provider and an opportunity to produce a higher quality product.
- 5.1.5. One other significant issue came out of the questionnaires (particularly those of school and university students): the air traffic control profession is associated with negative aspects of travel, including delays, accidents and controller strikes.

5.2 Promotion of Specific Recruitment Campaigns

- 5.2.1. In general, all the ANSPs carry out recruitment processes on a regular basis, but there are exceptions when recruitment exercises are delayed or interrupted, during an unprogrammed period of time, which can then lead to a shortage of controllers later.
- 5.2.2. Analysis of the questionnaires reveals a lack of recruitment processes over several years in various countries in Europe, this has contributed to the lack of controllers in recent years. Also, in most cases, there is no continuous promotion of recruitment exercises or of the dates of the selection processes, where these occur. Most of the providers implement promotional campaigns only when recruitment exercises are about to commence. Part of the problem with this approach, where applications are only accepted at certain times, is that these do not always tie in with the best times for school and university leavers.

5.3 Qualifications and Experience on Recruitment

- 5.3.1. All the respondent countries require an established level of English language, prior to selection for the ab initio training course. There are, however, significant differences between the qualifications and experience levels required on entry in other areas:
- Greece and Spain require special knowledge of aviation subjects (basic).
 - France and Spain require high levels of academic qualification.
 - Greece and Italy require some background in the use of computers.
 - The recruitment of air traffic controllers is generally done only at ab initio level in Spain, Greece and Belgium.
 - Sweden, Ireland and Germany, recruit controllers from other countries and have implemented special training processes for them. UK also employs a small number of non-UK controllers, having trained them to the standard required by Civil Aviation Authority (CAA) Safety Regulation.
 - France, Italy and the UK recruit military controllers - but not in significant numbers.

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- 5.3.2. There appears to be no logic to the range of qualifications required, and it is likely that they are more related to general entry requirements for similar jobs (or at least jobs with similar salaries) within each country, rather than a specific requirement of the controller's task. In some cases, the entry requirements also need to be in line with civil service rules within countries where ATC is still within the civil service.
- 5.3.3. There is no real evidence to establish what the entry requirements should be. UK, at one point, increased the level of entry requirements to degree level (from advanced level secondary school leaving examination level) but found that this had no effect on failure rates during training. Anecdotal evidence from instructors at the time of this experiment, indicates that university students were more difficult to teach than ex-school students. UK has now reverted to school leaving examinations with no discernible effect on the pass rate.
- 5.3.4. The only indication of any kind of correlation between the educational qualifications and success is in the low failure rates in France and Spain – two of the States demanding the highest educational qualifications. Further research is critical to determine whether this apparent correlation is more than coincidence. Given the need to reduce failure rates, as a staff planning and financial issue, such research could add real value to the debate over best value training.
- 5.3.5. Conversely, while this requirement may be one of the reasons for the low failure rate in Spain and France, in the future it could also be an important reason for resignation before the retirement age. If career development planning does not offer different possibilities to the incoming controllers who, it is assumed, have higher expectations of their career having gained higher academic qualifications, then they are more likely to look elsewhere in the long term.

5.4 Ex military Controllers

- 5.4.1. Traditionally, military controllers provided a good pool of recruits for civil ATC systems. Today, fewer countries select and train military controllers into the civil arena. Evidence from questionnaires completed by military controllers indicates that many are interested in a career in civil ATC. However, it appears that only those in regular contact with their civilian counterparts, for example where they work together in ACCs, seem to make the move to the civil environment. One military controller did comment that the entry salary, during training, was too low for him to accept, given his commitments. This may reveal a common problem for older, ex military personnel, entering the profession later in life but into a salary structure developed on the assumption that entrant level personnel will be young and not long out of school or university.
- 5.4.2. No comment was provided by ANSPs on the reasons for the reduction in recruitment of ex military controllers.
- 5.4.3. Anecdotally, there is little evidence to demonstrate that, given the differences between the control systems and technologies in the civil and military environments which exist today, there is any real benefit in the employment of ex military controllers above younger, and usually better educationally-qualified, civilians. In the circumstances, it would seem logical to re-examine this position.

5.5 Quality Assessment of Recruitment

- 5.5.1. Almost all the States surveyed undertake some quality assessments of their recruitment processes. The exact scope of this is unclear, except where organisations hold specific accreditations – International Standard Organisation (ISO) or human resource specific – which require continuous improvement processes.
- 5.5.2. An appropriate Question & Answer (QA) system for recruitment should include the following:
- assessment of recruitment advertising, selection, rejection and notification processes against national and European employment and anti-discrimination laws
 - standardisation sampling of both accepted and rejected applications
 - peer review of recruitment decisions
 - post-selection interview or questionnaires for candidate feedback

- routine management and recruitment specialist review of feedback from all sources
- established process improvement methodologies
- continuous monitoring of progress of selected applicants, with feedback from trainers etc
- monitoring of success rates of selected personnel
- exit interview for those leaving or failing during the training process and immediately afterwards

5.5.3. The issue of aptitude and selection testing needs to be reviewed in light of the range of alternative methodologies and their varying success rates.

5.5.4. Use of formal quality assessment of selection and recruitment processes is best practice throughout industry.

CHAPTER 6 – Mobility Issues

Introduction

6.0 With regard to mobility issues two different sub-issues can be identified: impediments in *hierarchical* mobility and impediments in *geographical* mobility. Possible impediments in hierarchical mobility could be limitations in the choice of an air traffic controller to move upwards inside national air navigation service providers. Impediments in geographical mobility have to be understood as the possibilities for air traffic controllers to move between different countries and legal obstacles to any such movements.

6.1 Hierarchical Mobility

6.1.1. Once again important differences are identified in the EU, ranging from countries that promote mobility, via career development system and encouraging the rotation, to others where controllers are civil servants and mobility is regulated by an administrative council. Also the differences in ANSP ownership are currently affecting domestic mobility and will be a constraint for international moves in the future when an employee of a private company may have to be contracted by a State-owned company in another EU country, or vice versa.

6.1.2. At first glance, hierarchical mobility does not seem to be problematic. Most countries actively encourage air traffic controllers to apply for management positions. The majority of the countries studied have career development schedules. The difficulty lies in the detail. In most States, it appears that the highest graded operational jobs are found mainly at the busiest units. Thus as a controller progresses through his career, and crucially as he gets older, he is more likely to be found at the busiest positions – if he remains within the operational sphere. This is a natural result of the current system and is understandable from the controller's viewpoint as they seek to maximise their pension entitlements. However, it may be that as controllers get older they need to move to quieter positions – this is unlikely to happen under current arrangements. This is clearly a reason for encouraging all controllers into non-operational jobs – at least in the later stages of their careers.

6.2 Geographical Mobility

6.2.1. As far as geographical mobility is concerned, there are two aspects: mobility within the State and international mobility either into or out of the State.

6.2.2. Domestic mobility appears to have little impact in terms of controller career expectation, and few controllers highlighted this as an issue in questionnaires. Providers do attempt to use domestic moves to fill specific regional and unit vacancies, but generally seek to fund only those, which they consider necessary. The majority of domestic moves take place as a result of controller requests for a move for personal reasons. This is borne out by the US experience reported by the General Accounting Office (GAO).

6.2.3. Internationally, the following impediments have been identified:

A) Language

- Recruitment of ATC is totally or partly done in the national languages
- Certain states encourage (or even require) the use of the national language in some or all controller-pilot communications (see note below)
- Even where States adopt international standard phraseology, then much of the controller-to-controller co-ordination is still done in the local language.

This issue was identified by a number of questionnaire respondents as the single biggest barrier to international mobility.

[Note: It is widely accepted that, in very busy airspace, it is important that pilots – as well as controllers – can maintain good situational awareness, and this is prevented by multi-lingual radio communications. Thus use of other than standard phraseology is a significant safety threat. The common licence requirements may address this issue – though it is likely that political decisions will override safety considerations.]

B) Harmonisation

There is no harmonisation of the national requirements to become a controller in the EU. Some States deliberately prevent non-nationals applying for jobs – France for example still requires French nationality for controllers. Entry qualifications vary greatly.

At present the standard of licensing varies widely in the EU Member States and, until there is a common licence – *which is acceptable to all Member States* – then additional licensing requirements may be placed on any controller moving internationally within Europe.

The introduction of the common European licence will, of course, address many of these differences. However, practical difficulties will still remain.

C) Management/Staff Relationships

In all States, to a greater or lesser degree, staffing levels – and thus associated vacancies - are subject to negotiated agreements between controllers and ANSPs. While this is normal practice, it can introduce delays in filling posts and could, if the Unions involved adopted a nationalistic stance, have a significant negative effect on international moves.

D) Job Advertising

A fairly minor, but probably important, issue is how controllers find out about jobs in other countries. If the comments made in the chapter on recruitment are adopted then such opportunities should be made more available through the Internet.

E) Liability Issues

Though not widely known, and certainly not identified during research as a specific impediment to recruitment, the issue of controller liability could become significant were it to be publicised. The legal team believe that this may become a key factor if the issue of cross border service provision is to be resolved. There is a significant difference in the liability held by individual controllers in event of accident or other loss.

ANSPs generally take the first responsibility and subscribe an insurance covering such events. It is also normal that Controllers have insurance on their own or through their unions. Air Traffic Controllers can incur penal sanctions. Generally the State assures the air traffic controller's defence; however this can be suspended in certain cases, e.g. personal mistakes.

While it is understandable that air traffic controllers may be discouraged to take up the job because of the potentially high damage they may have to pay in case they make mistakes, it is clear that a decent system of collective insuring liability can be set up to make the job more attractive. At the same time it is clear that a certain form of individual liability has to be

retained as an incentive for not committing errors. The emphasis should self-evidently be more on the corrective side than on the punitive side when mistakes are being committed.

- 6.2.4. Finally, the ability to move location – either domestically or internationally - is seen in some States as a positive opportunity (even if not a major one) while, in others, there is real resistance to any moves at all. Potential recruits responses reflected the controller responses in this respect and it is clear that this is a social, rather than a professional, issue. It is no surprise that amongst the first contract controllers working in Europe were the Irish and the British – two nationalities who traditionally move around their own countries and regularly work all over the world.

It is not clear that it would be impossible to recruit controllers from other parts of the world to work in Europe. Largely this will depend on changing attitudes both amongst the profession and the employers leading to recognition of the undoubted skills and capabilities of controllers from elsewhere in the world. The stage of development of ATM in the Pacific and the Far East easily reaches the standards of Europe and, in some cases (the use of ADS across the Pacific for example) is ahead of Europe. There is no reason to believe that controllers from Australia, New Zealand, Hong Kong, Thailand, Singapore and Malaysia – to name but a few – could not be rapidly integrated into a European environment. The level of English is generally excellent amongst such controllers and many – particularly from the old colonial States - have been trained in Europe in the first place. The additional training required would need to concentrate on legislation and procedures and the time taken to reach local standards should be minimal.

Salaries in these States are (with the possible exception of Australia and New Zealand) significantly below those in Europe and so a paid move to Europe would be attractive for many of these personnel.

6.3 A Shortage in the USA?

- 6.3.1 The United States (US) GAO⁵, in reviewing the potential shortage, which will affect the Federal Aviation Administration (FAA) over the next 5 – 10 years, estimates a shortfall of some 5000 – 7000 controllers (roughly 30 - 50% of the workforce) in the USA. In similar circumstances in the past, the US Government has reduced 'green card' requirements and accepted personnel from overseas to fill serious vacancies in its technical infrastructure. The most recent example being for licensed aircraft engineers. If the USA were to do the same for controllers, then there may well be a significant impact on the European system.

CHAPTER 7 - Training

7.1 Ab Initio Training and Failure Rates

- 7.1.1. With the current forecasts for retirement mentioned earlier (leaving aside any resignations etc), it is clear that the training schools will have to run at peak capacity in order to meet the operational need over the next few years. At present, providers are reporting the following failure rates during ab-initio training:
- 5% for France, Finland and Spain,
 - 20 to 25 % in Austria, Belgium, Greece, Italy, Sweden and UK.
- 7.1.2. The failure, or drop out, rate covers all students leaving the course before conclusion. It is important also to stress that this failure rate is merely during the initial training, further student controllers fail once they reach the 'live' training in the field. This figure seems to vary from almost nil up to 10% or so – though this is anecdotal only. This means that up to 35% of ab initio trainee controllers could be failing to complete the course. Given the cost of training, the facilities and the salary paid to the trainees (everywhere but Sweden and Spain), plus living allowances etc, then this is a considerable waste of resources, both financial and human.

⁵ Air Traffic Control; US GAO Report 02-591, June 2002.

Assuming that 8 students fail a course starting out with 24 students, then the wasted expenditure by the end of a 6-week training programme is in the order of Euro 140,000.

7.1.3. It is therefore in the interests of all to reduce this failure rate. Some of the possible ways of addressing the problem are:

- improve the selection process (although it is already updated almost every year) to deal with the huge amount of applicants (about 7000 for 250 new posts in Spain for example),
- implement and/or improve the continuous assessment of the training process and continuous monitoring of the ab-initio students by instructors (both ATC and supporting psychological staff),
- the introduction of new facilities, simulators and training tools to provide instructors with new preparation, evaluation and follow-up tools to enhance use of simulation training.

7.1.4. In a study of this nature, it is difficult to assess the difference between the systems which produce, typically, a 5% failure rate (in France, Finland and Spain) and those, elsewhere in Europe which produce 20%+. Nevertheless, the following elements appear to be common between France and Spain:

- high academic qualifications, which also result in high self confidence of the individuals within these systems,
- aptitude testing,
- large number of applicants from which to choose.

However, both aptitude testing and a large applicant base can also be found elsewhere in Europe amongst the countries with a much higher failure rate.

7.1.5. One issue which will be worthy of further study, is the increasing use of costly visual simulators for aerodrome control training. Spain, for example, has invested heavily in such technology and it will be essential to assess the added value such investment can provide. Other States utilise much simpler (and cheaper) simulators for this phase of training.

7.1.6. Finally, the decision on the extent of training received by ab initio trainees needs to be re-examined. Originally, almost all controllers were trained to validation standard in:

Basic ATC rules and procedures
Aerodrome Control
Approach Control
Approach Radar Control
Area Control
Area Radar Control

In the last 10 years or so it has been deemed to be inefficient to train all controllers in all techniques and, in some States, controllers split at an early stage - specialising in either aerodrome/approach or area control. While this had the effect of reducing the training time before a controller was operationally qualified, it did have the effect of restricting the promotion and career opportunities for all controllers, because a switch in disciplines became a major, back to basics, training exercise.

7.1.7. It would be of value to review the situation currently in this regard and determine whether any changes are necessary for the long term future of the profession.

7.2 Payments to Ab Initio Trainees

7.2.1 Most of the countries pay the students during their training period, some paying a salary, some living allowance and only Sweden offering no support whatsoever.

7.2.2. Those making such payments consider it essential in attracting sufficient candidates for the ab-initio training course. It is an added cost burden for the ANSPs, however, and there is little objective evidence to prove its value – despite specific questioning of school/university students. The same interviewees do express a desire to have a good salary – though the

majority accept a reasonably long-term approach. It could, however, be considered as a competitive advantage for ATS over other professions, where trainees only begin to draw a salary once reaching a defined level of competence.

- 7.2.3. There is no apparent difference in the ability to attract applications between countries offering such a salary and those only paying expenses etc.

CHAPTER 8 – Retention Of Air Traffic Controllers

8.1 Retention Strategies

8.1.1 Currently, ANS providers do not perceive there to be a significant resignation or early retirement rate and statistical evidence collected supports this view. Nevertheless, there is anecdotal evidence that elements typically included in retention strategies can affect recruitment rates. The retention strategies currently used by ANSPs in the study focus on:

- Salary,
- Social benefits,
- Good working conditions, as sabbatical leave, parental leave, maternity leave.

8.1.2. This broadly equates to the 'traditional approach'. Specific additional conditions include: Early retirement ages, before the official age in almost all EU, provision of variety of units in some countries and better geographical distributions; opportunity to move to non operational duties - training, working methods, airspace studies and management.

8.1.3. Most providers consider their retention strategies to be effective in light of the small numbers of controllers resigning. (Except in some local areas in Northern countries and Reims, France). Lessons from other industries show that other retention strategies should be considered in the future such as System Knowledge Management, including transfer of knowledge and enhancement of individual skills; Continuous training; Use of e-learning tools and Future – oriented human resources.

8.1.4. Systems providing for long periods of leave or career interruption such as for pregnancy, may make the job of air traffic controller generally more attractive but may be associated with re-qualification processes which may be a deterrent to taking advantage of such a career break.

8.2 Career Development Planning

8.2.1. Initially, the team considered it likely that Career Development Planning (CDP) would be a significant issue. However, the questionnaires revealed that, while controllers are interested in CDP as a concept, it is not a major factor either in their decision to join the profession, or to remain within it.

8.2.2. CDP is, however, a major factor in other industries such as Telecommunications, where new employees are offered a range of options when coming into the company. Progression to senior levels is not uncommon through a programme including experience of the different working environments within the company; working in close cooperation with senior management and participating in special projects. Additional study, for an MBA for example, is often a feature of such a package.

8.2.3. However for an operational controller, particularly in areas where the non-operational duties are unpopular, CDP is a marginal issue.

8.2.4. One area where CDP could provide assistance is in addressing the shortage of non-operational controllers. Methods must be found to make the non-operational posts attractive to working controllers and, if handled correctly, this could also form part of a career strategy for controllers. Such methods may include those with an obvious, direct impact, such as an enhanced financial package or better working conditions, but could also be extended to form part of the CDP offer where, for example, it may be necessary to have undertaken one or more non-operational tasks as a condition of promotion to supervisor or manager etc.

8.3 Retention Strategies from other Industries

- 8.3.1. The traditional approach to retention aims at training and personal development and increased salaries.
- 8.3.2. It is clear that many other industries are examining alternatives to the traditional methods of retention⁶. Amongst the more innovative companies, the initiatives broadly split between benefits and management activities.
- *Benefits*: better insurance, share options, vouchers, travel, flexible working and opportunities for lateral moves.
 - *Management actions*: specific efforts not to 'oversell' the job at recruitment stage, Management style, Job content, Training and Development, Career Action Centre, Opportunities for voluntary or community work in working time, High-involvement work practices⁷.
- 8.3.3. A combination of the above – both traditional and more innovative – can be characterized as the 'modern employer' approach. While more innovative approaches⁸ include the use of risk analysis processes, which attempt to establish where and when employees are in the 'danger zone' for early departure.
- 8.3.4. ANSPs need to become 'modern employers' in this sense if they are to be able to attract and retain staff in the future, more competitive, workplace.

CHAPTER 9 – Work Organisation And Shift Patterns

- 9.1. While the issue of the pattern of work organisation is not strictly a retention issue, it has an effect across a number of areas, including recruitment and retention. National differences are therefore considered here.
- 9.2. A country's national legislation might contain certain rules concerning working time shift, night work etc., that could be viewed as creating impediments to the recruitment of controllers. Conversely, there may be localised arrangements, within such legislation, which mitigate these effects. It is clear from the questionnaires that the irregular working routine attracts as many of the potential recruits as it repels. It may be that the negative effects of working unsocial hours only become significant later in a controller's career.

Average Working Hours and Days Off of Controllers

- 9.3. There is little accurate data on this issue – the best available to the team was:

Table 8 - Controller Shift Patterns and Working Hours

Country	Roster Type	Average working day	Days in shift pattern		Night shift (hours)	Average gross weekly hours	Average net weekly hours
			Work	Rest			
Belgium	Individual	7	5	2	10	35	
Spain	Team					31	
Greece	Individual		4 (5 in regions)	2			

⁶ McLuhan; Dangling the Carrot; Personnel Today, February 2000.

⁷ High involvement Work Practices, Turnover and Productivity; Guthrie; Academy of Management Journal February 2001: "The existence of high-involvement work practices can be indicated by: merit v seniority promotions; skill-based pay; profit sharing or share options; training (and specifically cross-training); employee inclusion and consultation; formal dispute resolution etc)".

⁸ Id. footnote n.15.

Ireland	Team		Varies		9	41	
UK	Team	8	6	4	9 - 10	40	
Netherlands	Team					36 - 38	
France	Team		1	1	11	32	
Germany	Team					39 – 38,5	
Austria						37,5	

Sources: ANSPs, responding trade unions, legal team and appropriate legislation.

Notes in addition:

Spain: breaks are 33% of rostered time 0800 to midnight; 50% of rostered time midnight to 0759.

Greece: 5 months maternity leave - 2 months before and 3 months after birth - restricted working hours on return or an extended absence period. The latter option is chosen by a majority of affected staff.

Ireland: max. 87 night duties per year.

United Kingdom: maternity and paternity leave is permitted, though with different durations.

Netherlands: 13 free Sundays over any 26-week period.

France: breaks are 25% of working time.

- 9.4. As can be seen from the above, variations are large and information patchy. In the circumstances it is difficult to draw significant conclusions. Questionnaires indicate that controllers prefer working a regular, rotating shift pattern rather than ad hoc arrangements. Research into Team Resource Management (ATC equivalent of CRM) indicates that rostered teams working routinely together deliver efficiency and safety gains. Total working hours will be subject to negotiation between individual providers and controllers' unions – at present they vary between 30 and 40+ hours per week – and thus this need not be a barrier to mobility.
- 9.5 Insufficient information was provided by all questioned to determine the effect, or extent, of overtime working. It does not appear to be a significant problem with the majority of States. With increasing, independent regulation of ATS, there is likely to be more clarity in the requirement for maximum working hours, shift lengths and patterns, minimum time off etc. This will assist the providers in making planning a simpler process.

CHAPTER 10 - Comparison Of Employment Conditions Of ATM Staff With Other Mainstream Industries

- 10.1. Questionnaires completed by controllers made it clear that the following are significant amongst the perceived advantages to a controller career:
- good working hours – probably shortly to be regulated,
 - an 'end' to work when it is finished – no taking work home,
 - time off during other's normal working hours,
 - significant holiday/leave entitlement,
 - good maternity/paternity provision,
 - reasonable/good salary,
 - good pensions.
- 10.2. Examination of table 8 above also reveals that controllers work significantly shorter hours than the majority of the rest of the population. Even pilots operating under Flight Time Limitation schemes, are routinely permitted to work for over 45 hours per week for an

extended period (4 weeks+). The effect of the introduction of regulated hours for controllers may well not result in a reduction of hours and, in some cases, may result in an increase in the number of hours a controller can work. The UK system, for example, currently permits 200 hours working and 100 hours standby during a 30 day period – roughly a gross working week of 50 hours work, with a further 25 hours standby.

- 10.3. Holiday and leave entitlement is good. IDS Europe estimate the EU average for public holidays as 11 per year and statutory holidays at 33 days per year. In general, where information is available to the team, controllers routinely exceed the statutory minimum.
- 10.4. Pensions are also good, most controllers can look forward to retirement at 60 and, provided they have served sufficient time in the job, they will generally receive a pension between 65 and 70% of their salary.
- 10.5. These issues in themselves are not sufficient, however, to work as retention factors – at least in the early/mid years of a controller's work life. Some alternative benefits are considered in the next section.

CHAPTER 11 - Exit Of Air Traffic Controllers From The Profession

- 11.1. While the outflow of Controllers for other reasons than retirement is marginal and does not explain the identified localised shortage, the age of retirement of Air Traffic Controllers may well be connected to this current/future shortage of ATCO since we understand that several Controllers at an EU level will retire in the next five years (see table 3 and 6 regarding Retirement of Controllers). In fact, Controllers are forced to retire at a certain age and this retirement age is before the general retirement age.
- 11.2. In comparison to other professions, most EU Member States provide early retirement schedules for their air traffic controllers and even allow early retirements on a reduced pension. Both points may add an extra burden to an already understaffed navigation service provider. This retirement provision, however, forms a minimal consideration to young people joining the profession. However, given the demanding routine of the job, the possibility of early retirement may also attract potential candidates – particularly those wishing to enter, or re-enter the profession later in life.
- 11.3. The opportunity to employ controllers in non – operational tasks, away from the pressures of the ops room, may be a benefit to the providers as well as the controllers.
- 11.4. The team has found no evidence to indicate that there is significant pressure for controllers to leave before their retirement – but that controllers are likely to take advantage of early retirement offers.
- 11.5. **Summary**

- Manpower planning is insufficiently accurate to ensure that shortages do not occur.
- Controller mobility is restricted by a number of factors, foremost of these is language.
- There is too high a failure rate in the ab initio training period – States with a very low failure rate are France, Finland and Spain.
- Payments to trainees, during the period before they become validated controllers – does not appear to have any effect.
- Developing better retention strategies is not considered critical at this stage due to the very small numbers of controllers leaving prior to retirement date.
- Some parts of the industry believe that rigid working practices by controllers are the heat of the shortage. We have found no evidence to support that contention. Regulators generally have a reasonable approach to this.
- Controller salaries, conditions of service, holiday entitlement etc are good when compared with other industries.

PART III. OPTIONS TO REDUCE THE SHORTAGE

12.0 This section contains those elements of good (ie effective) practice which the team believes worthy of further study, and suggestions concerning the other main issues identified. The team believes that it is now for the Social Partners to consider all these issues, combining those adopted into a single, coherent and co-ordinated action plan aimed at reducing the shortage which is identified in the report, and ensuring a suitable supply of experienced non-operational controllers into the future. This plan must be used as the underlying support document for the development of the Single Sky initiative for, without sufficient staffing (particularly in the early period) then Single Sky will fail.

12.1 Good Practice

12.1.1 Good practice must mean different things for different situations. For example, with a commercialised provider, able to make relatively rapid decisions within its own management structure, then the Deutsche Flugsicherung (DFS) decision to contract controllers from Ireland to cover a temporary shortage makes sense. Similarly, Ireland, as a commercialised provider, is able to respond quickly (and we assume profitably) to the German need. It is difficult to believe that the same opportunity would be available to the managers within a civil service system – which is not structured to deal with short term problems in such a manner. In those countries less well structured to take rapid, commercial-style decision in ATS it is even more important to get the requirement forecasting right. Therefore, whereas good practice amongst the commercialised providers could be the establishment of some sort of pooling arrangement, perhaps through routine interchange of staff, to assist with temporary shortages in the various systems, non-commercialised providers need to concentrate on supply and the accuracy of their forecasting.

12.1.2 Flexibility, either to provide or contract for the provision of, controllers comes with freedom to operate with some commercial structure in the ATM system. Gowland, in a June 2000 article in Cranfield's Aerogram, estimates that only 12 of 38 European ATC providers has any freedom to operate in a commercial manner. The implementation of commercial freedoms into ATM bodies, is an essential pre-requisite to the type of flexible functioning envisaged by Single Sky.

12.1.3 It is clear that there are a number of issues, which will affect recruitment in ATS in the next 10 years or so. We have identified the retirement issue, and the changes in technologies etc as foremost amongst these. In Annex I table 9 we further demonstrate the lack of direct correlation between traffic and controller numbers. These factors combine to demand good manpower planning techniques if employers are to correctly forecast the staff numbers required for the years to come. Tools mentioned elsewhere (Naviair etc) may assist in this area.

12.1.4 The very low training failure rates achieved by France and Spain must be examined in further detail to ensure that the lessons can be drawn for all providers.

12.1.5 It seems clear that the most successful recruitment campaigns are those undertaken on a planned and continuous basis. A human resources plan, established on an annual basis and which would cover a five year recruitment period (at operational and non -operational level) should be the basis of such recruitment planning. A sound QA system, with continuous improvement principles embodied within it, should be used as an essential developmental tool in HR.

12.2 Options concerning the Recruitment of Air Traffic Controllers

12.2.1 While there is a lack of direct correlation between growth in traffic and controller numbers, in light of ever-increasing traffic (despite occasional set backs), and the changes in organisation of ATM planned, it is likely that the EU will continue to experience pressure on the numbers of controllers required. The following paragraphs therefore present some suggestions which will enable controller numbers to be held at the levels desired.

Seasonal Shortages and Overtime

12.2.2 The report reviews the specific effects of seasonal shortages, and the perceived rigidity of working practices in some areas of ATC. In both cases it is likely that the ATS Regulator will need to have a view and it may be appropriate that the Social Partners seek the early involvement of the regulator in discussions covering these issues. If the rules of attendance, working and hours established permit greater flexibility then it may be that certain shortages could be relieved by that approach.

Promotion of the Profession

12.2.3 Both from the team's own experience, and from the interviews and research concerning both new entrant and potential entrant controllers, plus the interviews with personnel of other industries, we believe the following methods of promotion of the profession should be considered. Further, while acknowledging that the shortage is not EU wide, it is impossible to forecast (at this stage) the effects of Single Sky and therefore we believe that integrating some or all of the following into a single co-ordinated multi-national strategy will achieve a greater effect.

- Contact could be established with national organisations and media aimed at School and University Careers Advisers. Brochures and background information could be widely distributed. Brochures would need to be of high quality, modern and well designed. In co-ordination with this programme, 'Open Days' for local schools and universities could be regularly organised at air traffic units and at training schools. Contacting aviation schools to be given the list of failed students would they have an interest to become Controllers and an opportunity to remain in the aviation business with an attractive package.
- On the Internet, a single European, trans-national web site could be established. This could bring news of ATC, information regarding the profession and details of national recruitment in individual countries. This site would need to be specifically designed as fun, interesting, challenging and multi-lingual – perhaps running computer simulations, ATC computer games, web cams – or even live radar feeds for special events and occasions. It must be updated regularly. A specific site editor could be employed – perhaps from a youth magazine background.
- ANSPs and trade unions must learn to co-operate with the media to ensure that the images presented of the controller are positive. There are too many 'no comments' after incidents etc. Any time there is going to be negative publicity – strikes, delays etc – then information could be made rapidly available to the media to rebut the image of controllers as the cause of the problem. Where this is the case – and controllers are the cause of the problem - then it must be put in context by both ANSP and the controllers for the good of the profession.
- ANSPs, trade unions and ATC professional bodies should more closely co-operate to ensure that they are putting out a co-ordinated, positive message.
- A corporate image, multi-media advertising campaign could be launched at European level. It could use coming ideas – Single European Sky, European licence, international mobility and team working, new technologies – to portray the ATC profession as the key facilitator for efficient air transport in the future. Advertising in magazines, newspapers, Internet banners and on TV could be backed up by leaflets for distribution throughout schools and universities and through travel agents and at airports etc.

Mobility Issues

12.2.4 Concerning geographical mobility, the introduction of the common European ATC licence should bring with it many benefits. The training in the different EU Member States should be harmonised as far as feasible and English becomes the common language for safety reasons (Chapter 6). Similarly, the more nationalistic requirements regarding nationality etc should be reviewed.

12.2.5 Liability issues (paragraph 6.2.3) must be addressed, not only for the sake of controller mobility, but to ensure the success of Single European Sky.

12.2.6 Consideration of training and licensing of controllers for specific types of control may be considered – with more mobility available for ACC and en route controllers, while aerodrome/approach controllers are likely to be national staff.

12.2.7 Recruitment of experienced controllers from outside the EU could be considered.

12.3 Options concerning the Training of Air Traffic Controllers

12.3.1 It is clearly essential, and therefore worth repeating, that the ab initio failure rates experienced in some countries must be reduced. An active attempt to find ways of reducing the rates should be pursued.

12.3.2 The team finds the case for the payment of salary during training not proven. Though it is likely that the removal of such a salary may send the wrong signals and any such action should be considered carefully. It may be that a staged introduction of salary scheme would prove an additional incentive during training.

12.3.3 Also as part of a EU licence, a trainee should be able to study in any EU Member States and take part in exchange programs among EU training organisations (equivalent to the *ERASMUS* programs).

12.3.4 Consideration could be given to recruitment of personnel for non operational positions – with the jobs advertised as such, and with the persons taking the jobs provided with only sufficient ATC experience to permit them to do the job. This will have the counter effect of reducing opportunities for promotion or a change of career for operational controllers.

12.4 Options concerning the Retention of Air Traffic Controllers

12.4.1 Apart from the traditional retention measures including a good salary, social benefits, good working conditions (training and personal development), more innovative measures should be developed such as a collective insurance on health and life; a more advanced career development planning; share options, vouchers or travel; and proactive management actions (Chapter 8).

12.4.2 Career Development Planning is not currently a major issue for controllers. However, the existence of a CDP process is thought, by all controllers questioned, to be a positive offer.

12.5 Options concerning the Exit of Air Traffic Controllers of the Profession

12.5.1 Early retirement is seen as a positive aspect of the controllers working conditions. As such, and also from a safety point of view, it may be encouraged. But consideration needs to be given to making positive allowance for such early retirement in manpower planning.

LIST OF REVIEWED RELEVANT DOCUMENTATION

The following are the documents reviewed for this report:

NATS (en Route) Limited Business Plan Report, 2003

Skyway, the EUROCONTROL magazine (Spring 2002):

Controller shortage in Europe. Alexander Skonieczki.

Improving air traffic controller manpower planning. New tools: LAMPS and CHAMPS. Una Mellet and Cees Niesing.

IFATCA effectively marketing the job of air traffic controller. Luc Staudt.

Irish air traffic controllers to work in Germany under partnership agreement. Philip Hughes Director Commercial and Training Division; Irish Aviation Authority.

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-EATCHIP Human Resources Team. (1998). Heuristic modelling and policies in ATCO manpower shortage or surplus management. HUM.ET1.ST03.1000-DEL02.Brussels: EUROCONTROL.

-EATCHIP Human Resources Team. (1998). Quick reference guide to selection procedures and tests for ab-initio trainee controllers. HUM.ET1.ST04.1000.GUI-03-03. Brussels: EUROCONTROL.

Other articles and magazines:

-Facing the retention Challenge; uncredited; IRS Employment Review, April 2002.

-High involvement Work Practices, Turnover and Productivity; Guthrie; Academy of Management Journal February 2001.

-The Nursing Shortage: Solutions for the Short and Long Term; Online Journal of Issues in nursing; January 31, 2001.

-McLuhan; Dangling the Carrot; Personnel Today, February 2000.

-Employee Retention-the tools and techniques; uncredited; Employee Development Bulletin, August 2000.

The following websites have also been consulted:

www.vodafone.com	www.francetelecom.fr	www.dfs.de
www.telekom.de	www.belgacom.be	www.nats.co.uk
www.telekom.at	www.austrocontrol.at	www.aena.es
		www.erikson.com

ANNEX

Note: This Annex contains greater details on certain issues mentioned in the report, and further explanation of the issues for those readers less familiar with them.

The issues concerned are:

1. Analysis of the possibility of correlation between controller numbers and the level of increase of air traffic at European level.
2. Methodology for a mathematical calculation of required numbers of air traffic controllers at a particular unit.
3. Changes in the International Civil Aviation Organisation Annexes to the Chicago Convention and associated documentation and the potential effect on controller numbers.

A1. Analysis for Correlation between Air Traffic Controllers and Traffic in the European Union

Table 9: Air Traffic in the EU and Controllers Employed

		1998	1999	2000	2001	2002	2003
A	Daily number of flights / 1000 ¹	20,68	22,06	23,07	22.96	22.56	23.88
A1	% Traffic variation ¹	5,2%	6,7%	4,8%	-0.6%	-1.9%	
A2	CFMU Traffic forecast ¹				24.3 (5.3%)	22.87 (-0.4%)	
B	Number of OPS Controllers / 100 ²	10.6	11.0	11.4	11.5	11.9	12.4
	A/B	1.95	2.00	2.02	2.00	1.90	1.93
	A2/B				2.11	1.92	

Sources: ¹ Yearly ATFM Summary 1999 and 2000, CFMU; Eurocontrol; Air Traffic Statistic and Forecast, (STATFOR), Medium Term Forecast IFR Flights 2002 – 2009. EATMP Eurocontrol; ATFM Evolutionary Summary per ACC, JAN. – Dec. 2002. CFMU, Eurocontrol; ATFM Seasonal Summary per ACC, JAN. – Dec. 2001. CFMU, Eurocontrol.

² After results in tables 1 and 5 and estimations made by Air EuroSafe.

- A1.1 The above table demonstrates empirically the impossibility of directly correlating traffic increases with controller numbers on a wide area basis. We are aware that this conclusion directly contradicts the Booze Allen Hamilton study, which claims to have established a correlation – though without providing evidence to support the contention, we understand. In light of this contradiction, we would wish to explain briefly why we do not believe that a generalised correlation is achievable.
- A1.2 Firstly, we must state that we do believe that it is possible to establish a correlation between traffic growth and controller numbers at a micro level. For example, at an airport with combined Aerodrome and Ground Movement control positions, which is workload capacity-constrained to 20 movements per hour – then an increase above 20 movements per hour will require an additional control position (splitting aerodrome and ground control in this example) – which may, for example, now allow 30 movements per hour. Thus there is a requirement for an increase of one control position to permit an increase in the movement rate above 20 per hour, then, perhaps, another above 30 per hour. In this circumstance we can see a stepped

correlation between movements and controller numbers. A similar argument could be applied to a single ACC sector.

- A1.3 However, once a large number of sectors and airports is involved, then the multiplicity of individual sector and control tower steps is too complex to allow a simple correlation to be established. Similarly, a traffic increase or decrease across a wide area may mask a number of changes (in traffic mix, city pairs and scheduling, aircraft types etc) all of which can affect airport and sector capacities in different ways. Finally, technological or procedural changes may require a short term increase in controller numbers (during the training and implementation period of new equipment, new procedures or a new centre for example), but there may then be a reduction in required numbers due to technological benefits back to, or even lower, than the pre-change period.
- A1.4 Thus, the complexity of individual factors within a change, combined with the extreme complexity of the interrelationships of different factors affecting capacity, means a direct correlation between movement rates and controller numbers is, in our view, impossible to establish.

A2. Methodology for a mathematical calculation of required numbers of air traffic controllers at a particular unit.

- A2.1 As an example of a regulatory requirement, in terms of defining the number of controllers required, the UK Civil Aviation Authority adopts the following formula in Annex B Staffing Requirements, CAP 670 ATS Safety Requirements document (available at www.caa.co.uk):

“B1.1 Regulation of Air Traffic Controller’s Hours

- B1.2 The number of operational positions, periods of operation and limitation of duty hours dictate the minimum number of validated controllers required at a unit.
- B1.3 The CAA must be satisfied that the unit maintains sufficient qualified controllers to provide safe air traffic control services. Consideration will be given to the regularity of the Air Traffic Control Services in determining whether a service is safe. There must be no possibility that users will be confused as to which service they are receiving because the type of service changes from day to day or hour to hour. Careful consideration will also be given to the provision of more than one service simultaneously before approving a unit.
- B1.4 Although conditions at different units may vary, an approximation for the calculation of the minimum number of controllers required is given using the following formula:

$$\text{Total number of valid controllers } C = ND / (365 - R)$$

Where

- C = the total number of valid controllers required (rounded up to a whole number)
 N = the number of controllers required to attend for duties, including reliefs, each day. This will depend on the number of operational positions and the period for which they are scheduled to be open.
 D = Number of days the ATSU provides service per year.
 R = Number of days a controller is not available for duty (eg rest days, leave, public holidays, sickness and training allowances etc).

Thus, if we have, for example, an airport which is open for 16 hours per day, 362 days per year, with three operational positions, controllers working maximum 8 hour shifts and requiring breaks for controllers every 2 hours, the calculation would be as follows.

N can be calculated as:

3 positions x 2 shifts = 6 controllers + 2 morning and afternoon relief controllers = 8 controllers to attend each day.

Assuming leave at 30 days per year, 10 days public holidays and an average of sickness and training time as 7 days per year, then R = 47.

Thus $C = ND/(365 - R)$ becomes:

$C = 8 \cdot 362 / (365 - 47) = 2896 / 318 = 9.10$, rounded up to **10 controllers**.

Note that this calculation method accords with the regulatory requirements of CAP670, but could reasonably be adapted for any system with minimal effort.”

A3. Annex 11 Changes and USOAP

A3.1 The ICAO publishes its technical Standards and Recommended Practices in Annexes to the Convention on Civil Aviation (the Chicago Convention). Annex 11 concerns Air Traffic Services. Recent and planned amendments to Annex 11 will require two major changes:

- the implementation of safety management systems in ATM; and
- the establishment of an independent regulator for ATS

A3.2 The implementation of safety management has implications for non-operational controller (and engineer) staffing, in that such systems have to be developed and managed by personnel with an in depth understanding of ATM. This ICAO requirement is already a standard and should be immediately complied with by all ICAO Member States. The principle is also embodied in ESARRs. It is not known how many EU States currently have functioning SMS, but significant work is required to design and implement such systems, including the training required for all affected staff.

A3.3 The ICAO USOAP will, from 2004, for the first time include ATM and aerodrome regulation (Annexes 11 and 14 and PANS-OPS (Procedures for Air Navigation Services - Operations)) in the audit programme. (It will also include accident investigation though this is not relevant here.) This programme audits all Member States against the SARPs and identifies, in a published Final Report, where a state is deficient in its application of the Standards. It is clear that one of the key points of interest to ICAO is to identify the independent regulator.

A3.4 Possibly, the rapid transfer of regulatory responsibility for ATM to the European Aviation Safety Agency (EASA) would be the best way forward – but there will still be a demand for staff for this new unit. It is clear, however, that there would be a much higher demand for controllers if each individual member state were to establish its own ATM regulator.