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FOR THE SAFETY OF AIR NAVIGATION

EUROCONTROL

Airspace Infringement Initiative

Flight Information Services Survey

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Abstract

The survey of the scope and quality of the flight information service (FIS) provided by the European States has been conducted in the context of the airspace infringement causal factor analysis. It is considered an essential step in the identification of effective solutions to the airspace infringement risk.

The approach to the study included collection and analysis of information made available through reviews of the relevant ICAO provisions, national service provision requirements and procedures detailed in the State aeronautical information publications and site visits to flight information and air traffic control centres in five European States.

The study confirmed that the level of the FIS provided consistently exceeds that required by ICAO standards and recommended practices.

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EXECUTIVE SUMMARY

The survey of the scope and quality of the flight information service (FIS) provided by the European States has been conducted in the context of the airspace infringement causal factor analysis. It is considered an essential step in the identification of effective solutions to the airspace infringement risk.

The approach to the study included collection and analysis of information made available through reviews of the relevant ICAO provisions, national service provision requirements and procedures detailed in the State aeronautical information publications and site visits to flight information and air traffic control centres in five European States.

The review of the relevant documentation enabled the establishment of the following main conclusions:

Airspace classification in the various countries remains fundamentally the same in terms of requirements and criteria with a few exceptions. However, the structure and use of controlled airspace across the various countries differs greatly.

The provision of FIS as stated in the State AIPs significantly exceeds ICAO requirements in terms of equipment and scope of service. All States use radar in some form, either in the primary function of the FIS or in addition to the basic service provision. The inclusion of mandatory transponder areas is widely applied and enhances the use of radar in the provision of the FIS.

Although the use of radar does not actually imply that a radar service is being provided and in no way relieves the pilot of his responsibilities, the information available is far more detailed and results in improved traffic information being provided where possible. The main benefit of using radar in the provision of FIS is that of airspace protection.

The site visits to operational service provision units confirmed that the level of the FIS provided consistently exceeds that required by ICAO; however they also revealed a number of improvement opportunities, which if taken could contribute to the reduction of airspace infringement risk. The major opportunities are:

- Harmonise FIS provision across Europe
- Employ appropriately trained and licensed officers to provide FIS from dedicated positions that will not reduce the level of service due to high levels of IFR traffic in the vicinity
- Use of radar in the provision of flight information service
- Employ airspace infringement detection tools as they are developed to identify infringements at an early stage prior to incidents of higher severity occurring
- Make better use of SSR transponders and codes
- Improve communication with general aviation community.

The study included a high-level feasibility assessment of the full set of recommendations. It provided for consolidation of the identified improvement areas and allocation of initial cost and complexity factors.

CHAPTER 1 – Introduction

1.1 Background

The EUROCONTROL airspace infringement safety improvement initiative launched at the beginning of 2006 is geared to the development and harmonised implementation of a European-wide action plan to reduce the risk from airspace infringements.

A major finding of the analysis of the causal and contributory factors is that flight information services could make a considerable contribution to the prevention of airspace infringement, as well as having an important risk mitigation effect.

This finding is also supported by previous studies of the infringement issue, which have identified FIS as a major influencing factor. Therefore the survey of the scope and quality of the FIS provided by the European States is considered an essential step in the identification of effective risk mitigation solutions.

1.2 Approach to the survey

The survey was carried out in several consecutive steps to ensure a comprehensive overview of the requirements for provision of FIS in uncontrolled airspace and their practical implementation by Member States:

A) Review of FIS scope and procedures as laid down in relevant ICAO documents, annexes and circulars

B) Review of the relevant national regulations and procedures (published in the national AIPs). The following Member States were included in the survey: France, Germany, the Netherlands, Sweden and the United Kingdom.

C) Development of a structured framework of discussion points based on the analysis of the above documents to ensure a consistent approach across the countries and flight information centres (FICs) visited, and to enable a comparison of results.

D) Site visits to appropriate flight information centres in the countries listed in B above.

E) Identification of differences in terms of actual provision of FIS and applicable requirements and procedures as detailed in the relevant documentation of the individual air navigation service providers (ANSPs). A comparison of FIS provision across the various ANSPs was also attempted.

F) Review of the survey findings to determine areas that could enhance protection from airspace infringement or contribute to the mitigation of the infringement hazards' effects.

Two further steps were included in the scope of this study to support the elaboration of the airspace infringement risk mitigation strategy:

G) Creation of a consolidated set of potential risk reduction measures using the input from previous airspace infringement risk analysis studies carried out within the scope of the safety initiative

H) Initial high-level feasibility assessment of the safety recommendations in terms of expected cost and safety benefits.

CHAPTER 2 – Review of regulatory framework

2.1 Review of ICAO SARPs

2.1.1 Basic requirements

The review included an initial investigation into the appropriate ICAO documentation to be used in the survey. The objective of this step was to determine the baseline requirements and recommendations made by ICAO in respect of the provision of a flight information service.

Following discussions with UK AIS and the ICAO regional office in Paris, the following documents were selected for the study:

- Annex 11 to the ICAO Convention – Air Traffic Services
- Procedures for Air Navigation Services, Air Traffic Management (ICAO DOC 4444, Fourteenth edition, 2001)
- Circular 211 / AN128 – Aerodrome Flight Information Service

Full extracts from the relevant documents can be found in Annex 1 to this report, but the core ICAO requirements and guidelines about “who”, “to whom”, “how” and “with what” the FIS is provided are detailed below:

- Flight information service shall be provided within the flight information region by the appropriate air traffic service provider at a flight information centre unless the provision of the service has been assigned by the authority to another unit which is suitably equipped to provide the service (see Annex 1, par.1.1).
- The definition of an FIS (Flight Information Service) as determined in DOC 4444 is: “*Flight information service*. *A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights*.”
- The provision of an FIS is defined merely as the recording and transmission of information relating to the progress of flights that are not in receipt of an air traffic control service or an air traffic advisory service, and is effected by the air traffic service unit serving the FIR within which the aircraft is operating (see Annex 1, par.1.2).

- Flight information service shall be provided to any aircraft which is, by what ever means, known to the air traffic service unit that is likely to be affected by the information given.
- If this service is provided by the same unit that is providing an air traffic control service, the control service will take precedence over the FIS when required.
- Receipt of the FIS does not relieve the pilot in command of any responsibilities.
- The scope of the service is to include transmission of SIGMET and AIRMET information, changes in serviceability of navigational aids, information relating to the status of aerodromes and any other information deemed to be useful for the flight, including collision hazards in Class C, D, E, F and G airspace.
- The method of transmitting information to the aircraft (see Annex 1, par.1.3) is determined by the air traffic service provider, and will be by direct acknowledged radio transmission to the aircraft, a general unacknowledged radio transmission, a broadcast or a data link. The preferred method is that of direct radio transmission.
- VFR flights can be conducted in airspace classes B, C, D, E, F and G. In all classes of airspace, except Class G, IFR flights will be separated from VFR flights. However, VFR flights are not separated in any airspace, except Class B airspace, which means that VFR traffic is not considered essential traffic in relation to other VFR traffic (see Annex 1, par.1.4).
- Due to the nature of these (VFR) flights, ICAO offers no standard phraseology relating to collision avoidance to be used by service provider staff and pilots, but offers guidance with regard to the content of such transmissions:

  "*11.4.3.1.1.2 Where such messages are transmitted they shall, however, contain sufficient data on the direction of flight and the estimated time, level and point at which the aircraft involved in the possible collision hazard will pass, overtake or approach each other. This information shall be given in such a way that the pilot of each aircraft concerned is able to appreciate clearly the nature of the hazard*."
- The authority providing the service is not responsible for information relating to conflict hazards due to the inherent inaccuracies in the information being received. This information may be incomplete or inaccurate as only known traffic can be considered and even data relating to such traffic may be inaccurate.
- The provision of an alerting service is synonymous with the provision of a flight information service and shall be provided by the flight information centre or as determined by the air traffic services authority.

  "*Alerting service. A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required*".
- Details of the alerting service and timescales for overdue action are provided in ICAO DOC 4444. It is the responsibility of the air traffic service agency to determine who provides the alerting service.
- Assistance provided to a VFR flight is clear (see Annex 1, par.1.5). Any VFR flight reporting that it is uncertain of its position or lost, or encountering adverse meteorological conditions, should be considered to be in a state of emergency and handled as such.
- Although the use of radar is not specified as a minimum requirement for provision of an FIS, many references are made to its use, specifically in terms of the cautious approach that needs to be employed.
- RADAR can be used to provide limited navigational assistance (and more detailed assistance in the case of an emergency), advice on other traffic that may be in conflict and information on other hazards.

- Detail passed to the pilot can only be in the form of advice and suggestions and care must be taken not to direct VFR flights into IMC conditions
- Radar assistance to a VFR flight should be provided only at the request or on the agreement of the pilot. The type of radar service to be provided should be agreed with the pilot.

2.1.2 Summary

In accordance with ICAO basic requirements, flight information service is:

- Provided by an air traffic control authority at a flight information centre or other approved unit
- Provided to any aircraft known to the service provider
- Information on any issue that may present a hazard to, or affect the safety of the flight
- Collision avoidance is not required; however, traffic information, if available, will be given along with suggestions for resolution
- Alerting service provided by the flight information centre or other approved unit

The use of radar is limited to advice only and any radar service does not relieve the pilot of any responsibilities in respect of the flight.

2.2 Review of national AIPs

The provisions of the ICAO documents referred to in 2.1 above relating to FIS provision were examined and compared with the relevant sections in the AIPs of the following States:

- France
- Germany
- Sweden
- the Netherlands
- the United Kingdom

Each State provides a detailed list of differences relating to their declared provision of service from that stated in ICAO documentation. The information is found in AIP GEN section 1.7, but will be limited to direct differences in specified areas and does not cover general improvements or regulations above and beyond minimum requirements. The provision of the service is one aspect of differences discovered in AIPs. Other areas that require consideration are that of regulations relating to mandatory use of transponders, flight planning requirements and any other regulations relating to the aircraft itself or the pilot in command and not the service provider.

Detailed examination of the AIP, for the States to be visited, has highlighted several areas where the service differs from the ICAO documentation; most of these do not form part of the declared differences in AIP, section GEN 1.7. The differences are detailed in the following sections of the report, country by country and summarised at the end.

It will be seen that, with the exception of the UK, there are very few additions detailed in the AIPs. This is mainly due to the structure of FIS provision in the UK, which is provided primarily as a non-radar-derived service and different responsibilities and services are therefore detailed. Radar services in addition to the basic FIS are also detailed in the UK AIP as separate services provided by various units. These services or ones of a similar nature are provided in other countries by the same unit as that which provides the FIS and additional detailed explanation is not therefore required because they form part of the basic FIS provision.

2.2.1 Review of Dutch AIP

There are no direct differences stated in section GEN 1.7 relating to ICAO Annex 11 which are deemed significant for this study.

Significantly, there is a mandatory transponder carriage area above 1200 feet AMSL (and other defined North Sea areas) where both modes A and C are required. An exception is below Schiphol TMA where the base of controlled airspace is 1500 feet and transponders are not used.

The area of FIS provision is divided laterally and vertically. Lateral divides are between military and civil, and the vertical divides are from the surface up to FL 055 for VFR traffic. Above FL 055 is military airspace.

There is no requirement to file a flight plan for VFR flights by day within the Netherlands. However, this is required if an alerting service is requested.

2.2.2 Review of French AIP

There are no direct differences stated in section GEN 1.7 relating to ICAO Annex 11 which are deemed significant for this study.

Traffic information is provided on known IFR traffic and at the request of the pilot. Controllers may also use their own initiative to suggest a manoeuvre to avoid other traffic.

There is another requirement that controllers in France provide collision avoidance to known traffic under French law, but this is not an aviation-related law, and although it is applicable in France, should not be confused with aviation law or regulations relating to service provision.

There are areas within the French FIR that are deemed transponder-mandatory areas and any pilot flying VFR who has a transponder which is Mode A and C-equipped must have the transponder turned on with A and C active. If the transponder is only mode A-equipped, then the pilot should not use it unless instructed to do so by ATC.

2.2.3 Review of German AIP

There are no direct differences stated in section GEN 1.7 relating to ICAO Annex 11 which are deemed significant for this study.

The FIS in Germany provides navigational assistance to aircraft – primarily due to the service being radar-derived - and this will be discussed later in the report.

German airspace does not contain Class A or B airspace. VFR traffic is permitted in Class C airspace; however, pilots are required to obtain an additional qualification for such flights which is a basic radio navigation flying test detailed as a CVFR (VFR flight in Class C airspace). This is to help ensure improved navigational ability in congested airspace. Traffic information is provided in Class C and D airspace and avoidance advice is given on request.

There are defined areas of mandatory transponder use detailed in the AIP and an overriding regulation that all aircraft flying above 5000 feet AMSL or 3500 feet above the ground must operate a transponder with Mode A and C.

2.2.4 Review of Swedish AIP

There are no direct differences stated in section GEN 1.7 relating to ICAO Annex 11 which are deemed significant for this study.

With regard to traffic information, in “circumstances permitting, the service provider will pass traffic information to aircraft in accordance with the procedures prescribed for area control service.”

Flight plans are mandatory for all flights requiring flight information and alerting service.

2.2.5 Review of UK AIP

The UK does not detail any differences in section GEN 1.7 relating to the provision of FIS.

Outside controlled airspace other services are provided by air traffic control units in certain circumstances. These services are:

A) An air traffic service to participating flights arriving at, departing from and overflying aerodromes located within Class G airspace. The service comprises aerodrome control, approach control and, where appropriate, approach radar control services.

Note: Although these services are advisory in nature as the airspace is not controlled, participating flights are expected to comply with ATC instructions.

B) Radar advisory service (RAS) and radar information service (RIS), as detailed in Annex 1, par. 2.1 and summarised below, are available from suitably equipped ATC units, subject to controller workload and radar availability. In certain radar advisory service areas (RASAs), lower airspace radar services (LARS) and military middle airspace radar services are established.

C) An RAS is an air traffic radar service in which the controller will provide advice necessary to maintain prescribed separation between aircraft participating in the advisory service, and in which he will pass to the pilot the bearing, distance, and, if known, level of conflicting non-participating traffic, together with advice on action necessary to resolve the conflict. Where time does not permit this procedure to be adopted, the controller will pass advice on avoiding action followed by information on the conflicting traffic.

D) An RIS is an air traffic radar service in which the controller will inform the pilot of the bearing, distance, and, if known, the level of the conflicting traffic. No avoiding action will be offered. The pilot is wholly responsible for maintaining separation from other aircraft regardless of whether the controller has passed on traffic information.

E) Flight information service, as described in ICAO Annex 11, chapter 4, is available to aircraft flying outside controlled airspace and advisory routes. It is provided by the appropriate ACC through flight information service officers (FISO) operating on specially allocated RTF channels.

In addition to normal flight information service, the FISO will:

(a) On receipt of a request for clearance to join or cross controlled airspace or advisory routes, either:

- inform the pilot that he should change frequency in time to make the request direct to the appropriate ATC unit at least ten minutes before ETA for the entry or crossing point; or
- obtain the clearance from the appropriate ATC unit himself/herself and pass it to the pilot on the FIR frequency.

(b) Pass the estimated time of arrival (ETA) to the destination aerodrome in special circumstances, such as diversions, or at particular locations when traffic conditions so demand.

(c) Accept airborne flight plans and pass the information to the appropriate authority.

(d) Operate a very limited warning system of proximity hazards. Whenever possible, the FISO will tell aircraft of known traffic in the vicinity and will also warn them when his/her information clearly suggests a possibility of dangerous proximity. However, he cannot assume responsibility for the accuracy or completeness of this information.

Transponders capable of both mode A and C must be carried by all aircraft operating above FL100; however, this regulation has little impact on general aviation. It is however recommended that all aircraft fitted with a transponder have it turned on for mode A and C during flight at all levels in order to aid conspicuity.

Filing (VFR) flight plans is not mandatory. There is a recommendation that if a flight is intended to operate 10 miles from the coast or over sparsely populated or mountainous areas, particularly if the aircraft is not equipped with radio, it is advisable to file a flight plan to facilitate the provision of alerting and search and rescue services. A flight plan may, however, be filed for any flight.

2.2.6 Summary of AIP information

The airspace classification in the various countries remains fundamentally the same in terms of requirements and criteria. An exception is the reduced minima applied in the UK for Class C, D, E, F and G airspace, and in the Netherlands Class G airspace, where at or below 3000 feet, “clear of cloud and in sight of the surface” is added (example given in Annex 1, par. 2.2).

However, the structure and use of controlled airspace across the various countries differ greatly.

The overriding trend across all countries analysed is that the provision of an FIS as stated in the AIP is significantly better than the ICAO requirements in terms of equipment and scope of service. All States use radar in some form, either in the primary function of the FIS (France, Germany, the Netherlands and Sweden) or in addition to the basic provision (UK).

The inclusion of mandatory transponder areas in France, Germany and the Netherlands is significant and enhances the use of radar in the provision of the FIS.

Although the use of radar does not actually imply that a radar service is being provided and in no way relieves the pilot of his responsibilities, the information available is far more detailed and results in improved traffic information being provided where possible. The main benefit of using radar in the provision of an FIS is that of airspace protection.

CHAPTER 3 – Discussion framework

In order to ensure the completeness of all areas of the investigation and ensure consistency across the study, a framework consisting of 6 areas was created:

- Documents
- Statistical information
- Service provision staff
- Flight information service provision
- General aviation parameters
- Airspace infringement mitigation means

Objectives:

Area 1: To discuss outstanding areas or points of confusion related to the documents reviewed and to add any further information that is evident in the local Manual of Air Traffic Services.

Area 2: To obtain any relevant statistics from the provider that might be useful. The outcome of this is greatly dependent on the reporting culture.

Area 3: To establish staff competence requirements and schemes.

Area 4: To establish the expected development trends in various countries, perceived proficiency of pilots and how rules and regulations affect their activity; to draw conclusions on how this may impact on infringements.

Area 5: To answer the question “how and with what” the flight information service is provided.

Area 6: To discuss with the provider as far as possible any mitigation currently in place or under development and to gauge how the use of such tools can or will assist in airspace infringement prevention or detection.

1. Documents used prior to and during site visits:
    - ICAO documents
    - State AIPs
    - ATS manuals of service providers
2. Statistical information
    - Infringement reports
    - Other incidents: LOS, aborted approach
    - Reporting culture aspects: types of incident reported, corrective actions taken
3. Service provision staff
    - Selection: background / requirements/ previous experience
    - Training: length /depth / flying experience
    - Licence privileges – 'ratings', maintenance, competence schemes
    - Other duties - currency
4. Flight information service provision
    - Equipment: use of radar-derived information (or TSD) vs. procedural service
    - Airspace classes covered: requirements / limitations
    - Vertical transitions between airspace structures and flight plan requirements
    - Alerting service: content, who / how / with what
    - Provision of RIS/ RAS / traffic information / avoidance advice
    - Primary navigational assistance (airspace protection)
    - Flight identification: methods and requirements
    - Coordination: with controllers of adjacent sectors and other ATSUs
5. General aviation parameters:
    - Type of GA: profile, trends – A/C associated licence
    - Volume of flights served
    - Pilot pre-flight briefing
    - Maps and charts: provision / distribution / cost
    - Pilot training / continuity / refresher
    - GA community communication links - effectiveness
    - Transponder uptake and usage; Mode S introduction to GA
    - Altimeter setting procedures
    - Other relevant statistical information
6. Airspace infringement mitigation means:
    - Radar tools, e.g. infringement warning, STCA
    - SSR code usage : specific assignments - FIR / Listening Out / Lost
    - Military: any involvement or service provided
    - Mandatory or advisory transponder areas

CHAPTER 4 – Site visits

4.1 France

4.1.1 Staff selection & training

The provision of an FIS in France is primarily by air traffic controllers at approach units and assistants at the ACC.

The selection process and training of the controllers is self-evident; however, the maintenance of the ATCOs' validation with regard to FIS function competency is not checked consistently over time.

Flight training is given as part of the controllers' training, which increases understanding of pilot issues.

The assistants that operate at ACCs are not radar-trained and receive theoretical training in the FIS and its delivery. They do not receive a formal radar qualification.

4.1.2 FIS provision

The provision of the FIS in France consists of two parts. The ACC has a dedicated sector which is operated by assistants and provides a limited FIS in terms of comparison with other countries and indeed the majority of France. In many aspects it is similar to the basic UK provision, using radar for very limited information to pilots.

The major part of France is covered by flight information sectors. These sectors are situated around and covered by approach units using qualified ATCOs as part of their primary role. As in Sweden, and in line with ICAO guidelines, the provision of an FIS in these areas will be secondary to the provision of an air traffic control service when traffic levels are high.

Primary navigational assistance is given, specifically in relation to airspace protection.

The service provided by this system lends itself to increased local knowledge by the controllers as the areas covered are relatively small.

The sectors each have a list of SSR codes that can be issued and code / call-sign conversion is possible via manual entry of an abbreviated flight plan into the system.

Traffic information is passed to pilots as appropriate for known traffic but in terms of air navigational responsibility collision avoidance is not required (although it may be under French civil law). Despite the use of radar, information and limited advice can be given.

As service provision is localised, the VFR pilot will transit areas frequently and coordination from one sector to another is effected in these cases.

The alerting service is provided by the controller providing the FIS and 121.5 is monitored on the suites.

4.1.3 General aviation

General aviation in France is growing at a rate of between 2 and 5% per annum and as in the other countries studied there appears to be a move towards “homebuilt” aircraft and microlights / ultralights with the previously discussed issues being of concern.

Briefing for VFR pilots is available on line and coincides with the filing of flight plans and receipt of meteorological information; it is not however a mandatory requirement to file a flight plan for a VFR flight.

The renewal period for PPL holders in France is the same as those in the other countries studied within JAR regulations.

Mode S is only becoming mandatory in eastern France and not for VFR traffic as yet.

Despite there being several general aviation associations, communication between the service provider and the general aviation community is not very effective. There have been successful attempts to hold seminars bringing together flying clubs from the Paris region but these are not frequent. Campaigns to highlight awareness of infringements have taken place, but are relatively infrequent. They could potentially be very effective as interest is reported to have been good.

General aviation flights are perceived as a problem, especially in the Paris area.

4.1.4 Infringement risk mitigation

The continued development of the flight information sectors to cover all of French airspace is ongoing.

The Short Term Conflict Alert system, which at present does not show VFR in relation to VFR conflict, is being modified to make this possible.

There is an airspace proximity warning (APW) system that can be used to identify danger area and restricted area intrusion. It was suggested that it could be set to aid controlled airspace protection, but this was not demonstrated and the details were slightly unclear.

A new chart is being issued that is a ‘close-up’ view of the TMA in order to highlight and simplify the area for VFR pilots.

4.2 Germany

4.2.1 Staff selection & training

The provision of a flight information service in Germany is undertaken by assistants on a dedicated suite using radar to assist in the service. These assistants have a background in area/approach operations or are trainee controllers who failed to reach the required standard for area or approach control duties. They are selected by means of an entrance exam and receive theoretical and practical training. The use of radar forms part of their training and they are then examined on sector as operational FIS officers.

Their currency is maintained by a requirement for minimum hours per 6-month period (80 hours) and an annual theoretical check.

Interestingly the function of FIS was originally provided by ATCOs, but it was discovered that infrequent exposure to the FIS task led to a lack of knowledge of the large airspace covered. The role of FIS was also, in many cases, viewed as a downgrading of their individual contribution to the company. Increasingly this resulted in poor performance and motivation.

The assistants have been 'promoted' to this role, and are very prompt in providing the service and highly motivated; the view is therefore that an improved service is being provided.

The assistants still undertake other duties not associated with the FIS and this is not deemed to have an impact on their effectiveness.

4.2.2 FIS provision

The service is provided using radar-derived information from a dedicated suite of three radar positions using three frequencies.

The service is advisory only and traffic information may be given, but collision avoidance is not. The FIS officers are careful to ensure that they do not imply that a radar service is being provided and that the pilot is in no doubt as to the quality and extent of service he is receiving.

Service provision does suffer from some radar coverage issues, rendering reduced services at lower levels and extreme ranges, as does any radar-derived service.

The service is divided vertically, with one SSR code being used below the 5000 feet division level; aircraft squawking this code are displayed on the radar and aid conspicuity.

One of the suites is designated the role of airspace protection for the TMA and individual SSR codes are available if required, but these are limited.

Despite having generic SSR codes used above and below 5000 feet, there is a facility to manually input a text block and 'attach' it to the target. Despite not having discrete SSR codes, the radar system will keep the label attached to the target (providing radar cover is not lost for any length of time), thus aiding identification and tracking.

Other tools available on the suites include airfield data and digitised 1:500000 charts for rapid access.

The controllers readily coordinate with adjacent units for transit or joining clearances.

The alerting service is provided by the FIS officer. 121.5 is monitored from various locations within the ACC but not by the FIS positions.

Mode S is available on the FIS positions despite not yet being compulsory. There is an increasing uptake of Mode S equipment by VFR pilots in Germany.

4.2.3 General aviation

As in the UK and Sweden, the growth in general aviation is not evident but there is a shift towards homebuilt aircraft and microlights / ultralights. Concern is focussed on the areas of reduced pilot qualifications in what are potentially better performing aircraft than many of the more 'traditional' types.

The pilot pre-flight briefing system is comprehensive and although there is no requirement for VFR flights to submit a flight plan, the facility is available on line together with narrow flight brief details for NOTAMS.

Charts in Germany are updated annually and, as in all other countries in the study, are charged for. However in the case of significant changes mid-term, the authority has been known to issue new charts free of charge.

The renewal period for the PPL is biannual in line with JAR requirements. There is a regional variation on the PPL, the CVFR rating, required for a PPL in order to operate in Class C airspace. This is a basic operational skill requirement for pilots to demonstrate their ability to

follow radials to/from and execute intercepts of tracks derived from radio navigation aids.

Links between the provider and the GA community are good – there are regular seminars and campaigns to raise awareness and local conferences are structured to concentrate on issues relating to airspace in that region; so it is effective at identifying problem areas relevant to the local pilot.

There is involvement by the service provider in instructor seminars so that best practice and awareness can be reinforced through the GA community during training.

There is a generally high degree of transponder use in Germany by VFR traffic. This is likely to be due to the regulation that all aircraft flying above 5000 feet AMSL or 3500 feet above ground level (whichever is higher) must operate a transponder with Mode A and C. There are defined transponder mandatory areas detailed in the AIP and on VFR charts. Such high levels of transponder usage represent a significant improvement in the service that can be provided.

There is no requirement to file a flight plan in Germany to operate VFR.

GA infringements are perceived as a problem area in Germany, but actions tend to be tackled at a local level, focussing on local issues with local pilots.

4.2.4 Infringement risk mitigation

There is a policy in German aviation that airspace boundaries should be changed as infrequently as possible. This could be a factor in reducing navigational errors, especially with pilots who operate on out-of-date charts.

There is an airspace proximity device that can be created around restricted airspace, be it permanent or temporary, danger areas, etc.

The radar displays show a weather overlay identifying areas of significant cloud or precipitation.

A short-term conflict alert (STCA) is in operation but, as in many other States, this only helps to identify conflicts between IFR and IFR, or IFR and VFR, and not between VFR and VFR.

4.3 The Netherlands

4.3.1 Staff selection & training

The officers providing the service in the Netherlands do so as a dedicated task and are flight information officers, trained in theoretical aspects related to the service and radar skills, but are not fully qualified controllers.

They are licensed to perform the role and are subject to annual proficiency checks to maintain currency. The knowledge base and the motivation demonstrated by the team is good as it is a dedicated function.

4.3.2 FIS provision

The provision of the FIS in the Netherlands is from two dedicated radar positions in the ACC operations room. The suite is equipped with direction-finding equipment identifying the position of every aircraft calling, thus reducing the possibility of confusion. The displays have overlaid weather information to aid navigation advice.

The provision of an FIS to IFR traffic operating to and from the oil platforms in the North Sea (which is paid for by the operators) does tend to take precedence over the VFR traffic being provided a service by the same officer. This particular situation is similar to that observed at approach radar units providing an FIS, when the FIS to VFR pilots degrades as the IFR traffic loading increases and to some extent detracts from the dedicated service provision that it is being provided.

Mandatory transponder usage undoubtedly improves the service provided; however, the area beneath Schiphol TMA is exempt from transponder usage yet constitutes a high-risk area in terms of infringements. This area has shown a 42% increase this year to date compared to the whole of 2006, with 40% of all infringements in the Netherlands being committed by aircraft in receipt of an FIS at the time, although this could equally be the civil or military service provider.

The military portion of the FIR is served with one officer offering a service in a very large area. Although no information was readily available on statistics relating to this service, the feeling is that it is overworked, providing a minimal FIS and proportionally is responsible for a large number of infringements due primarily to a lack of coordination.

Radar coverage in the Netherlands is exceptional due to the low terrain and settings aimed at improving the service to the helicopter fleet in the North Sea.

It should be noted that some of the airspace in the Netherlands changed from Class E to D recently and due to the changes in clearance requirements the number of reported infringements is significantly higher than previous years.

4.3.3 General aviation

The trend identified in the Netherlands is one of a slight increase in the volume of GA traffic although with only a slight 'swing' towards microlights / ultralights and home builds. There is a national PPL similar in concept to that of the UK although precise details as to the competency maintenance and initial training differences compared to a full PPL are not available at this stage.

The pre-flight briefing process for GA pilots is limited as the AIS website only caters for viewing documents and does not contain MET information, a narrow route briefing for NOTAMS or flight planning service. As the only country in the survey that does not provide these services, it was expected that GA pilots would be insufficiently prepared, although there is no direct evidence that this is indeed the case.

Communication between the service provider and the GA community is generally poor and is perceived as a possible point of liability should such communications fail to be established.

Standard JAR biannual checks are required for PPL holders in line with the rest of Europe.

Transponder uptake is estimated at 80% + and is viewed as a direct result of mandatory transponder usage above 1200 feet AMSL. It should be noted that in the Netherlands the tendency by GA pilots is to fly at unusually low altitudes compared to the rest of Europe, presumably due to the lack of obstacles in such a flat terrain. This fact, despite appearing insignificant, could have an impact on the effectiveness of the mandatory transponder areas.

Due to the location of the Netherlands and particularly its dimensions at some points (i.e. in the south-east corner of Beek) it suffers from an increased percentage of foreign infringements compared to most other European providers.

Despite the requirement to file a flight plan for receipt of an alerting service, the usual accepted method of operation is for airfields to communicate departure and ETA with destination airfields.

4.3.4 Infringement risk mitigation

The mandatory transponder areas are significant but under-utilised under Schiphol TMA. There are a number of individual SSR codes available for use which can be converted to labels if required.

4.4 Sweden

4.4.1 Staff selection & training

The FIS is provided by air traffic controllers as part of their normal sector duties. The selection process is therefore straightforward and of a high standard as fully-qualified ATCOs are used.

The FIS portion of their training is undertaken as part of their basic training.

In line with ICAO guidelines, if the controller is busy providing an air traffic control service, this will take precedence over the provision of the FIS.

Monitoring of performance is coincident with the competency programme for controllers.

4.4.2 FIS provision

As the FIS is provided by ATCOs using radar, the information received by the pilots is improved. However the ATCOs are cautious in their approach and make every effort not to imply that a radar service is being provided and ensure that the pilot is in no doubt as to the class and extent of the service he is receiving.

As with all FIS provision, advice will be passed on and traffic information given where possible. Traffic avoidance service is not offered.

Basic navigational assistance is given to VFR pilots receiving an FIS especially in terms of airspace protection.

An alerting service is provided by the controllers, who monitor 121.5 from their positions.

4.4.3 General aviation

As in the UK, the trend in general aviation is not in terms of direct growth but a shift in type towards microlights, ultralights and homebuilds. The implications of this trend are detailed in the UK site visit section of the report and carry the same perceived risk in Sweden.

The recommendation that general aviation pilots should file a flight plan for any flight in Sweden is felt to have greatly enhanced the service. The AIP states that all pilots must file a flight plan if they wish to receive an FIS and alerting service. Although this is not strictly correct as the controllers would still endeavour to provide a service even if a flight plan was not filed, it does improve identification. The entry of the flight plan into the system enables code call-sign conversion on discrete SSR codes and due to the action of filing the plan it is thought that the pilot is better briefed on all aspects of the intended flight. It is estimated that in excess of 80% of general aviation flights in Sweden file flight plans.

Pre-flight briefings are available in three different formats:

- Web-based AIS site for briefing and flight plan entry
- Flying club briefing facilities
- Filing of flight plan by telephone with the flight plan officer, who will provide a NOTAM briefing verbally at the same time.

Pilot licence renewal is JAR-based and is the same as in the UK, however national specific qualification does not exist.

The volume of GA in Sweden is relatively constant and is not viewed as a problem.

The general aviation community enjoys a good relationship with the service provider and many campaigns are undertaken to improve communication in several areas, including infringement reduction.

4.4.4 Infringement risk mitigation

There is an airspace proximity warning tool that can be set to encompass restricted areas and danger areas to highlight any potential intruders; however it is not designed for controlled airspace protection.

4.5 United Kingdom

4.5.1 Staff selection & training

In the UK FIR flight information outside controlled airspace is provided by flight information service officers (A)-s at London and Scottish ACCs.

The FISO-(A)s at the London (LACC) and Scottish (ScACC) area control centres are recruited from the assistant / support grade (ATSA). The ATSAs, because of the nature of their job, are likely to have a comprehensive knowledge of the airspace, ATC structure and procedures at their respective units. When choosing recruits, preference is given to those who already hold an R/T licence (e.g. airfield FISOs or ATSAs who have been trained as controllers but failed to validate) and also those who hold a pilot's licence.

The initial FISO training is classroom and simulator-based and lasts for a period of 3 weeks (15 working days) with an exam on completion of the course. After passing the exam the FISOs rejoin their operational watch to begin the "on-the-job" phase of the training. During this period they work closely with an instructor (OJTI), who monitors their work and continues instructing them on the various FIS skills required. The OJTI is a valid FISO(A) who has completed the necessary training and examining courses. When the OJTI is satisfied that the trainee has reached a satisfactory level of competency they undergo a practical and oral examination, and if successful are considered valid as an Area FISO at that particular ATC unit. This process is closely monitored by CAA SRG, the regulators.

4.5.2 FISO licence

The FISO(A) licence means that the FISO(A) can only pass information to pilots. The FISO cannot instruct a pilot, or suggest a course of action. In special circumstances (e.g. aircraft wishing to join or cross controlled airspace) the FISO(A) can relay an ATC clearance issued by the appropriate controller. The licence does not include a radar rating so no radar or traffic information display-derived information can be passed to the pilot.

All FISO(A)s undergo a yearly local competency exam (LCE) to assess their continued competency and, if it is considered necessary, will undergo a period of retraining or monitoring. This process is carried out by the OJTI examiners and, like the initial training, is closely monitored and regulated by CAA SRG.

All FISO(A)s at LACC and ScACC also work on the ancillary positions in the operations room. These include airways sector assistant, flight plan section supervisor and senior watch assistant. This other work ensures that they maintain current knowledge of the ATC environment in which they provide an FIS.

4.5.3 FIS provision

Equipment

The flight information service provided is a non-radar, procedural service using paper strips on which information provided by the pilot is recorded. The primary reference points for the operator are two maps of the UK in front of the FISO(A); these are supplemented by documentation and numerous information retrieval systems.

Airspace

The flight information service is used mainly by general aviation aircraft operating in Class G airspace, although many airline pilots flying on airways utilise it to obtain up-to-date METAR, TAF, airfield information etc. In the UK Class G airspace extends up to FL195, above this it is classified as controlled airspace (Class C) and any information service is provided by Royal Air Force (RAF) or Royal Navy (RN) controllers. London and Swanwick military will, in some circumstances, provide a radar service to aircraft at FL100 and above in Class G airspace. Other controlled airspace such as CTAs, CTRs, TMAs and airways are a mixture of Class A and D airspace, with some Class E in ScACC airspace.

Traffic information

Traffic information given to pilots is limited, and based on information received from other aircraft on the FIS frequency or from information provided by other ATC units.

Alerting service

As a part of the licence to provide an area ATC service in the UK, NATS are obliged to provide alerting service within the boundaries of the London FIR. London Information provides this service (outside CAS) at Swanwick and works closely with the Distress and Diversion unit (D and D) which is staffed by RAF controllers. As ‘London Information’ is a non-radar service, aircraft that are lost or declare an emergency on the London Information frequency are, after coordination, transferred to ‘D and D’. The UK is unique in having a dedicated unit to handle aircraft emergencies. The FISO(A) will, workload permitting, assist in the trace action of aircraft declared overdue.

Integration

The London and Scottish information sectors are integral parts of the UK ATC structure and as such can easily contact all other concerned agencies (both civil and military) in the UK. Communications with foreign ATSUs are also comprehensive and robust procedures are in place for any coordination required, be it national or international.

LARS

The lower airspace radar service detailed in the documentation section has been extended to cover a major portion of southern England, which has the effect of increasing airspace protection within the area of greatest infringements.

FIS Information Display (FID)

London Information, which is situated in the operations room at Swanwick LACC, is trialling an FIS information display (FID). This display utilises heavily filtered and processed radar information to assist the FISO(A)s with their positional awareness. The outline of all controlled and regulated airspace is shown on the screen and also all traffic that has selected the London FIS SSR code (1177). Although no aircraft is "radar identified", or Mode C readout verified, it gives the FISO(A) valuable positional information that can be used to reduce airspace infringements and also enhance the service, and type of information given to the pilots. Results of the trial have been very encouraging and it will be adopted as a permanent feature from 1 January 2008.

4.5.4 General aviation

There is a trend in the UK away from what may be described as ‘traditional’ general aviation (fixed-wing single / multi engine aircraft) to more homebuilt aircraft, microlights and ultralights. Although there is no significant growth in general aviation as a whole, the change in type is of concern, as weight and cost restrictions limit cockpit equipment, especially radio navigation and transponder units. A lack of affiliation to flying clubs can also reduce the access to information that enables the pilot to be sufficiently briefed. As the new lighter categories of aircraft are explored it is apparent that the training leading to qualification of the pilots may be of a lesser standard, specifically in the navigational and MET aspect. With many of the new microlight and ultralight aircraft being capable of speeds well in excess of

'traditional' aircraft, the navigation challenge is increased.

The renewal period for PPL holders in the UK does not differ from the rest of Europe as it is JAR-based and renewal is by general handling flight test every 24 months. There is in the UK a national PPL qualification that has a slightly shorter training period than the PPL and which has limitations on flight entitlements. The general aviation community has a good relationship with the service provider and many campaigns have been undertaken to reduce infringements and heighten awareness.

4.5.5 Infringement risk mitigation

Unit-specific SRR code

To mitigate against CAS infringements all aircraft receiving a service from London Information are requested to squawk 1177. This code is displayed on all control radars (converted to "FIS" on NATS radar screens) and allows a controller who has a concern about a 1177 return showing on their radar screen to quickly contact the FISO(A) who is talking to the aircraft. This procedure has been shown to be able to stop certain CAS infringements and reduce the impact on ATC and airport operations if they have already occurred. Because of this success Scottish Information will soon be adopting the same procedures using the SSR code 7401.

'Listening Out' SSR code

Defined areas are trialling a 'listening out' SSR code whereby a pilot within the area (at present around approach units) will select a generic 4-didgit SSR code and select the appropriate frequency for the controlled airspace unit in their vicinity. This code indicates to the controller that the aircraft is listening out on their frequency and should they wish to communicate with it, the controller can request the aircraft (by geographical location) to make contact. It also enables general broadcasts relating to localised information (e.g. runway, weather, pressure setting, etc.) to be passed to these aircraft selectively.

Controlled airspace infringement tool (CAIT)

A controlled airspace infringement tool is about to be introduced which, using squawking aircraft (Mode A and C), will highlight their radar return if they are observed by the system to have entered controlled airspace.

4.6 VFR traffic considerations

Varying statistical information has been made available and might seem inconclusive. It is very dependent on the reporting culture of the countries studied. In Sweden it has become a legal requirement for controllers to file a report on every incident. This is partly thought to be the cause of a peak in reported infringements in July and August 2007 when the law was applied.

In the UK and France controllers should file on all incidents, but this is not mandatory in the most minor of situations and as such a degree of incidents go unreported. In France for example 73% of all the reported infringements were in the Paris area, which contains 30% of all movements in France. The issue here is that the airspace around the Paris area is complex and at certain points the interaction of VFR infringes and IFR traffic is dense, thus producing a higher incidence of reports. Similarly in the UK the airspace in the South East is complex and creates much the same effect.

Statistical data received is also presented in differing and incompatible formats, rendering direct comparison difficult; however some useful extraction can be made from the data and will be discussed later.

The trend across the countries (except Germany) has demonstrated a marked increase in infringements over the last 4 years. However, much of this coincides with improved reporting practices being put in place by the ANSPs.

Of more value in this report are the trends associated with the GA community and particularly VFR traffic.

Information from the UK suggests that current uptake of transponder mode A and C carriage is 70% which is strongly supported by Sweden's suggestion that uptake there is 80% plus. These identifiers are significant in terms of what service can be provided.

It has been found in the UK that the majority of aircraft that infringe are operating between 2000 feet and 4000 feet and the majority of infringements are regional. This result has been repeated in every country studied. In the UK the majority of incidents occurred around the London TMA and specifically Stansted Class D airspace. In France the majority occurred around the Paris TMA and in Class D Airspace. In Germany the majority occurred around what was Düsseldorf airspace and in Sweden in the TMA surrounding Arlanda. The significant point emerging here is that the lower airspace boundaries approaching the terminal areas, especially the many varying levels around airfields such as Stansted (Class D), are a significant problem for VFR traffic. Terminal airspace, which is comprised of large areas at the same base level, has a lesser problem. It could be considered that rapidly changing airspace levels contribute to vertical navigational errors and complex lateral navigational scenarios by VFR pilots.

It would appear that generally the incidence of infringements is roughly constant throughout the week and is significantly affected seasonally.

CHAPTER 5 – Conclusions

The conclusions fall clearly into two different areas related to FIS provision and pilot skills and competence. The latter can only be addressed to a limited degree within this report, yet accounts for a significant portion of the recommendations.

5.1 FIS provision

It is clear that FIS provision varies greatly across the various FIRs as does the training of the staff providing the service and their recruitment. The level of the FIS provided, however, consistently exceeds that required by ICAO documentation.

The selection of staff varies from assistants with no radar training through assistants with radar training to fully qualified ATCOs. At first sight an obvious assumption would be that the higher the qualification of the provider the better the service. However it has been demonstrated by the Langen and Schiphol-based FIS officers that assistants with appropriate radar training are a very cost-effective solution and one which was seen to provide a greatly improved service on a local level in terms of motivation and currency. This is not to say that the service provided by the Swedish or French controllers is in any way deficient. On the contrary, a radar controller operating smaller areas of a sectorised FIR would inherently maintain a greater in-depth knowledge of that airspace; the disadvantage in terms of service provision is that utilising controllers to provide both air traffic control and FIS service simultaneously will on occasion reduce the extent to which a FIS can be given due to IFR traffic loading. This would also imply that in busy IFR periods, when the risk of incident involving IFR and VFR traffic is at its greatest, the service provision may be limited.

The increasing use of radar in the provision of an FIS is evident in every country studied and its use in areas adjacent to CTRs and terminal areas greatly increases the level of service provided to the pilot specifically in terms of basic navigational assistance and therefore increases CAS protection.

The various airspace structures in each FIR could be considered confusing; however, statistics show that the majority of infringing aircraft take off and land at airfields within the parent FIR, although the proportion does vary throughout Europe. The complexities of airspace in some areas, where the base of controlled airspace is very low (e.g. to the north-east of Paris, where the base is 1500 feet AMSL and the ground elevation is approximately

300 – leaving just 1200 feet for GA traffic) or where changes in level are numerous over a relatively short distance (e.g. many areas of Class D airspace surrounding CTRs) could lead to vertical navigation errors by private pilots, resulting in infringements. In the Paris CTA1 area for example, most infringements are due to vertical errors, not lateral navigational errors.

The use of radar to provide primary navigational assistance is obviously of great benefit, although this may deteriorate at times of high IFR demand.

The increased uptake in carriage of transponder equipment in Germany, the Netherlands and Sweden is possibly due to the flight plan policy in Sweden and transponder mandatory areas in Germany and the Netherlands.

Such increased uptake has an impact on future development of technical mitigation measures or radar usage. Two of the five States studied use generic squawks for traffic outside CAS to aid conspicuity without using large numbers of individual squawks. Information from the UK demonstrates that a significant proportion of infringements were either identified at an early stage or prevented completely by this method.

Better utilisation of SSR codes can assist in identification of traffic in congested airspace. For example, an “FIR lost” SSR code applied by FIS units to aircraft when pilots are unsure of their position draws attention to the aircraft and its predicament without multiple communications taking place across sectors. The ‘Listening out’ SSR code identifies to a controller (specifically aircraft operating outside a busy CTR) that the aircraft is listening on their frequency should they wish to call them. It is understood that this does not attribute any benefit to a FIS direct, as two-way communication is not established. Under ICAO guidelines two-way communication is not required as the mere passing (and receiving) of information constitutes an FIS. In this case the controller can readily pass very relevant information to aircraft in the local area without occupying great amounts of R/T time.

No data was available regarding airspace proximity warnings or CAS infringement tools as it is either early days in terms of their implementation or none has been collected. Discussion however has indicated that depending on transponder uptake, the outcome of such implementation could be very impressive (15-17% reduction in airspace infringements is predicted).

All ANSPs visited reported either an active involvement in communicating with the GA community or a desire to improve their communication.

In brief:

- Provision of an FIS differs from State to State, but consistently exceeds ICAO requirements
- Qualifications of staff providing the FIS vary from State to State
- The provision of an FIS may be a primary or secondary task depending on the provider
- Use of radar in the provision of an FIS reduces the risk of infringements
- Multiple steps in CAS boundaries increase the risk of infringements.

5.2 Pilot skills

Much criticism is often levelled at pilots for their part in the infringement of CAS, although such incidents are usually unintentional.

The Swedish approach to the filing of flight plans is not replicated in any other country yet would appear to encourage a greater uptake of transponder carriage and properly planned flights. The pilot who takes time to plan the intended trip and file a flight plan on-line where the other information is readily available is more likely to check NOTAMS and MET information correctly, thus making for a better briefed pilot. This pilot is therefore perceived to

be less of a risk in terms of infringements.

Encouraging pilots to plan correctly, carry up-to-date charts and be aware of all relevant NOTAMS is vital in reducing infringements. Poor planning and lack of MET information and NOTAMS can rapidly lead to disorientation and navigational error.

The trend away from 'traditional' types of aircraft to microlight or ultralight aircraft for general aviation activities is worrying. This is not due to the aircraft, but to reduced initial pilot training specifically in navigational and meteorological areas and the lack, in some areas, of adequate competence checks after defined periods of time. Coupled with the increased performance of some microlights and ultralights compared to 'traditional' aircraft, such shortcomings can make basic navigation challenging.

Competency checks for some 'limited' PPLs are self-certifying and not audited successfully.

The PPL competency check consists of a general handling flight check every 24 months (and minimum number of hours completed during that period), but does not include any navigational exercise, check for current documentation or examination of the pilot's basic theoretical knowledge. The EASA move to introduce a "basic" PPL licence with no navigation training is very worrying in this regard.

Ongoing charging for charts is a factor directly contributing to the failure of many PPLs to carry current documentation, which is a legal requirement.

With all ANSPs either communicating well with the GA community or expressing an interest in doing better, it is incumbent upon the community to reciprocate and actively become involved. It is probable that those who are interested and attend or take note of such communications are by their nature less likely to have an incident as they are highly conscientious. Methods need to be explored to ensure that all pilots are aware of changes and initiatives that affect them.

In brief:

- Increased carriage of transponders takes advantage of new ATC tools and procedures
- Good pre-flight planning and carriage of current charts reduces the risk of infringements
- Charging for charts is perceived to have a negative effect on chart currency
- Pilot training and currency standards are of concern to ANSPs.

CHAPTER 6 – Recommendations

6.1 FIS study recommendations

Examination of ICAO documents and local AIPs, as well as the visits to the previously referred to service providers' sites, studying their local procedures and the detailed discussion on infringement mitigation resulted in the following set of recommendations (not ranked in any order of effectiveness, cost or complexity):

- Use radar-derived information for the provision of FIS.
- Employ appropriately trained and licensed officers to provide the service within the confines of the FIS guidelines and limitations.
- Provide FIS from dedicated positions that will not reduce the level of service due to high levels of IFR traffic in the vicinity.
- Review airspace design and attempt to simplify the numerous level changes surrounding terminal areas and CTRs which may contribute to vertical navigation errors.
- Harmonise charts across Europe. Although harmonisation of airspace is infinitely difficult and protracted, there needs to be a standard chart representation of the existing airspace to prevent cross-border confusion. Jeppeson already provide cross-European charts in a common format, but this could be adopted by the Member States.
- Employ detection tools as they are developed to identify infringements at an early stage prior to incidents of higher severity occurring.
- Apply mandatory transponder areas to incorporate the majority of infringing traffic.
- Enforce the use of flight plans or abbreviated flight plan data for all except local flights.
- Utilise listening out and FIR conspicuity (not including 7000) discrete SSR codes at centres where individual SSR code allocation is not feasible.
- Improve the web-based AIS system across Europe, incorporating a narrow route NOTAM briefing capability, MET data and flight planning capability for all States.

- Recommend mandatory membership of recognised flying schools or clubs for all PPL holders to facilitate improved notification of changes, guidance and documentation supply.
- Improve communication with the general aviation community, considering the use of a free email notification service to all registered PPLs regarding airspace changes and other important data relating to a predetermined radius surrounding their registered airfield.
- Ensure that all pilot qualifications are checked for currency and audited in line with full JAR PPL requirements.
- Ensure that all initial pilot training, whatever the level, includes the same navigational and meteorological skills as the PPL.
- As part of the competence check on all private pilots, irrespective of qualification, undertake a basic navigational exercise and ensure that current documentation is being used in line with legal requirements.
- Encourage flying clubs to incorporate the cost of the annual chart renewal into their membership fees and issue them 'free of charge' at the appropriate time to all of their members.
- Review and simplify the process for identifying and tracing pilots responsible for causing infringements and review actions vis-à-vis such pilots to incorporate suitable navigational retraining and if necessary, examination. Heavy fines or prosecution should not be encouraged as these methods fail to resolve the problem.

6.2 Full set of potential risk reduction recommendations

The full list of risk reduction recommendations incorporates the findings from previous airspace infringement risk analysis studies carried out within the scope of the safety initiative.

The results of the FIS study and the other risk analysis studies were collated to comprise a comprehensive set of recommendations, which were then submitted in the context of a feasibility study to produce the final recommendations.

As in 6.1 above, these combined recommendations have not been ranked in any order of effectiveness or cost-benefit ratio.

1) Review and optimise airspace design.
    - Harmonise airspace design across Europe
    - Simplify the numerous level changes surrounding terminal areas and CTRs which may contribute to vertical navigation errors
    - Avoid GA bottlenecks around complex airspace structures
    - Reduce general airspace complexity and align boundaries with prominent ground features and landmarks
    - Establish corridors/transit routes through controlled airspace to accommodate VFR transit traffic; allocate dedicated SSR code to each corridor/route
    - Create VRPs and simple arrival/departure routes for access to airfields within or beneath CAS
    - Reduce CAS dimensions if no longer required (much 'historic' airspace still exists throughout Europe that in the modern ATC environment is redundant)

- Investigate lower levels of airspace specifically over high ground; redefine as appropriate
- Review airspace restrictions; review mix of IFR and VFR in congested areas.

2) Harmonise charts across Europe. Although harmonisation of airspace is infinitely difficult and protracted, there needs to be a standard chart representation of the existing airspace to prevent cross-border confusion. Jeppeson already provide cross-European charts in a common format but this could be adopted by the Member States. Ensure frequencies are clearly identifiable for all airspace areas and services. Show ICAO airfield designators and GPS coordinates for each airfield
3) Review location of navigation aids to be more efficient for VFR traffic, not just covering IFR routes.
4) Harmonise AIRAC updates with GPS database updates.
5) Use radar-derived information for the provision of an FIS.
    - Extend scope of FIS
    - Include individual identification of every flight
    - Increase navigational assistance requirements
    - Improve coordination between FIS providers and adjacent units
6) Employ sufficient numbers of appropriately trained and licensed officers to provide the service within the confines of the FIS guidelines and limitations. Ensure these personnel are specifically trained in the requirements and limitations of VFR pilots, especially those operating in marginal conditions. Preferably the officers should have experience as a light aircraft pilot – include such experience in training programmes.
7) Incorporate 'infringement' training for ATCOs to assist in rapid detection and appropriate reaction to infringements.
8) Provide FIS for VFR traffic from dedicated positions that will not reduce the level of service due to high levels of IFR traffic in the vicinity.
    - Ensure pilot and controller are clear on what service is being given on each occasion
    - Ensure same services are provided across Europe, be it from civil or military officers
    - Increase ATIS network in order to enable more current weather information relative to pilot's position.
9) Employ detection tools as they are developed to identify infringements at an early stage prior to incidents occurring. Concentrate on 'safety nets'
10) Utilise listening out and FIR conspicuity (not including 7000) discrete SSR codes at centres where individual SSR code allocation is not feasible.
11) Mandate squawking of SSR code 7000 (Mode A and C) for all other areas where transponder carriage is mandatory. And recommend squawking the code, where not mandatory.
12) Apply mandatory transponder and R/T contact areas to incorporate the majority of infringing traffic.
    - Promote increased carriage of transponders
    - Use data link e.g. Mode S and interactive GPS systems
    - Use full A/C registration, not ID-linked call signs for non-commercial traffic outside CAS

- Develop low-cost Mode S transponder and phase in mandatory use in accordance with above

13) Apply mandatory R/T contact areas as ‘buffers’ around CAS from the surface.

14) Enhance the web-based AIS system across Europe to a centralised web-based system incorporating a telephone briefing centre free of charge.

- Ensure narrow route NOTAM briefing facility, including grouping by topic and en-route frequencies (Departure to Destination); simplify format
- Include current GPS database identification to aid currency check of equipment
- Include airspace opening / closure times where appropriate.
- Provide MET details and flight planning capability for all States
- Develop 3D airspace familiarisation tool
- Develop Europe-wide VFR route network and planning tools
- Include GPS coordinates for obstructions, danger areas, restricted areas and temporary segregated areas
- Enable free download of current chart or section of chart from website
- Establish feedback or ‘Lessons Learned’ area for safety feedback to GA pilots

15) Enforce the filing of flight plans for all except very local flights (radius 10nm) to the point of departure

16) Review primary navigational requirement – move away from conventional radio navigation aids towards advanced GPS

- Ensure approved scheme for correct GPS installation and maintenance
- Utilise automated warning systems (GPS and /or VDL 4) to alert the pilot of possible infringements
- Use of moving map
- Database uplink even during flight

17) As part of GA aircraft maintenance checks, ensure all navigational equipment is operating within tolerances and GPS databases are current.

18) Improve communication with the general aviation community.

- Consider free email notification service to all registered PPLs concerning airspace changes and other such important data relating to a predetermined radius surrounding their registered airfield
- Resist over-regulation of GA – encourage best practice by pilots and improve education/currency
- Improve pilots’ understanding of responsibilities and safety accountabilities
- Utilise ‘open-door days’ to break down barriers between GA pilots and ATC by organising visits to ATC establishments
- Improve military liaison with GA pilots at seminars to improve understanding of each others’ needs

19) Recommend mandatory membership of recognised flying schools or clubs by all PPL holders.

- Improve provision of briefing at club
- Ensure information flow and initiatives passed on

- Provision of better briefing facilities to encourage better briefings

20) Encourage flying clubs to incorporate the cost of the annual chart renewal into their membership fees and issue them 'free of charge' at the appropriate time to all their members.

21) Ensure that all initial pilot training, whatever the level, includes the same navigational, meteorological and R/T skills as the PPL. Increase training at entry level to improve R/T standards and appreciation of infringements.

- Include airspace crossing as part of PPL training
- Incorporate more rigorous navigational training package approved by the regulator
- Include minimum radio navigational training as part of PPL syllabus
- Ensure training in use of GPS systems and basic radio navigation aid training and use of more than one method of navigation
- Encourage pilots to contact ATC
- Ensure understanding of radio failure procedures, phraseology and 'if in doubt – check' (even if it was someone else's call that was incorrect)
- Enforce appreciation by pilot of prevailing conditions and tell them not to fly in conditions outside of their licence limitations
- Allow use of mother tongue to pilots outside controlled airspace to reduce 'lost' or 'misinterpreted' information due to language barriers of GA pilots. English mandatory requirement only for pilots flying abroad (A national licence would have to be used to restrict overseas travel. Qualified PPLs using only their mother tongue in their own country would be an increased risk if permitted to travel abroad with limited practice of English R/T)

22) Develop Europe-wide extended navigation 'rating' beyond basic PPL navigational requirements, but less costly to obtain and maintain than an IFR rating. (e.g. UK IMC, German CVFR).

23) As part of the competence check on all private pilots, irrespective of qualifications.

- Make the check assessed – 'Pass / Fail'
- Ensure current chart is being carried in line with legal requirement
- Ensure GPS update is current (where fitted)
- Review procedures with pilot for controlled airspace requirements, trip planning and route alternates if CAS transit refused
- Reinforce infringement consequences
- Check R/T performance
- As part of general handling, check altimeter setting procedures and altitude holding ability

24) Review and simplify the process for identifying and tracing pilots responsible for causing infringements.

- Review actions vis-à-vis such pilots to incorporate suitable navigational retraining and examination if required, but not heavy fines as they fail to remedy the problem
- Improve follow-up procedures and standardise approach across Europe.

CHAPTER 7 – Initial feasibility assessment

This chapter gives an overview of the costs and benefits that are associated with the recommendations to prevent airspace infringements. It should be noted that the list of recommendations in the previous chapter includes subjects that need to be mandated to ensure efficient deployment within the GA community[1]. However, to mandate additional equipment or training for GA requires buy-in from all related national and regional regulatory authorities and such a procedure can take time. For that step, technical, financial and regulatory analyses are necessary which may follow the current Airspace Infringement Initiative.

The study at this stage offers possibilities for reducing the risk of infringement. Therefore it is not possible to calculate the exact costs and benefits of the recommended actions. Most of the recommendations depend on the adoption of the recommendations by national ANSPs, training establishments, flying clubs, and other organisations, with varying regulations depending on the country. Thus the possibility of implementing some of the preventive measures and their costs will vary as well. In the following section, quantitative and qualitative benefits/costs that are associated with recommended actions in the previous chapter will be described.

7.1 Expected benefits

The proposed measures, e.g. radar-derived information for the provision of an FIS, better pilot training for navigational training, increased geographical coverage of FIS in lower airspace and assignment of appropriately trained officers for FIS and use of transponders, all have similar benefits. They all aim for:

- increased safety
- increased flight efficiency
- more airspace capacity

[1] The recently published European Commission discussion paper “GA in the European Community” estimates that there are 90,000 pilots engaged in "private powered flying" in Europe, using 20,000 aircraft and flying between three and four million hours a year. There are 40,000 micro-light pilots, about 90,000 glider pilots and 22,000 gliders, 115,000 hang glider and paraglider pilots, 120,000 parachutists, and 5,300 balloon and airship pilots.

- fewer delays

It is difficult to assign one single benefit to each action; therefore, the benefits are described below generally.

7.1.1 Safety

Loss of separation and risk of collision may cause loss of control; injuries to passengers and/or crew arising out of abrupt avoiding manoeuvres may result. The problem with assessing the safety benefits of new equipment or procedures is that it is difficult to assign a monetary value to human life. Below are examples of values for avoided fatality and avoided injuries.

Value of avoided fatality (€)	€ 2.3 million
Value of avoided injuries (€)	Minor injury: € 35 400
	Major injury: € 479 800

Reference: Standard Inputs for EUROCONTROL Cost Benefit Analyses, 2007.

7.1.2 Flight efficiency

Flight efficiency is a generic term that can refer to different concepts and definitions. Each actor involved in air transportation activities has its own perception of flight efficiency. From all viewpoints, flight efficiency always involves trade-offs (safety versus capacity, fuel cost versus time cost, ground versus airborne delay, noise versus emissions, etc)[2].

A reduction of a few miles in flight length by using more direct routes can result in significant savings on a yearly level.

Benefit to airlines for each km flown directly	~5 € / km (Source PRR 2006)
Fuel cost	530€ / tonne (Source Airline Business, world average jet kerosene spot price in 2006)

7.1.3 Increased capacity and fewer delays

Infringements also result in increased costs through delayed departures, go-arounds and extended routings. By preventing them, delays could be reduced and airspace capacity would be increased.

Benefit of avoided delay per minute (€)	Airborne delay € 45
	Ground delay € 27
Value of an additional flight	700€ / flight

Reference: Standard Inputs for EUROCONTROL Cost Benefit Analyses, 2007.

[2] Source: Flight Efficiency Studies in Europe and the United States.

7.2 Expected cost

7.2.1 Navigation training of pilots

The EC report on general aviation describes flight training as "a core of general aviation" which is "usually considered to be one of the important sources of qualified aviation staff for airlines".

A typical training package includes a minimum number of hours of training which are required, including dual instruction and solo flying. In addition, theoretical knowledge is mandatory to become a qualified VHF radio operator. This includes information on international aviation law and understanding the principles of flight and aircraft engines and systems. To adopt the changes that will result from the implementation of the airspace infringement preventive measures, additional training hours will be necessary. The cost of flight training varies between 100€ and 200€ per hour.

7.2.2 Transponder carriage

Currently in Europe it is mandatory for all aircraft flying in controlled airspace to carry a transponder (Mode S/A/C). Core Europe (excl. Sweden) currently has a mandate for all IFR traffic to carry a Mode S transponder (with VFR traffic also subject to certain mandatory equipment). However, there are no mandates for carrying a transponder in uncontrolled airspace, which means GA aircraft flying there do not have to be equipped.

In the case of mandatory Mode S transponder carriage at 1500' AMSL and above, GA aircraft have to be equipped accordingly. This will result in the following costs:

- Avionics purchase and installation
- Cost of supplementary certificates and other approvals
- Cost of maintenance

The cost of a transponder would depend on the type of transponder mandated. The cost of a Mode S transponder is approximately € 2000[3] plus an installation cost of €300. Maintenance costs also need to be considered but there is a high degree of variability across different types of GA aircraft.

7.2.3 EUROCONTROL awareness activities

It can be expected that EUROCONTROL will play a key role in implementing the airspace infringement preventative measures. With its expertise in the area and its international nature, the Agency is best placed to support the actors involved such as ANSPs, GA pilot associations, etc.

It can be assumed that EUROCONTROL activities would include:

- Enhancement and maintenance of an AI awareness website (already in place)
- Organising regular workshops for pilots, FIS providers and flying clubs
- Preparing newsletters and distributing them
- Meeting FIS providers and GA representative organisations (such as IAOPA Europe)

For this purpose, it is estimated that 2 full-time Agency staff and the involvement of one senior manager will be needed. Below is a tentative calculation for 3 years including staff costs, Agency support activities, missions and marketing (awareness) activities. The

[3] See Business case for the use of VHF-VDL multi-mode radio in General Aviation/Aerial Work, Helios Technology-2006

EUROCONTROL cost is expected to be around 500 000 € per year. The basis for these figures is another EUROCONTROL support initiative concerning the environmental management of airports. Depending on the nature of the AI initiative in terms of time and budget, the cost will be adjusted.

Requirement	2008		2009		2010	
	FTE [4]	Euro	FTE	Euro	FTE	Euro
Senior Management	***0.1***		***0.1***		***0.1***	
Programme Manager	***1***		***1***		***1***	
Expert	***1***		***1***		***1***	
Support		***100***		***100***		***100***
Missions		***25***		***25***		***25***
Marketing		***50***		***50***		***50***
Total cost per year	***~500***		***~500***		***~500***	

7.3 Impact of SESAR

The implementation of the Single European Sky initiative of the European Commission, called Single European Sky ATM Research (SESAR), started in March 2006. This modernisation programme will combine technological, economic and regulatory aspects and will use the Single European Sky (SES) legislation to synchronise the plans and actions of the various stakeholders and gather resources for the development and implementation of the required improvements throughout Europe, in both airborne and ground systems. The second phase of the project will be a development and implementation phase to build the next generation of air traffic control systems.

In SESAR Deliverable 3, “The ATM Target Concept”, several technology enablers were identified to meet the operational and architectural requirements of the air transport industry. “The communication systems will increasingly use digital technology and protocols to a full integration of terrestrial and satellite networks towards a data network connecting all ATM sub-systems…New surveillance systems e.g. ADS-B will increasingly provide improved 4D-trajectory information (position and time).”

Within the programme, GA aircraft which operate under VFR will be equipped with the following: a “structural’ package consisting of advanced communication capabilities, GNSS based navigation capabilities and a squitter”. General aviation also assumes 100% participation by 2020 either through retrofit or new aircraft purchases (i.e. about 132,000 powered aircraft and aerial vehicles in 2020). The SESAR cost-benefit analysis foresees a cost per GA aircraft of between 5000€ and 7000€[5].

It is highly probable that this package will have a positive impact on preventing AI. Therefore, the synergy impact of the projects should be considered when calculating the cost of measures against infringement.

[4] Full-time equivalent (FTE) is a way of measuring a worker's involvement in a project, or a student's enrolment at an educational institution. As an average, 150000€ is used as 1FTE.

[5] Source SESAR Deliverable 3 “The ATM Target Concept”, 2007.

7.4 Risks and further issues

The most significant issue to be resolved is for all aviation stakeholders to accept the proposed measures. Their implementation will require investment by aircraft owners, flight training establishments, FIS providers and EUROCONTROL. A possible way of ensuring participants' buy-in would be active awareness initiatives and marketing by EUROCONTROL.

Currently, the ATM world is undergoing important changes through SESAR. Some recommendations in this report could be linked to SESAR concepts. As an example, training for air traffic controllers and improvement of the AIS systems are already envisaged in the programme. The AI initiative could also be linked to the SESAR concept of operations. The safety-related working groups in SESAR could be informed about the AI initiative and methods of cooperation could be considered.

CHAPTER 8 – Final recommendations

In order to rationalise the findings in this report, a list of 'Final recommendations' has been created from the full set of recommendations.

The purpose of this rationalisation is to review the effectiveness of the full set of recommendations' based on the following;

a) Regulatory requirements

b) Airspace design and ATC procedures

c) CNS infrastructure and technical support

d) Implementation timeframe and necessary investment.

Those that offer the highest benefit have been weighted in a way that indicates the cost / complexity relationship of each of the recommendations. This relationship is a tentative estimate and is presented as a 'rating' between 1 and 5 with '1' indicating a minimal cost or low complexity and 5 indicating a high cost or very complex solution. This rating relates to cost/complexity for the airspace provider and not necessarily for the user.

The order of the items in the list does not indicate any priority as it is recognised that each Member State may have a different assessment of priorities based on its individual circumstances and operational environment. Each recommendation includes a series of measures which add to the effectiveness of the recommendation as a whole.

	Recommendation	Cost rating	Complex-ity rating
1	**Harmonise charts across Europe.** Although harmonisation of airspace is infinitely difficult and protracted, there needs to be a standard chart representation of existing airspace to prevent cross-border confusion. Jeppeson already provide cross-European charts in a common format but this could be adopted by the Member States. Ensure frequencies are clearly identifiable for all airspace areas and services. Show ICAO airfield designators and GPS coordinates for each airfield.	**2**	**3**

2	**Use radar-derived information for the provision of an FIS.** Increase scope of FIS Include individual identification of every flight Increase navigational assistance requirement Improve coordination between FIS providers and adjacent units	**5**	**4**
3	**Employ infringement detection tools** Concentrate on 'safety nets' as they are developed to identify infringements at an early stage, prior to incidents occurring.	**3**	**3**
4	**Use listening out and FIR conspicuity squawks** Use these squawks (not including 7000) at centres where individual squawk allocation is not feasible.	**1**	**2**
5	**Mandatory transponder and R/T contact areas** Apply mandatory R/T contact areas as 'buffers' around CAS from the surface Apply mandatory transponder and R/T contact areas to incorporate most infringing traffic. Promote increased carriage of transponders Use Data link, e.g. Mode S and interactive GPS systems Use full A/C registration, not I.D-linked call signs for non-commercial traffic outside CAS. Develop low-cost Mode S transponder and phase in mandatory use in accordance with above.	**2**	**4**
6	**Implement a Web-based AIS System across Europe** Develop a centralised Web-based system incorporating a free telephone briefing system. Incorporate a narrow route NOTAM briefing, including grouping by topic and en-route frequencies (Departure to Destination). In simplified format. Include current GPS database identification to aid currency check of equipment. Include Airspace, Open / Closed times where appropriate. Met details and flight planning system for all States Development of 3D airspace familiarisation tool Develop Europe-wide VFR route network and planning tools Include GPS coordinates for obstructions, danger areas, restricted areas and temporary restricted areas.	**3**	**3**

	Enable free download of current chart or section of chart from website. Feedback or 'Lessons Learned' area for safety feedback to GA pilots. Enforce the filing of flight plans for all except very local flights (radius 10nm) to the point of departure		
7	**Review primary navigational requirements** Move towards GPS as a basic tool in navigation Ensure approved scheme for correct GPS installation and maintenance with legislative requirements as a primary navigational aid. Use automated warning systems (GPS and /or VDL 4) to alert the pilot of possible infringements. Utilisation of moving map Database uplink even during flight Harmonise AIRAC revisions with GPS database updates	**4**	**3**
8	**Improve communication with the general aviation community** Consider free email notification service to all registered PPLs on airspace changes and other data relating to a predetermined radius surrounding their registered airfield. Resist over-regulation of GA – encourage best practice by pilots and improve education / currency. Improve pilots' understanding of responsibilities and safety accountabilities Use 'open door days' to break down barriers between GA pilots and ATC by organising visits at ATC establishments Military liaison with GA pilots to improve awareness	**2**	**1**
9	**Mandatory membership of recognised flying school or club for all PPL holders**. Provision of briefing terminal at club Information flow and initiatives passed on Better briefing facilities encourage better briefings! Encourage flying clubs to incorporate the cost of the annual chart renewal into their membership fees and issue them 'free of charge' at the appropriate time to all their members	**1**	**1**
10	**Review basic pilot training** Ensure that all initial pilot training, regardless of level, consists of the same navigational, meteorological and radiotelephony	**2**	**4**

	skills as the PPL. Increase training at entry level to improve R/T standards and appreciation of infringements. Include airspace crossing as part of PPL training. Incorporate more rigorous navigational training package approved by the regulator. Include minimum radio navigational training as part of PPL syllabus. Ensure training on use of GPS systems and basic radio navigation aid training. Use more than one method of navigation Encourage pilots to contact ATC Ensure understanding of radio fail procedures, phraseology and 'if in doubt – check' (even if it was someone else's call that was incorrect) Enforce appreciation by pilots of prevailing conditions and tell them not to fly in conditions outside of their licence limitations.		

ANNEX 1 – FIS provision requirements

PANS ATM (DOC 4444**)**

1.1

“4.2 RESPONSIBILITY FOR THE PROVISION OF FLIGHT INFORMATION SERVICE AND ALERTING SERVICE

Flight information service and alerting service shall be

provided as follows:

a) *within a flight information region (FIR):* by a flight information centre, unless the responsibility for providing such services is assigned to an air traffic control unit having adequate facilities for the exercise of such responsibilities;

b) *within controlled airspace and at controlled aerodromes:* by the relevant air traffic control units.”

“4.3.1 General

The appropriate ATS authority shall designate the area of responsibility for each air traffic control (ATC) unit and, when applicable, for individual control sectors within an ATC unit. Where there is more than one ATC working position within a unit or sector, the duties and responsibilities of the individual working positions shall be defined.”

1.2

“9.1. FLIGHT INFORMATION SERVICE

9.1.1 Recording and transmission of information on the progress of flights

Information on the actual progress of flights, including those of heavy or medium unmanned free balloons, under neither air traffic control service nor air traffic advisory service shall be:

a) recorded by the air traffic services unit serving the FIR within which the aircraft is flying in such a manner that it is available for reference and in case it is requested for search and rescue action;

b) transmitted by the air traffic services unit receiving the information to other air traffic services units concerned, when so required in accordance with Chapter 10, 10.2.2."

1.3

"9.1.3 Transmission of information

9.1.3.1 MEANS OF TRANSMISSION

9.1.3.1.1 Except as provided in 9.1.3.2.1, information shall be disseminated to aircraft by one or more of the following means as determined by the appropriate ATS authority:"

a) the preferred method of directed transmission on the initiative of the appropriate ATS unit to an aircraft, ensuring that receipt is acknowledged; or,

b) a general call, unacknowledged transmission to all aircraft concerned; or

c) broadcast; or

d) data link.

Note.— It should be recognized that in certain circumstances, e.g. during the last stages of a final approach,

it may be impracticable for aircraft to acknowledge directed transmissions.

9.1.3.1.2 The use of general calls shall be limited to cases where it is necessary to disseminate essential information to several aircraft without delay, e.g. the sudden occurrence of hazards, a change of the runway-in-use, or the failure of a key approach and landing aid.

1.4

"11.4.3.1.1 *MESSAGES CONTAINING TRAFFIC INFORMATION TO AIRCRAFT OPERATING OUTSIDE CONTROLLED AIRSPACE*

Note.— Pursuant to Section 5.2 of Chapter 5, but subject to certain exceptions stated therein, ATC is required to provide separation between IFR flights in airspace Classes A to E, and between IFR and VFR flights in Classes B and C. ATC is not required to provide separation between VFR flights, except within airspace Class B. Therefore, IFR or VFR flights may constitute essential traffic to IFR traffic, and IFR flights may constitute essential traffic to VFR traffic. However, a VFR flight would not constitute essential traffic to other VFR flights except within Class B airspace."

1.5

15.4 ASSISTANCE TO VFR FLIGHTS

15.4.1 Strayed VFR flights and VFR flights encountering adverse meteorological conditions

Note.— A strayed aircraft is an aircraft which has deviated significantly from its intended track or which reports that it is lost.

15.4.1.1 A VFR flight reporting that it is uncertain of its position or lost, or encountering adverse meteorological conditions, should be considered to be in a state of emergency and handled as such. The controller shall, under such circumstances, communicate in a clear, concise and calm manner and care shall be taken, at this stage, not to question any fault or negligence that the pilot may have committed in the preparation or conduct of the flight. Depending on the circumstances, the pilot should be requested to provide any of the following

information considered pertinent so as to better provide assistance:

a) aircraft flight conditions;

b) position (if known) and level;

c) airspeed and heading since last known position, if pertinent;

d) pilot experience;

e) navigation equipment carried and if any navigation aid signals are being received;

f) SSR Mode and code selected if relevant;

g) departure and destination aerodromes;

h) number of persons on board;

i) endurance.

15.4.1.2 If communications with the aircraft are weak or distorted, it should be suggested that the aircraft climb to a higher level, provided meteorological conditions and other circumstances permit.

15.4.1.3 Navigation assistance to help the pilot determine the aircraft position may be provided by use of radar, direction-finder, navigation aids or sighting by another aircraft. Care must be taken when providing navigation assistance to ensure that the aircraft does not enter cloud.

Note.— The possibility of a VFR flight becoming strayed as a result of encountering adverse meteorological conditions must be recognized.

15.4.1.4 The pilot should be provided with reports and information on suitable aerodromes in the vicinity where visual meteorological conditions exist.

15.4.1.5 If reporting difficulty in maintaining or unable to maintain VMC, the pilot should be informed of the minimum flight altitude of the area where the aircraft is, or is believed to be. If the aircraft is below that level, and the position of the aircraft has been established with a sufficient degree of probability, a track or heading, or a climb, may be suggested to bring the aircraft to a safe level.

15.4.1.6 Radar assistance to a VFR flight should only be provided upon the request or concurrence of the pilot. The type of radar service to be provided should be agreed with the pilot.

15.4.1.7 When providing radar assistance in adverse meteorological conditions, the primary objective should be to bring the aircraft into VMC as soon as possible. Caution must be exercised to prevent the aircraft from entering cloud.

15.4.1.8 Should circumstances be such that IMC cannot be avoided by the pilot, the following guidelines may be followed:

a) other traffic on the ATC frequency not able to provide any assistance may be instructed to change to another frequency to ensure uninterrupted communications with the aircraft; alternatively the aircraft being assisted may be instructed to change to another frequency;

b) ensure, if possible, that any turns by the aircraft are carried out clear of cloud;

c) instructions involving abrupt manoeuvres should be avoided; and

d) instructions or suggestions to reduce speed of the aircraft or to lower the landing gear, should, if possible, be carried out clear of cloud.

15.5.1 Strayed or unidentified aircraft

Note 1.— The terms “strayed aircraft” and “unidentified aircraft” in this paragraph have the following meanings:

Strayed aircraft. *An aircraft which has deviated significantly from its intended track or*

which reports that it is lost.

Unidentified aircraft. *An aircraft which has been observed or reported to be operating in a given area but whose identity has not been established*.

Note 2.— An aircraft may be considered, at the same time, as a "strayed aircraft" by one unit and as an "unidentified aircraft" by another unit.

15.5.1.1 As soon as an air traffic services unit becomes aware of a strayed aircraft, it shall take all necessary steps as outlined in 15.5.1.1.1 and 15.5.1.1.2 to assist the aircraft and to safeguard its flight.

Note.— Navigational assistance by an air traffic services unit is particularly important if the unit becomes aware of an aircraft straying, or about to stray, into an area where there is a risk of interception or other hazard to its safety.

15.5.1.1.1 If the aircraft's position is not known, the air traffic services unit shall:

a) attempt to establish two-way communication with the aircraft, unless such communication already exists;

b) use all available means to determine its position;

c) inform other ATS units into whose area the aircraft may have strayed or may stray, taking into account all the factors which may have affected the navigation of the aircraft in the circumstances;

d) inform, in accordance with locally agreed procedures, appropriate military units and provide them with pertinent flight plan and other data concerning the strayed aircraft;

e) request from the units referred to in c) and d) and from other aircraft in flight every assistance in establishing communication with the aircraft and determining its position.

Note.— The requirements in d) and e) apply also to ATS units informed in accordance with c).

15.5.1.1.2 When the aircraft's position is established, the air traffic services unit shall:

a) advise the aircraft of its position and corrective action to be taken; and

b) provide, as necessary, other ATS units and appropriate military units with relevant information concerning the strayed aircraft and any advice given to that aircraft.

15.5.1.2 As soon as an air traffic services unit becomes aware of an unidentified aircraft in its area, it shall endeavour to establish the identity of the aircraft whenever this is necessary for the provision of air traffic services or required by the appropriate military authorities in accordance with locally agreed procedures. To this end, the air traffic services unit shall take such of the following steps as are appropriate in the circumstances:

a) attempt to establish two-way communication with the aircraft;

b) inquire of other air traffic services units within the FIR about the flight and request their assistance in establishing two-way communication with the aircraft;

c) inquire of air traffic services units serving the adjacent FIRs about the flight and request their assistance in establishing two-way communication with the aircraft;

d) attempt to obtain information from other aircraft in the area.

15.5.1.2.1 The air traffic services unit shall, as necessary, inform the appropriate military unit as soon as the identity of the aircraft has been established.

Note.— Requirements for coordination between military authorities and air traffic services are specified in Annex 11,

UK AIP

2.1

3 Radar Service Outside Controlled Airspace

3.1 Radar Advisory Service (RAS)

3.1.1 RAS is an air traffic radar service in which the controller will provide advice necessary to maintain prescribed separation between aircraft participating in the advisory service, and in which he will pass to the pilot the bearing, distance, and, if known, level of conflicting non-participating traffic, together with advice on action necessary to resolve the confliction. Where time does not permit this procedure to be adopted, the controller will pass advice on avoiding action followed by information on the conflicting traffic. Under an RAS, the following conditions apply:

(a) The service will only be provided to flights under IFR irrespective of meteorological conditions;

(b) controllers will expect the pilot to accept vectors or level allocations which may require flight in IMC. **Pilots not qualified to fly in IMC should accept an RAS only where compliance with ATC advice permits the flight to be continued in VMC;**

(c) there is no legal requirement for a pilot flying outside Controlled Airspace to comply with instructions because of the advisory nature of the service. However, a pilot who chooses not to comply with advisory avoiding action must inform the controller.

The pilot will then become responsible for initiating any avoiding action that may subsequently prove necessary;

(d) the pilot must advise the controller before changing heading or level;

(e) the avoiding action instructions which a controller may pass to resolve a confliction with non-participating traffic will, where possible, be aimed at achieving separation which is not less than 5 nm or 3000 ft, except when specified otherwise by the regulating authority. However, it is recognised that in the event of the sudden appearance of unknown traffic, and when unknown aircraft make unpredictable changes in flight path, it is not always possible to achieve these minima;

(f) information on conflicting traffic will be passed until the confliction is resolved;

(g) the pilot remains responsible for terrain clearance, although ATSUs providing an RAS will set a level or levels below which an RAS will be refused or terminated.

3.2 **Radar Information Service (RIS)**

3.2.1 RIS is an air traffic radar service in which the controller will inform the pilot of the bearing, distance, and, if known, the level of the conflicting traffic. No avoiding action will be offered. **The pilot is wholly responsible for maintaining separation from other aircraft whether or not the controller has passed traffic information.** Under an RIS, the following conditions apply:

(a) The service may be requested under any flight rules or meteorological conditions;

(b) the controller will only update details of conflicting traffic, after the initial warning, at the pilot's request or if the controller considers that the conflicting traffic continues to constitute a definite hazard;

(c) the controller may provide radar vectors for the purpose of tactical planning or at the request of the pilot. However, vectors will not be provided to maintain separation from other aircraft, which remains the responsibility of the pilot. There is no requirement for a pilot to accept vectors;

(d) the pilot must advise the controller before changing level, level band or route;

(e) RIS may be offered when the provision of RAS is impracticable;

(f) requests for an RIS to be changed to an RAS will be accepted subject to the controller's workload; prescribed separation will be applied as soon as practicable. If an RAS cannot be provided the controller will continue to offer an RIS;

(g) for manoeuvring flights which involve frequent changes of heading or flight level, RIS may be requested by the pilot or offered by the controller. Information on conflicting traffic will be passed with reference to cardinal points. The pilot must indicate the level band within which he wishes to operate and is responsible for selecting the manoeuvring area, but may request the controller’s assistance in finding a suitable location. The controller may suggest re-positioning on his own initiative, but the pilot is not bound to comply;

(h) the pilot remains responsible for terrain clearance. ATSUs providing an RIS will set a level or levels below which vectors will not be provided, except when specified otherwise by the regulating authority.

3.3 Establishing a service

3.3.1 In order to establish a radar service the pilot and controller must reach an 'accord'. When requesting a radar service the pilot must state the flight rules under which he is operating and whether he requires an RAS or RIS. If the controller is able to offer a service he will attempt to identify the aircraft. When he is satisfied that he has positively identified the aircraft, the controller will confirm the type of service he is about to provide, and the pilot must give a read-back of the service. **The identification procedure does not imply that a radar service is being provided and the pilot must not assume that he is in receipt of an RAS or an RIS until the controller makes a positive statement to that effect.** If a controller is unable to provide a service he will inform the pilot.

3.3.2 Should the pilot fail to specify the type of service required, the controller will ask the pilot which service he requires before endeavouring to provide any service.

3.3.3 London Control - Requests for RAS or RIS

3.3.3.1 In order to avoid excessive RTF conversations on the frequencies used by 'London Control', pilots who intend to request such a service from 'London Control' are to make their initial request on the FIS frequency ('London Information') appropriate to their geographical position. The FIS controller will coordinate with the appropriate Radar Sector and subsequently inform the pilot whether or not an RAS or RIS can be provided and, if so, on what frequency.

3.3.3.2 Pilots should note that no RAS or RIS will be available on any London Control Frequency below FL 70. In any case a serviceable transponder will be a pre-requisite for either service.

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ABBREVIATIONS

AAIB	Aircraft accident investigation bureau
ACC	Area control centre
ADS-B	Automatic dependent surveillance - broadcast
AIP	Aeronautical information and publication
AIS	Aeronautical information services
AMSL	Above mean sea level
ANSP	Air navigation service provider
AOPA	Aircraft owners and pilots association
APW	Airspace proximity warning
ATC	Air traffic control
ATCO	Air traffic controller
ATM	Air traffic management
ATS	Air traffic services
ATSA	Air traffic service assistant
ATSU	Air traffic services unit
AWY	Airway
CAIT	Controlled airspace infringement tool
CAS	Controlled airspace
CPA	Closest point of approach
CPL	Commercial pilot licence
CTR	Control area
EC	European Commission
ETA	Estimated time of arrival
FIC	Flight information centre
FIR	Flight information region
FIS	Flight information services
FISO	Flight information service officer
GA	General aviation
GPS	Global positioning system
HDG	Heading
ICAO	International Civil Aviation Organization
IFR	Instrument flight rules
IMC	Instrument meteorological conditions
JAR	Joint Aviation Regulation

LARS	Lower airspace radar service
LCE	Local competence exam
MET	Meteorological information
NOTAM	Notice to airmen
PPL	Private pilot licence
PR	Primary radar
PRR	EUROCONTROL Performance Review Commission report
R/T	Radio telephony
RAS	Radar advisory service
RIS	Radar information service
TMA	Terminal control area
TSD	Traffic situation display
SARPs	Standards and recommended practices
SESAR	Single European Sky ATM Research
SSR	Secondary surveillance radar
STCA	Short term conflict alert
VFR	Visual flight rules
VRP	Visual reference point