European Action Plan for Airspace Infringement Risk Reduction

EAPAIRR - Version 2.0

CANSO

EUROCONTROL

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Introduction

Airspace infringement, also known as "unauthorised penetration of airspace" is a major operational hazard that can result from the division of airspace into different classes and structures, with their associated procedures and services, and its joint use by different categories of users, often with competing objectives and different operational requirements and capabilities.

Infringements are not rare events in busy European airspaces and, without prompt action by air traffic controllers and pilots, could result in a loss of separation, or even mid-air collision. Recognising the severity of this threat to aircraft operations and the need to ensure the safe use of airspace and sustainable development of commercial, military and general aviation in the short, medium and long term, the major aviation stakeholder groups in Europe agreed that coordinated actions should be taken to control this aviation risk. The launch of the Airspace Infringement Safety Improvement Initiative in 2006 provided the vehicle for achieving this goal.

The first Action Plan was initiated in 2006, and was the key deliverable of the European Airspace Infringement Initiative. This initiative delivered an action plan in 2009, presenting a set of safety improvement measures and provides guidance on how they can best be implemented. This action was partially adopted throughout the European Aviation Industry.
The plan was developed with the support of, and active contributions from, organisations representing the airspace users, service providers, regulatory and military authorities. Notable contributions were made by the International Council of Aircraft Owner and Pilot Associations (European region), Europe Air Sports, Association of European Airlines, International Air Transport Association, the European Commission and EUROCONTROL.

Ten years after that publication the issue of Airspace Infringements is still present, as is the associated risk. Many local and regional initiatives have been running for a number of years. These have resulted in the sharing of many best practices and have gone some way to reducing the risk slightly: but they have come nowhere near to eliminating it. With a further developed aviation industry which has seen increased traffic in both General Aviation and Commercial Aviation and flexible use of Airspace by the military, the environment has changed as well. Other developments like the evolution of Flight Information Service, 8.33khz implementation, development of surveillance and detection equipment, changes in airspace structure and activations and last but not least the rapidly increasing professional and recreational drone activities may have an impact on the risk as well.

All the aforementioned elements and the open ends to the questions, demand a renewed European Airspace Initiative. Again the ultimate goal is to develop a risk reduction action plan and support airspace users, civil and military service providers and national authorities in implementing the recommended safety improvement measures for the timeframe 2020-2030. CANSO and EUROCONTROL chair the initiative which draws on the expertise and close support of a working group of stakeholders.

The recommendations have been divided in 5 domains: Airspace Design (AD), ANSPs (ANSP), Airspace Users (AU), AIM & Meteorology (AIM) and Regulators (REG). The document is available in a full version and in booklets per domain, and is complemented by a list of implemented best practices by the contributing stakeholders.

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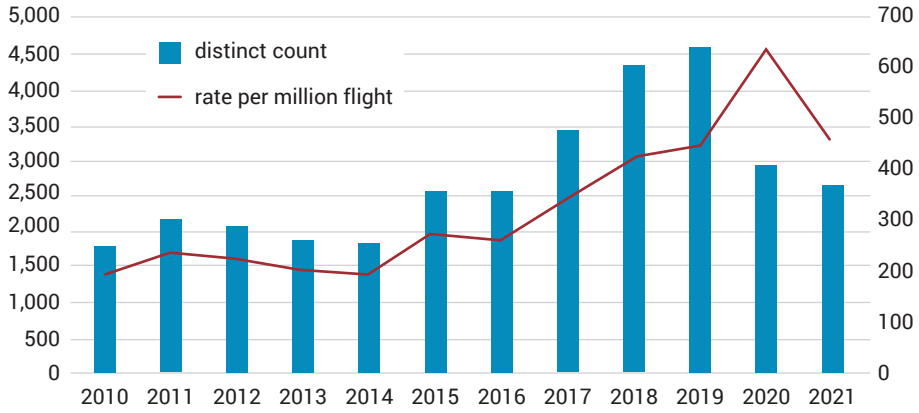
Scope and Justification

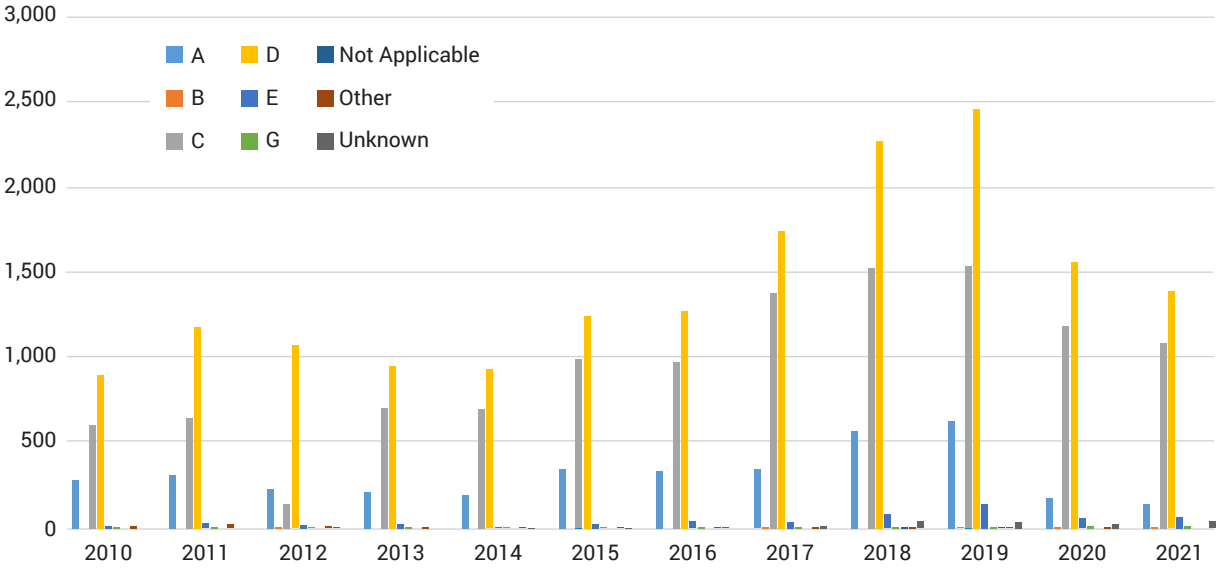
Tackling airspace infringements has been a high priority for many European ANSPs for almost two decades. Much time and energy has been expended in reducing the risk of a mid-air collision caused by an infringement. These actions have been successful in managing the risk to an extent, but leaves a lot of room for improvement. Data from the ECR (European Central Repository for Aviation accident and Incident Reports), retrieved by EASA, shows that during 2010-2021 there were over 32800 reported infringements in the EASA member states and the United Kingdom.

Airspace Infringement



EASA.(2022). Airspace Infringement, 2010-2021 [Graph]. European Central Repository for Aviation accident and Incident Reports.

Airspace Infringement occurences per airspace class



EASA.(2022).Airspace Infringement occurrence per airspace class, 2010-2021 [Graph]. European Central Repository for Aviatio accident and Incident Reports.

Despite the lower numbers in 2020 and 2021 due to the COVID-19 pandemic, this continues a trend that has been ongoing for nearly twenty years. It is worth reminding ourselves that the true risk of airspace infringements is higher than currently documented. Evidence from a number of EUROCONTROL and individual ANSP Safety Culture surveys, internal audits, and questionnaires shows that many ATCOs admit that they are less likely to report airspace infringements if, in their subjective opinion, the situation was not perceived as a major threat.

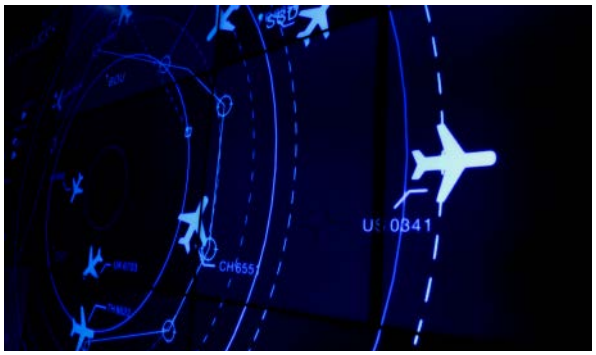
Analysis of the data available from a number of different sources shows some clear trends. The majority of infringement events happen in TMAs, CTRs, and CTZs: the majority involve GA pilots flying under VFR: the majority occur due to issues regarding navigation, planning, distraction in the cockpit, and/or difficulty dealing with unexpected or unfamiliar weather conditions.

The overall upward trend may be influenced by the increasing awareness of this type of risk and other improvements in the general reporting culture. However, a comparison with the evolution in the number of reported incidents assigned to other key risk areas (such as Separation minima infringement and Near CFIT) shows a particularly marked trend. It should also be noted that a number of States still do not report this category of safety occurrence.

The reporting of Airspace Infringements was made mandatory in 2017 under Regulation (EU) No 376/2014. It is likely that this has contributed to an increase in Airspace Infringement report since that time, although the precise impact is difficult to assess.

The data shown in figures 1 and 2 comes from the European Central Repository for Aviation accident and Incident Reports (ECR) and illustrates the infringement data for the subject period, as collected, analysed and reported by EASA. It must be recognised that different organisations, whether they are ANSPs, Regulators, National Authorities, or flying clubs, capture, analyse, assess, and report such data in a variety of ways and using a number of methodologies. This can and does lead to apparent variations between organisations in the absolute numbers of events, including airspace infringement events reported year-on-year. Nevertheless, the data published in this plan serves as an illustration of the continuing scale of the challenge faced in reducing the number and severity of airspace infringement events across Europe.

Focus on the Problem



Airspace infringements occur when an aircraft enters notified airspace without previously requesting and obtaining clearance from the controlling authority of that airspace or enters the airspace under conditions that were not contained in the clearance.

Notified Airspace includes controlled airspace structures in ICAO airspace classes A to E, such as Airways, Terminal Control Areas (TMAs), Control Zones (CTRs) or aerodrome traffic zones (ATZ) outside controlled airspace, as well as restricted airspaces, such as danger areas, restricted areas, prohibited areas and temporary segregated/reserved areas. Although VFR flights do not require clearance to enter Class E airspace, serious incidents have occurred between VFR and IFR flights in such airspace due largely to limitations in the "see-and-avoid" principle.

All classes of aircraft are prone to airspace infringement, but the majority of incidents recorded involve General Aviation (GA).

Airspace infringements create a significant safety risk. This safety risk often cannot be controlled by ATC. Many infringements result in losses of separation with commercial passenger-carrying aircraft, or inadequate separation where there is no prescribed separation. Furthermore, the disruption to the operation of the ATM system caused by airspace infringements is significant.

The three potential major consequences, which result from airspace infringements, are:

Mid-air collision:

The worst-case scenario. Only the collaboration of all aviation sectors can prevent this.

Loss of separation:

An infringement leading to loss of separation or close proximity of aircraft could have a number of consequences, e.g. loss of control due to wake vortex encounter, violent avoiding manoeuvres, and injuries to passengers or crew as a result.

Disruption to flight operations:

Especially in congested airspace there is potential for a significant increase in controller and pilot workload due to the need to break off an approach, change aircraft sequence for landing, or implement other contingency measures, as well as the resulting R/T congestion.

The most commonly infringed airspace structures are Terminal Manoeuvring Areas (TMAs) and airport Control Zones (CTRs). The majority of infringements occur during level flight by the infringing aircraft rather than on departure or approach. Airspace infringements are caused by a range of user types, including OAT (Operational Air Traffic) and commercial air transport. However, analysis of the incidents reported by European ANSPs clearly indicates the majority of infringements are committed by GA VFR flights, although there is some local variation due partly to variations in local airspace and rules.

There is also an increasing incidence of airspace infringement by unmanned aerial vehicles (UAVs), commonly referred to as drones. UAV use is currently limited compared to future predicted usage. The rapidly expanding UAV market – especially the potentially overwhelming increase in the use of UAVs for commercial logistics, delivery and taxi flights – means that actions to manage the safety risk of airspace infringement must also take into account the emerging UAV phenomenon. However, because of the emerging nature of the UAV phenomenon it is not possible to assess the potential impact of their use on Airspace Infringement risk. Therefore, because of the projected timescales involved in the current EAPAIRR project, drones and UAVs will be treated as out of scope.

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How to use this action plan

The safety recommendations and best practices in this action plan are arranged in tables for each of the following groups of action owners:

AD Airspace Design
ANSP Air navigation service (including FIS) providers
AU Airspace Users (civil and military)
AIM AIM and MET services providers
REG Regulatory authorities (national and supranational)

Some of these action owner groups may be included in one organisational entity. For example, the provision of AIS or MET services may fall within or outside the responsibility of the ANSP (civil or military), but all entities providing such services should consider that list of actions.

Not all actions are phrased in precise terms as measurable achievements that can be 'ticked off' when completed. Some are, intentionally, phrased in more general terms - such as 'improve' or 'harmonise'. This recognises that some actions are matters of degree and that there should be flexibility for action owners to decide how far they need to go, in line with their particular operational context and safety needs. It is acknowledged that different action owners will start from different positions.

While airspace infringement is an important operational risk across much of Europe, the nature and scale of the problem varies between States. The complexity of the airspace structure, the scale of military flying activity, the scale and maturity of both commercial and general aviation sectors, the scope and nature of air traffic service provision and State's regulatory and legislative frameworks are the factors which will shape the local airspace infringement risk reduction strategies and determine the most appropriate and effective actions to be taken by individual States. Therefore the number of Action Plan recommendations that can be implemented is likely to differ from State to State.

National authorities should play the leading role in establishing and promoting local implementation priorities and actions in consultation with airspace users and service provider organisations.

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Monitoring of recommendations

Since almost 30 year ago, EUROCONTROL provides support to the ATM community in planning and reporting their progress on implementing the European ATM Master Plan Level 3 (also known as the European Single Sky ImPlementation, ESSIP).

Every year, EUROCONTROL takes stock of where each one of the ECAC States (and Comprehensive Agreement States) is in terms of implementing the ATM Master Plan (Level 3). The results of this reporting exercise are compiled in a set of Local Single Sky ImPlementation (LSSIP) documents. The LSSIP documents then feed into the annual European ATM Master Plan Level 3 Progress Report. This Implementation Report, together with the Implementation Plan, constitute the 'implementation view' or Level 3 of the European ATM Master Plan.

The Level 3 of the ATM Master Plan addresses the deployment towards operational implementation, therefore focusing on the plans for 5 to 7 years ahead.

The Master Plan Level 3 planning and reporting process:

- provides a comprehensive picture of the implementation of the Single European Sky package across the ECAC States;
- helps align the performance of State plans with the evolution of ATM;
- ensures that EUR Region States report to ICAO about their progress on the Global Air Navigation Plan (GANP) ASBU modules;
- Contributes to the alignment between States at the policy level of SESAR deployment.

Therefore, the EAPAIRR 2.0 is expected to be part of the reporting cycle detailed above as a new Implementation Objective starting on ATM Master Plan Level 3 Implementation Plan Edition 2022, and in alignment with the rest of the Single European Sky improvement actions to the overall European ATM system.

EAPAIRR v2.0
Recommendations

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Airspace Design

REF	Recommendation	Rationale
AD1	The design principles should encompass the safety, environmental and operational criteria, and the strategic policy objectives that the change sponsor seeks to achieve in developing the airspace change proposal.	Design principles must be set through a two-way process and involve effective engagement. The change proposal should include the maintenance of a high level of safety and avoid overflying densely populated areas where possible. The proposal should also include other design principles that reflect local considerations or impacts on other airspace users so that they are considered as part of the design process. The development of these design principles can be undertaken by the change sponsor without additional engagement. All design options will need to demonstrate how they meet (or don't meet) the design principles. The design principles should consider U-Space and UAS operations.
AD2	Any change must be transparent and involve stakeholder engagement throughout the entire process.	Those potentially affected by a change in airspace design should feel confident that their voice has a formal place in the process if trust is not to be eroded. Openness also allows change sponsors to see more clearly what is expected from them. The change should include assessing the impact of airspace changes on certified navigation systems and apps.
AD3	Maintain and enhance safety by design	States should perform an assessment of the impact of airspace complexity on the workload for all affected airspace users and publish the results of an agreed objective measurement either for each airspace change or at regular intervals.
AD4	Where possible, design airspace boundaries with ground features that are not susceptible to significant change, and do not delimit airspace by national borders	Features such as roads, railways and major topographical features aid navigation and situational awareness. This is less true of towns, cities, and industrial parks as they grow with economic expansion.
AD5	Where new airspace is established provision should be made for ATS outside of controlled airspace to facilitate airspace infringement prevention. See also recommendation ANSP8	ATS should provide airspace infringement warning and navigational assistance.
AD6	The design should be as simple as possible to avoid confusion or pilot overload in interpreting the airspace.	Complex airspace with multiple CTAs or differing levels and complex shapes are inherent airspace infringement hot spots. The design should consider adjacent controlled airspaces to avoid creating narrow corridors that increase funnelling and risk of airspace infringement and mid-air collision.
AD7	Base levels of CTA should be as high as possible to allow containment of SIDs and STARs but also elevate lower limits of TMAs where possible.	Enable the retention of as much uncontrolled airspace as possible.
AD8	National authorities should play the leading role in establishing and promoting local implementation priorities and actions in consultation with airspace users and service provider organisations.	While airspace infringement is an important operational risk across much of Europe, the nature and scale of the problem varies between States. There are several key factors which will shape the local airspace infringement risk reduction strategies. These will determine the most appropriate and effective actions to be taken by individual States. These are: the complexity of the airspace structure; the scale of military flying activity; the scale and maturity of both commercial and general aviation sectors; the scope and nature of air traffic service provision; and the State's regulatory and legislative frameworks. Therefore, the number of Action Plan recommendations that can be implemented is likely to vary from State to State.

REF	Recommendation	Rationale
AD9	Review the controlled airspace structure and simplify boundaries where possible.	A safety assessment must be made for all changes at the functional system level with regard to the Airspace Structure. This action is particularly relevant to areas of dense VFR traffic. It should aim to simplify, where possible, the numerous boundary level changes of TMAs and CTRs that can contribute to vertical navigation error. It should also aim to ensure the protection of the IFR traffic established on the extended runway centreline and within 15 NM from the runway threshold from nearby uncontrolled VFR traffic. This would reduce the number of operationally unnecessary RAs generated by TCAS. Alignment of the <FL195 airspace structure, boundaries and of ATS routes for VFR flights (hereinafter referred to VFR routes) with prominent ground features and landmarks should be sought to make them more easily identifiable by pilots during flights. The review should be informed by identification of hot spots based on the analysis of incident reports (e.g. airspace infringements) or other appropriate methods. Automated tools may also be used to plot actual flight tracks in a particular area onto the existing airspace structures in order to identify potential inconsistencies in the design of protected (controlled) airspaces. Such methods will also facilitate the identification of under-utilised portions of controlled or restricted airspaces that may be released for use by GA VFR flights. This action concerns ANSPs that have been delegated the responsibility of developing and implementing changes to the airspace organisation subject to the approval of the National authorities.
AD10	Harmonise airspace classification below FL195 in line with the strategic airspace design principles.	An appropriate strategic design of the airspace is crucial in permitting the ATM System to provide the right services, at the right time and in the right places decreasing routine tasks and the requirement for tactical intervention. Harmonisation of airspace classification below FL195 should be based on the ICAO-defined airspace classes. It should aim for the establishment of common vertical limits, as far as practicable. It should also include harmonised application of associated rules, procedures, and air traffic services. It is highly recommended deploying airspace structures that provide a greater degree of strategic de-confliction with particular consideration of cross-border operations. The EUROCONTROL Agency should support and facilitate the harmonisation efforts of the Member States within the framework of the existing EATM working arrangements (NETOPS and sub-groups) providing the required expertise, and in line with the approved Strategic Guidance in support of the execution of the European ATM Master Plan and SES regulations.
AD11	Eliminate class A from TMAs and airspace below FL195 wherever and whenever possible.	This increases the availability of airspace for General Aviation while providing a more tailored approach to retaining the necessary controlled airspace for commercial flights to operate.
AD12	Resize CTRs and TMAs on a case-by-case basis, especially at lower levels.	This increases the availability of airspace for General Aviation while providing a more tailored approach to retaining the necessary controlled airspace for commercial flights to operate.
AD13	Create VFR routes in the CTRs if they are deemed beneficial in accordance with the needs of all stakeholders in this area.	This may lead to a more predictable traffic behaviour for both pilots and controllers, with routes between easily identifiable points.
AD14	Resize special activities airspace to limit them to the minimum required and restrict their activation to what is strictly necessary. Eliminate those areas/zones that are no longer needed.	This increases the availability of airspace for General Aviation and reduces the frequency of 'technical' airspace infringements, i.e., those 'infringements' where the airspace is notified as restricted but eventually no activity is taking place in it. This concerns: Prohibited, Restricted and Danger Areas Military Exercise Area, Military Training Area, Air Defence Identification Zone (ADIZ), Cross-Border Area (CBA), Temporary Reserved Area (TRA), Temporary Segregated Area (TSA) Flight plan Buffer Zone (FBZ)

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ANSPs

REF	Recommendation	Rationale
ANSP1	Ensure ATCO and FISO communication skills and discipline is included in FIS training and licensing/certification. See also recommendation AU8	This action reinforces the objectives and provisions of the Action Plan for Air Ground Communications, focusing on the aspects that are of particular importance in the communication exchange between ATS units and VFR flights. ATS staff should be trained to: Strictly apply the readback/hearback procedure; Actively seek confirmation in case of doubt; Use unambiguous call-signs - full call-sign or call-sign coupled with type of aircraft; Use published reference points in ATS messages to pilots as far as possible; Use simple ATC clearances and instructions; Use more concise transmissions, if necessary broken into shorter segments; Use reduced rate of speech and better articulation when talking to VFR pilots; Issue pre-warning of instructions to be passed; Provide FIS in English language; Acquire adequate knowledge of and apply communication failure procedures as required. Improve and harmonise FISO training curriculum. The training curriculum should be improved to adequately match the level of service to be provided. FIC staff should receive dedicated training to improve their awareness and understanding of VFR flights' needs, specificities, and light aircraft performances. Best practices already exist (e.g., in Germany) to deliver emergency situation training to FIC staff and VFR pilots in a coordinated manner. A sufficient number of FIC staff should be made available to support the provision of enhanced FIS. A number of ATS providers have already implemented dedicated training programmes for staff that become redundant or underutilised due to the increasing automation of ATS provision (e.g., implementation of OLDI). See also 6.20 and 6.23 above. Add familiarization basic training for: ATCO and FISO in training meetings; for Pilots at ATC/FIS Centres.
ANSP2	Implement a properly tuned Area Proximity Warning function.	The objective is to implement an automated safety net function that should systematically alert controllers of airspace infringements, i.e., of unauthorised entries into controlled and restricted airspaces. Implementation decision should be based on positive cost-benefit-analysis and safety assessment. Area Proximity Warning (APW) is a ground-based safety net intended to warn the controller of unauthorised penetration into an airspace volume by generating, in a timely manner, an alert of a potential or actual infringement. Use APW Safety net data to highlight "hotspots" where potential or actual airspace infringements have occurred. This can in turn be used to focus work on airspace infringement causes and mitigations This can also be used for the investigation of the causes of the potential airspace infringements and later for the mitigations. It is recommended that a survey is undertaken to determine the relevant implementation of this function and its effectiveness.
ANSP3	Establish a platform to discuss procedures, incidents and hotspots between aerodromes, local ATS units and flying clubs. See also recommendation AU7.	This action aims to establish standard coordination procedures between closely located ATS units, military, and user sites. The implementation of such procedures will reduce the volume of routine coordination, and thus controller and pilot workload. The FUA concept implementation work should also take account of the specific needs of the GA VFR flights with regard to the timely dissemination of information about the activation/deactivation of reserved airspaces (including those for glider activity). Implementation of (direct) communication lines or means between local ATS units, military units and GA airports/airfields should be considered in this respect. The implementation of the above referred coordination procedures, which would enhance the FUA procedures in <FL195 airspace at local level, should be preceded by careful safety assessment Establish Local Airspace Infringement Teams (LAITs) to be run by the airspace owner. Participants should be included from ANSP's, airspace users (GA, CA and MA), local airports and regulators. Provide more general information on hotspots and ways of communication.

REF	Recommendation	Rationale
ANSP4	The ANSP & Regulator should establish a procedure to provide feedback on individual incidents to the 'Airspace Infringer'.	Set up a process to allow direct access to individual pilots to acquire the relevant information immediately after an incident. Be aware that information provided «right after an incident» may not be sufficiently considered. It is useful to have information as soon as possible in order to avoid repeated mistakes if the infringer continues operating. However, all parties should assess whether the completeness of the available information might risk cancelling out the advantages brought by immediate access to the pilot. This direct process should respect Just Culture principles to avoid any negative consequences e.g., TXPD off. Anonymous ways of providing the relevant safety information could be considered.
ANSP5	Enhance and harmonise FIS provision to VFR flights	Harmonisation of FIS provided to VFR flights should be based on European IRs/AMCs/GMs, ICAO SARPs and existing best practices. Examples of best practices are thus the Low Airspace Radar Service provided in UK airspace and the radar information services provided in German airspace. Radar-derived information available at ATS units should be used to enhance the information passed to pilots. It should include, as appropriate, navigational assistance, coordination of controlled airspace entry/crossing clearance, passing traffic information and information about restricted airspace activation/deactivation and concerned traffic, as well as provision of other aeronautical information and information about potentially hazardous conditions. The service could include provision of warnings to pilots of any unfavourable factors including airspace infringement and traffic warnings. FIS "level" could be raised to enable proactive prevention of potential conflict situations. The scope of this action should include the harmonisation of services provided by civil and military FIS provider organisations. Provision of FIS across Europe is not consistent. There are good reasons for different levels of service provision under FIS. Level of service is a decision that rests with the state. As long as the service meets the minimum required by the state then the state is deemed compliant. At the moment there are no ongoing initiatives to harmonise FIS at the European level. EASA is waiting for the implementation of Part ATS and will review this later to see if any further action is needed. The principles and fundamentals of provision of FIS are established in Commission Implementing Regulation No. 923/2012. The upcoming PART-ATS which will be included in Commission Implementing Regulation 2017/373, will further detail the specific technical requirements for FIS and provide harmonization to the suitable extent. Based on the implementation feedback, consideration for further refinement of existing FIS provision could be undertaken.
ANSP6	Review the controlled airspace structure and simplify boundaries where possible	This action is particularly relevant to areas of dense VFR traffic. It should aim to simplify, where possible, the numerous boundary level changes of TMAs and CTRs that can contribute to vertical navigation error. It should also aim to ensure the reliable protection of the IFR traffic established on the extended runway centreline and within 15 NM from the runway threshold from the nearby VFR traffic. This would reduce the number of operationally unnecessary RAs generated by TCAS. Alignment of <FL195 airspace structure boundaries and of VFR routes (corridors) with prominent ground features and landmarks should be sought to make them more easily identifiable by pilots during flights. The review should be informed by identification of hot spots based on the analysis of incident reports (e.g. airspace infringements) or other appropriate methods. Automated tools may also be used to plot actual flight tracks in a particular area onto the existing airspace structures in order to identify potential inconsistencies in the design of protected (controlled) airspaces. Such methods will also facilitate the identification of underutilised portions of controlled or restricted airspaces that may be released for use by GA VFR flights. This action concerns ANSPs that have been delegated the responsibility of developing and implementing changes to the airspace organisation subject to the approval of the National authorities. Introduce, where necessary, standard VFR entry, exit and crossing procedures and/or routes in busy controlled airspaces. Meet with relevant stakeholders for review of proposals, e.g., Airlines, ANSP's, GA, etc. Add the promotion of implementing VFR routes/corridors in controlled airspace – if they are deemed beneficial – where simplification is not possible.

REF	Recommendation	Rationale
ANSP7	Facilitate the exchange of information and operational experience between ATCOs/FISOs and pilots at local level.	"Open doors days" at ATS units and familiarisation visits by ATS staff to flying clubs and military sites should improve the understanding of each other's operational needs, capabilities, and concerns. ATS staff will improve their awareness of single-pilot aircraft operation (pilot workload, limits, priorities, etc.) and mission/training requirements (for military). Pilots will improve their knowledge of controllers' tasks, ways of working and the assistance that may be provided to them by ATS. Other approaches that could be adopted are dedicated safety seminars with the participation of all airspace user types, service provider organisations and regulatory authorities, or periodic safety analyses (e.g., bi-annual) of the common use of airspace. Pilot associations and flying clubs could play a role in improving the interface with ATC. Knowledge exchange programmes should include pilots with different experience from the various type of operations, e.g., pilots of light aircraft, gliders, helicopters, etc.
ANSP8	Ensure adequate Radio and Surveillance data coverage in the airspace where FIS is provided. See also recommendation AD5	Review and improve, if necessary, the low-level radio coverage in particular around CTRs/TMAs and of airspaces containing high density VFR routes and choke points. Some receiver/transmitter sites, built for IFR traffic, may not be appropriate for FIS provision due to the terrain. Subject to availability, the number of ATS frequencies for the provision of FIS in busy areas may need to be reviewed and increased to ensure the required quality of service provision and better controlled airspace protection. There are new and increasing options available in non-radar surveillance available, e.g. Non-cooperative Radar Air Target Identification radar detection, ADS-B, multi-static primary, RadNet etc.
ANSP9	For VFR traffic in uncontrolled airspace, transfer services from ATC sectors to dedicated FIS positions at ACCs, Mil centres or aerodromes.	The objective is to ensure provision of FIS from dedicated positions that will not reduce the level of service to VFR flights when there is a high level of IFR traffic in the airspace assigned to the ATC sector(s). Procedures may be established for the delegation of services to VFR flights in class E airspace from the control sectors to FIC, if appropriate and depending on the specific operational environment and regulatory framework. The aim should always be to have a dedicated FIS position at an ACC ideally with a Surveillance display, including offshore services.
ANSP10	Include a dedicated and harmonised VFR services training module in ATCO/FISO training curriculum.	The objective is to ensure that ATS staff: Are aware of the different levels of training and experience of PPL holders, military, and airline pilots: • Have improved knowledge of light aircraft, ultra-light, gliders and balloons and their performance characteristics, which will ensure correct understanding and communication with GA pilots. (ATS/FIC controllers should be trained to ask, not to assume). • Are familiar with the cockpit workload of VFR flights (mostly single-pilot operated aircraft) in the various conditions and flight phases. • Are aware of the fact that a VFR GA flight might not be able to follow the clearance due to the need to stay in VMC. Inclusion of dedicated limited training in VFR flying may be considered. It will improve ATCO/FISO understanding of VFR flying
ANSP11	Optimise SSR code assignment procedures to make best use of transponders' MODE-S, MODE A/C data and other surveillance methods, e.g., ADS-B, etc.	Better utilisation of SSR codes can assist in the identification of traffic in congested airspace. Existing best practices should be applied as widely as possible. For example, a "FIR or AC 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. MODE-S data, and ADS-B are all useful tools for reducing the risk of airspace (and even separation) infringements by increasing the controller's ability to monitor and anticipate aircraft intentions. Implementing Frequency Monitoring SSR codes would identify that the aircraft is listening on their frequency should the ATCO/FISO wish to call them. It is specifically valuable for aircraft operating outside of a busy CTR. Other examples are: implementation of mandatory transponder areas or zones (e.g., at and above a certain altitude or flight level); SSR codes and frequency coupling; GA single event codes; dedicated codes for VFR routes etc.

REF	Recommendation	Rationale
ANSP12	Improve tactical coordination procedures between adjacent civil/military control units.	Improved civil - military coordination (ASM level 3) will enable: The provision of up-to-date, correct information to all flights about current airspace restrictions and their use; Timely action by the controllers/officers (in the control units concerned) in the case of imminent or actual infringement of controlled or restricted airspace to reduce the severity of the possible consequences. Implementation of this action should be considered within the scope of efforts for further enhancement of the FUA concept.
ANSP13	Early provision of weather data to assist GA pilots in avoiding adverse weather in accordance with SERA.9005.	Additional navigation support should be provided to VFR flights in compliance with ICAO Doc 4444 PANS-ATM, section 15.4.1 "Strayed VFR flights and VFR flights encountering adverse meteorological conditions" in order to help pilots avoid flying into meteorological conditions not conforming with the required minima Technology now allows for data uplink with weather information directly to the aircraft, although it should be noted that this kind of ADS-B is not yet mandated in Europe. The requirement to provide relevant weather information as part of the FIS is already included in SERA.9005, without specifying the means of transmission. An EASA Best Intervention Strategy to promote existing methods to facilitate the availability of weather information to pilots (CA and GA) in flight is being developed and will be submitted to stakeholders for consultation.
ANSP14	Promote the use of SSR and/or radio mandatory airspace in the vicinity of busy and/or complex controlled airspace.	The objective of this action is to ensure the protection of high-density controlled airspaces, like busy TMAs and CTRs. Implementation decisions should be taken following analysis of safety data and records. It should be noted that establishing mandatory R/T buffer zone may not always be possible. Indeed, the feasibility of implementing such buffer airspace depends on the typology of adjacent airspace (continuous controlled airspace, military airspace, etc.) and relevant consultation with other stakeholders and airspace users. Implementation of mandatory R/T buffer zones should also include a review of existing «buffer airspace» at the TMA or CTR boundaries and corresponding optimisation of such airspace to the necessary minimum due to the additional protection provided by the R/T buffer zone. A possible implementation may include tracking all flights operating within a certain range of the controlled airspace in question. Depending on the operational need a minimum altitude/level above which the requirement will be applicable may be defined. Since radio communication is not required in class G airspace, an alternative means of reducing the probability of severe airspace infringement incidents occurring is to require GA flights to maintain listening watch on 121.5 MHz, except when in contact with an ATS unit. This would help ATC contact an airspace infringing aircraft early enough to prevent the infringement from evolving into high-risk incident. A potential solution for a buffer is the use of Transponder Mandatory Zones around/below Controlled Airspace, with a co-located Radio Mandatory Zone.

REF	Recommendation	Rationale
ANSP15	Harmonise the requirements for the provision of FIS and licensing of ATCOs/ FISOs, including: a harmonised FISO training curriculum and improved communication training of FISOs.	Improve and harmonise FISO training curriculum. Training curriculum should be improved to adequately match the level of service to be provided. FIC staff should receive dedicated training improving their awareness and understanding of the VFR flights' needs, specialties, and light aircraft performance characteristics. Best practices already exist to deliver emergency situation training to FIC staff and VFR pilots in a coordinated manner. Enough FIC staff should be made available to support the provision of enhanced FIS. Several ATS providers have already implemented dedicated training programmes for staff that become redundant or underutilised due to the increasing automation of ATS provision. This action reinforces the objectives and provisions of the Action Plan for Air Ground Communications, focusing on the aspects that are of particular importance in the communication exchange between ATS units and VFR flights. ATS staff should be trained to: Strictly apply the readback/hearback procedure; Actively seek confirmation in case of doubt; Use unambiguous call-signs - full call-sign or call-sign coupled with type of aircraft; Use published reference points in ATS messages to pilots, to the extent possible; Use simple ATC clearances and instructions; Use more concise transmissions, if necessary broken in segments; Use reduced rate of speech when talking to VFR pilots; Issue pre-warning of instructions to be passed; Provide FIS in English language; Acquire adequate knowledge of and apply communication failure procedures as required Harmonisation of FIS provided to VFR flights should be based on European IRs/AMCs/GMs, ICAO recommendations and existing best practices. Examples of best practices are i.e the Low Airspace Radar Service provided in UK airspace and the radar information services provided in German airspace. Radar-derived information available at ATS units should be used to enhance the information passed to pilots. It should include, as appropriate, navigational assistance, coordination of controlled airspace entry/crossing clearance, passing traffic information and information about restricted airspace activation/deactivation and concerned traffic, as well as provision of other aeronautical information and information about potentially hazardous conditions. The service could include provision of warnings to pilots of any unfavourable factors including airspace infringement and traffic warnings. FIS level could be raised to enable proactive prevention of potential conflict situations. The scope of this action should include the harmonisation of services provided by civil and military FIS provider organisations. In some states, this is believed to be urgently required, including the provision of FIS with Surveillance data by FIS staff (not ATC).
ANSP16	Ensure all MORs are timely and comprehensive to enable review/ investigation and collation of causal factors.	This is particularly important in states where there is post-infringement communication between the ANSP and the pilot. Timely reporting and investigation allow for greater accuracy in causal factor identification when recollections are fresh in the memories of all parties.

EAPAIRR

Airspace Users

REF	Recommendation	Rationale
AU1	Enhance pilot proficiency checks beyond simple aircraft handling to include navigation and R/T communication skills check	Pilot proficiency checks should include verification and assessment of navigation and R/T communication skills. The verification of air-ground communication skills could include typical scenarios of air-ground communication exchange, such as requesting clearance to cross controlled airspace. It is important that the check is planned and carried out in the form of a learning exercise, not just a test. Proficiency checks should be included in the licensing schemes for PPL and glider pilot licenses.
AU2	Improve pilot awareness of airspace infringement risk.	Airspace user organisations should organise and encourage member participation at safety seminars and other events aimed to improve pilot awareness of airspace infringement risk. Internet fora should also be considered. Examples of good practice are the flight safety seminars, "Open Day's", booths on trade fairs organised by national AOPAs, ANSPs and CAAs. Awareness materials, such as posters, leaflets, safety letters produced by international and national organisations and authorities can be used directly or adapted according to local needs. Improve communication strategies to raise awareness for pilots. Publish real airspace infringement cases to create awareness. Split the objective from the means of communication. Establish Local Airspace Infringement Teams (LAITs) to be run by the airspace owner. Participants should be included from ANSP's, airspace users (GA, CA and MA), local airports and regulators. Provide more general information on hotspots and ways of communication.
AU3	Contact FIS when it's available.	In some states a dedicated FIS is available and capable of providing the appropriate flight information to help pilots with many aspects of flight, including the avoidance of airspace infringement. Give consideration to who is the most suitable air traffic unit to contact.
AU4	Regularly update GPS systems' database.	GA organisations and establishments should encourage their members, the owners, and operators (pilots) of GA aircraft to regularly update the database of the GPS systems used as navigation support means during VFR operations. The recommendation is relevant to both hand-held GPS receivers and those permanently installed on the aircraft. Reminders could be issued to pilots in case of planned implementation of considerable airspace changes. The database update procedure should also include verification of the parity between the GPS database and the VFR en-route chart(s) used during flight. The 28-day cycle for aeronautical information publication used by most GPS manufacturers and database providers need be considered in this respect. The GPS manufacturers and database providers should be asked to support this effort. They have the opportunity to provide regular notifications to the users of their services to download the relevant data upon update. Data providers have the opportunity to assist in this regard by providing data in a format that is easy to use for GPS manufacturers.
AU5	Improve pre-flight briefing capabilities	This action is designed to improve the pre-flight preparation of pilots. It calls for improvements to capabilities of existing briefing facilities and the implementation of new facilities, where they do not exist at the various GA locations, for example at flying clubs. Cooperation with the AIS and MET service providers (or ANSPs) is essential for successful implementation of this action. Support from the regulatory authorities should be sought and obtained. A typical briefing facility available at flying clubs should include provision of aeronautical and meteorological information, but also support the filing and submission of flight plans by means of PC's, information screens and Wi-Fi availability for access with personal devices. Remote access of members to the briefing facility should be ensured.

REF	Recommendation	Rationale (for chapter 4, GM)
AU6	Incentivise innovative training for GA pilots	Refresher training should be designed to achieve and maintain an adequate level of navigation and communication skills by all PPL holders. GA organisations, flying clubs and schools should offer such training courses to private pilots. Refresher training should be provided for all PPL types and include glider pilots as well. Refresher courses are considered of particular importance for recreational pilots, but this is relevant to the GA pilots in general. Implementation of refresher training every two years appears to be reasonable for PPL holders. Pilots should be encouraged to be aware of their own training needs. A refresher might involve a one-hour flight with an instructor including pre-flight paperwork. Flying clubs should ensure additional training opportunities for 'low-hours' pilots. Rallies and cross-country tours are an example of good practice implemented by many flying clubs. The communication training may be based on typical scenarios of R/T exchange and associated basic radio discipline rules (e.g.: think what you are going to say before pressing the button; keep transmissions clear and concise; listen before talking on the frequency, etc.).
AU7	Implement knowledge exchange programs between ATCOs/FISOs and Airspace Users. See also recommendation ANSP3	The knowledge exchange programmes should aim to support controllers and pilots in sharing their knowledge of airspace and aircraft, improve understanding of each other's needs, limitations, and way of working. Programmes should include pilots with different experience, e.g., pilots of light aircraft, gliders pilots, helicopters, etc. Such knowledge exchange programmes should be organised at local level in order to maximise effectiveness. Meeting events should be held at the flying schools and clubs and ATS facilities. Pilots' associations and flying clubs should play an essential role for improvement of the interface to ATC. Establish Local Airspace Infringement Teams (LAITs) to be run by the airspace owner. Participants should be included from ANSP's, airspace users (GA, CA and MA), local airports and regulators. Provide more general information on hotspots and ways of communication.
AU8	Review private pilots' initial training content and ensure there is improved R/T training coverage. See also recommendation ANSP1	Private pilots should be taught to: Use unambiguous call-signs - full call-sign or call-sign coupled with type of aircraft; Contact ATS for assistance in complex situations (e.g. unsure of position); Actively seek confirmation in case of doubt; Strictly apply the readback/hearback procedure; Use 121.5 MHz in complex/unusual and emergency situations if not in contact with an ATS unit on another frequency; Adhere to communication failure procedures; Use standard phraseology in English for essential air-ground communication exchanges, like clearance requests. The training course should include practicing R/T skills for the most common R/T exchange scenarios, like crossing controlled airspace, reporting basic flight plan data, and requesting information. This recommendation is also applicable to ULM pilots whose training and licensing are not covered by the EASA regulations.
AU9	Ensure adequate proficiency of flight instructors in terms of navigation and R/T skills	The navigation and communication skills requirements for flight instructors should be reviewed and updated, as needed, to meet the training syllabus needs. The risk awareness of instructors at flying schools should be raised through dedicated workshops, safety seminars and publications. Support from the regulatory authorities should be sought and obtained.
AU10	Promote extended flight corridor and alternate route planning for VFR flights	Promote awareness of the need and encourage private pilots to plan alternative/secondary routes to be flown in the event of unexpected/unforeseen circumstances, e.g., clearance to cross controlled airspace is refused, weather changes occurring faster than predicted, etc.

EAPAIRR

AIM/MET

REF	Recommendation	Rationale
AIM1	Examine ways of making AIS available to pilots, with real-time information, in a format that is suitable for handheld devices.	Real-time AIS information increases the situational awareness of the pilot. By providing ways to have this information available in the cockpit, activation of various types of special airspace and other NOTAMs can be pushed by the software. Careful and thorough flight preparation is still key to a safe flight execution, tools like this will help to reduce the risk of airspace infringements.
AIM2	Standardise (harmonise) VFR en-route charts.	Improved VFR publications will contribute to better IFR traffic protection. Standardisation of VFR en-route charts is considered the highest priority. The products provided by commercial sources (different from the State AIS organisations) should be considered within the scope of this standardisation effort. There must be a standard representation of airspace to prevent confusion in cross-border flights. Compliance with and common interpretation of ICAO Annex 4 requirements needs to be achieved. This includes common map layout conventions, consistent use of colour coding, symbols etc. High priority should be assigned to the standardisation of the most commonly used ICAO VFR chart (1:500 000). The action aims to improve the readability and simplify VFR en-route charts as much as possible. Only information relevant to VFR flights should be printed. There are instances of VFR en-route charts saturated by the volume of printed information. It takes the pilot too long to consult during flight and may lead to distraction. However, simplification should not lead to loss of important features. The clarity of frequency information should be improved. Frequencies should be indicated clearly on electronic and paper maps, allowing easy reference by pilots during flights. Harmonisation may include a review of needs and an agreement to publish charts with more appropriate scales (e.g., 1:250 000) for local flights. Harmonisation of VFR AIPs (manuals) should also be considered. The involvement of GA representatives in such reviews and in the process of VFR publications' standardisation is essential. The EUROCONTROL Agency should support and coordinate AIS providers' chart harmonisation efforts through the existing working arrangements.
AIM3	Investigate the feasibility of providing aeronautical information free of charge for GA.	The action aims to make aeronautical and MET information, that is relevant to airspace and airports/airfields open to VFR flights, freely available to the GA VFR flying community. This would reduce the probability of inadequate pre-flight preparation. For example, VFR en-route charts should be freely accessible and downloadable via internet from the service provider sites. There is a need for a dedicated study to identify what kind of information will bring the highest benefit to the users of the concerned airspace. EUROCONTROL, national authorities and AIS service providers should support GA establishments in their efforts to improve the briefing facilities on airfields (for example feeding them with the relevant aeronautical data, making necessary HW/SW available, etc.). A variety of solutions and business models (or combinations thereof) could be considered in this context. For instance, the service provision cost could be recovered through license fees or public (state or European Community) funds. The development of the SES2 package offers an opportunity to support the implementation of a high quality and «publicly accessible» AIS portal.
AIM4	Provide and enhance on-line (web-based) accessibility of aeronautical information services	NOTAMs, maps, charts, and current weather information should be made easily accessible at the service provider websites. Dedicated pages for GA VFR flights that provide access to all information needed for a flight could be designed. Visualisation of information should be improved: it should be user-friendly and intuitively comprehensible. The mechanisms, processes and means for delivery of the actual airspace structures' status to users (in particular GA) should be reviewed and optimised. Online AIS provision should not totally replace the traditional methods. Pilots should be provided with the option to obtain pre-flight briefing materials in hard copy or to contact the appropriate briefing office whichever is the preferred method of preparing for the flight.

REF	Recommendation	Rationale
AIM5	Harmonise, enhance, and classify AIS provision to VFR flights and promote classification rules and usage of keywords.	The implementation of this action should include: Provision of dedicated VFR sections in the AIPs or VFR AIPs (manuals); Provision of up-to-date VFR charts; Implementation of a user-friendly NOTAM system for VFR flights. The NOTAM briefing facilities should provide for: Graphical visualisation of information about changes to airspace structures and activation/deactivation of restricted airspaces; Narrow route briefing for (long distance) route flights; NOTAM selection and prioritisation tool; Grouping NOTAMs by topic. Enabling the generation of briefing packages tailored to the needs of the various user types may be considered (e.g., a glider pilot would need different information to a pilot planning a cross country flight). In case of generation of NOTAM update packages, the type of users the update is intended for should be taken into account (e.g., GA VFR flight). It would be desirable to include a short summary outlining the changes in traffic schemes and airspace. The readability of NOTAMs and other publications (AIC) of potential interest to VFR flights should be improved using plain language rather than encoded text where possible. The names of towns, villages and other well-known geographic notions should be used instead of coordinates, which most of pilots cannot use in-flight. In the case of military ATS providers, the airspace status information should be made available to the units providing services to the VFR flights. Military controllers should pass this information to concerned flights which maintain radio contact. In cases where FIS is provided by a civil entity, the airspace status information should be made available according to the implemented FUA procedures. Concerned FIC(s) may be informed directly or through the responsible FUA structures.
AIM6	Improve availability of and access to VFR en-route charts and dissemination of updates to pilots.	Both electronic and hard copy (paper) versions of maps/charts should be maintained in order to provide the preferred means of flight briefing to the different generations of GA pilots. Enabling downloads of current charts or sections thereof is an improved service requested by pilots. Further improvement could be achieved by alerting subscribers (users) to implemented changes/updates, for example by means of e-mail notification messages. In addition, site visits and seminars should be considered in the case of major airspace changes.
AIM7	Include geographical coordinates in information items containing position details wherever possible.	Geographical coordinates are a major issue in GPS systems. Most GPS systems provide an extensive data file including all kinds of way points, navigational aids etc. The availability of LAT/LONG information on VFR maps would support the crosscheck and input of correct data in the GPS set. However, increasing clutter on VFR en-route charts must be avoided. Therefore, more appropriate vehicle appears to be ENR and/or AD part of the AIP, rather than charts. This information can also be provided on-line (on the service provider or CAA website) and can be picked up by commercial data providers.
AIM8	Implement MET products tailored to low level VFR flights in line with ICAO requirements.	The recommendation concerns the implementation of weather reports and forecasts in line with ICAO Annex 3 requirements, e.g., GAMET and AIRMET. Where possible, integrated on-line provision of aeronautical and meteorological information should be ensured, for example on the AIS/ATS providers websites.
AIM9	Promote standard and free maps on GPS. Promote standards to describe maps and add-ons.	GPS moving maps on portable devices provide the pilot with real time information on position and airspace. When used correctly, the increase in situational awareness is a benefit to the safety of air traffic. By providing free maps, according to set standards, the number of users is likely to increase.

EAPAIRR

Regulators

REF	Recommendation	Rationale
REG1	Increase harmonisation for navigation and communication licensing requirements for private pilots, to include the use of VFR Moving Maps in PPL training.	Basic navigation and communication skills training requirements for all private pilot licences should be harmonised. Knowledge and use of GPS systems should be addressed as well. A minimum adequate level of pilot navigation and communication skills should be achieved and maintained by the introduction of mandatory refresher training. Competence checks should include exercises on basic navigation and communication exchange (e.g., requests for clearance to cross controlled airspace) irrespective of the pilot's qualification. The flight check should include "pass/fail" criteria and could include some basic theory as well. Oversight of the pilot training process should be improved by strengthening the regulatory oversight of flying schools, training, and licensing process. The competency and proficiency of instructors and examiners will need to be assessed and appropriate standards established. The currency of instructors' knowledge of aviation regulations should be ensured. Integrate the use of VFR Moving maps in PPL training curriculums. Enable pilots to use mobile devices like smartphones and tablets with VFR Moving maps effectively during training. By learning to use the devices and software in a training environment, pilots will be better prepared to use them in flight while not compromising lookout, scan, or pilot capacity.
REG2	Harmonise the licensing of FIS staff and ATC staff across the Europe in the use of Surveillance data to provide FIS. See also recommendation ANSP15	Harmonisation of FIS provided to VFR flights should be based on European IRs/AMCs/GMs, ICAO recommendations and existing best practices. Examples of best practices are i.e. the Low Airspace Radar Service provided in UK airspace and the radar information services provided in German airspace. Radar-derived information available at ATS units should be used to enhance the information passed to pilots. It should include, as appropriate, navigational assistance, coordination of controlled airspace entry/crossing clearance, passing traffic information and information about restricted airspace activation/deactivation and concerned traffic, as well as provision of other aeronautical information and information about potentially hazardous conditions. The service could include provision of warnings to pilots of any unfavourable factors including airspace infringement and traffic warnings. FIS level could be raised to enable proactive prevention of potential conflict situations. The scope of this action should include the harmonisation of services provided by civil and military FIS provider organisations. Other types of surveillance data (e.g., ADS-B) are now available in addition to Radar. The use of these new sources of available information can increase the situational awareness of the FISO or ATCO. To support the best practices and information sharing in this area, a working Group on FIS provision has been created. According EASA, at the time of writing, there is no initiative to establish a harmonised FISO licensing and training scheme. Additionally, the qualification and training of ATCOs and FISOs is a national prerogative, with observed noteworthy differences. Moreover, the use of ATS surveillance in FIS provision is a subject for which various practices are observed throughout the EU Member States, and for which a thorough technical debate is being initiated. The proposed harmonization should be verified and addressed carefully.

REF	Recommendation	Rationale
REG3	The National Regulator should form an Airspace Infringement Strategic Working Group to review airspace infringement risk dimensions and establish national safety improvement priorities.	The responsible national authority should review in consultation with the concerned airspace user and service provider organisations the dimensions of airspace infringement risk in their particular operational environment and establish local safety measure implementation priorities. This will enable the identification of the most relevant (for the given operational environment) recommended and proposed actions contained in this plan for implementation at national and local level. Risk awareness should be raised by dedicated safety seminars and workshops with the participation of the service providers and all airspace user types. The safety related efforts of GA organisations should be supported. Strengthening the voice and influence of GA organisations and establishments will help proactively shape pilot safety culture by campaigning on different safety issues. Various means and best practices could be used to this effect: publications (safety letters, notices, magazines), dedicated safety evenings at flying clubs, participation at flight safety seminars, dedicated safety webpages, etc. This brings together GA Associations, ANSPs, Airport Operators, Weather Service Providers, and safety partners to develop strategies. It should be an ongoing and permanent process. Promote the establishment of Local Airspace Infringement Teams (LAITs).
REG4	Ensure that airspace change processes take due account of the different airspace users' requirements.	The applicable airspace change processes, methodology and practices should be reviewed and, as necessary, modified to ensure that the needs of the various airspace user categories are fairly considered in the process of designing and implementing changes to airspace organisation. All stakeholders affected by the intended change should be afforded the chance to (at best) influence the shapes and volumes of airspace structures, or (at least) to make change sponsors aware of airspace user requirements so that the impacts of an airspace change can be minimised or mitigated through, for example, operating arrangements (that in effect be in the spirit of the FUA concept). Changes to airspace structures should be introduced following consultation with GA user representatives and organisations. See also 6.50 below. It is important to have a transparent and comprehensive consultation/engagement process in line with national practices.
REG5	Harmonise airspace classification below FL195 in line with the strategic airspace design principles.	An appropriate strategic design of the airspace is crucial in permitting the ATM System to provide the right services, at the right time and in the right places decreasing routine tasks and the requirement for tactical intervention. Harmonisation of airspace classification below FL195 should be based on the ICAO-defined airspace classes. It should aim for the establishment of common vertical limits, as far as practicable. It should also include harmonised application of associated rules, procedures, and air traffic services. It is highly recommended deploying airspace structures that provide a greater degree of strategic de-confliction with particular consideration of the cross-border operations. The design of airspace should be as simple as possible, whilst not compromising safety. Where possible, reduce the amount of controlled airspaces and mitigate risk through establishment of TMZ/RMZ.
REG6	Establish a requirement for regular update of the on-board GPS systems database.	It is recognised that there is no mandatory requirement for VFR pilots to have a GPS set in their aircraft. However, a considerable number of incidents occurred due to use of out-of-date GPS maps or due to other GPS use related issues (e.g., power failure). Therefore, aircraft operators and pilots, who intend to use a GPS set in the planning and execution phases of a flight, should be required to operate a GPS system with the correct database only. The suitability of placing appropriate requirements on GPS database providers could be considered in this context. See also 6.2.

REF	Recommendation	Rationale
REG7	Review and harmonise requirements for the carriage and use of transponders and other conspicuity devices by light aircraft.	To reduce the risk on a mid-air collision. The use of transponder equipment is recommended. It improves: • Situational awareness for pilots and FISOs/ATCOs • Occurrence reporting regarding airspace infringements • The ability to provide traffic information There are several options to be considered when reviewing the requirements for the use of transponders: • ADS-B • FLARM • Mode-S
REG8	Optimise and harmonise occurrence reporting requirements and taxonomy, including those related to airspace infringement.	Regulation (EU) No. 376/2014 is clear in the ANSP and pilot reporting requirements. It is recommended to increase the scope to include ULMs, gliders and paragliders as reporting is currently not mandatory for these users. This type of airspace infringement is mainly notified if another pilot or ATC reports.
REG9	Ensure updated maps and charts are made available to flying clubs and schools and encourage the use of VFR moving map technology.	Updated VFR en-route charts should be available on-line. Frequent changes should be avoided. Sponsorship should be considered to ensure that as a minimum the GA clubs directly affected by airspace changes (located in the vicinity) obtain the updated maps and charts for use by their members. Both electronic and hard copy (paper) versions of maps/charts should be maintained in order to provide the preferred means of flight briefing to the different generations of GA pilots. Enabling downloads of current charts or sections thereof is an improved service requested by pilots. Further improvement could be achieved by alerting subscribers (users) to implemented changes/updates, for example by means of e-mail notification messages. In addition, site visits and seminars should be considered in the case of major airspace changes. Moving maps provide enhanced situational awareness and timely warnings of airspace and airspace activity. The safe use of moving maps is beneficial to minimizing the risk of airspace infringements. Regulators should encourage the use, and work with ATOs and flying clubs on a safe concept to operate the devices in flight.
REG10	Undertake periodic reviews of airspace allocation and structures within the respective FIRs and improve oversight of airspace management.	The action is designed to support the implementation of an optimised airspace organisation that takes into account, to the extent possible, the requirements of the different airspace user categories, while ensuring the safe use of airspace. Improved efficiency of airspace allocation and management will reduce the probability (hence the risk) of airspace infringements caused by the practice of 'cutting the corners' of controlled and restricted airspaces. It should include a review and optimisation of the number and volume of restricted airspace volumes according to their actual utilisation parameters. The regime of restricted airspaces should be reviewed, and tactical airspace management procedures improved, if needed. The review should include all airspace structures within the respective FIRs. It should be carried out in consultation with the concerned military organisations, airspace users and service providers. Given its scope and the amount of effort required, it is expected that the optimisation of the airspace structure will be performed in incremental steps over a number of years. Priorities may be established, as necessary (For example areas of dense VFR traffic may be reviewed first).

REF	Recommendation	Rationale
REG11	Promote membership of flying clubs and GA associations among private pilots.	Encouraging private pilots to become members of flying clubs, schools and/or GA associations (for example AOPA, FAI, etc.) would support an improved downward flow of aeronautical information (e.g., notification of airspace changes), guidance materials and information supply in general. It would improve availability and accessibility of education and awareness materials and thus contribute to raising pilots' general knowledge and awareness of risk. However, flying schools and clubs may have to accept that this will place additional responsibility on them.
REG12	Establish requirements for correct GPS equipment installation and maintenance.	Implementation of the action should reduce the probability of GPS system failure, in particular due to loss of power supply or signal.
REG13	Harmonise the regulation of flights by ultra-lights, microlights and gliders (including hang-gliders and para gliders).	A minimum level of pilot navigation and communication skills should be achieved. While the operation and licensing of sailplane/glider pilots is under EASA's remit and action has already been taken, the other mentioned categories (e.g., micro-lights) are operated under national rules because they are Annex II aircraft. Subject to individual national air navigation orders/regulations.
REG14	Introduce formal Just Culture and Human Factors training as part of all flight crew licensing training	By introducing a formal Just Culture and Human Factors training, as part of all flight crew licensing training, pilots will acquire information to help their performance in flight but also in briefing/debriefing, Topics to be included are: improved reporting, safety awareness, airmanship and Threat and Error Management.
REG15	Introduce a process for Regulatory post-Infringement review and action.	Conduct this process under a "Just Culture", where blame is not apportioned for an infringement. Instead, the facts are sought to fully-understand why the infringement occurred and actions are identified to prevent a repeat.
REG16	National Regulators to reassess requirements for obtaining a private pilot license.	NSAs should consider other measures to enhance pilot skill levels. These measures are collated in the toolbox below. The necessity/applicability of these recommendations differs per country and therefore have no separate listing in the recommendations' list. 1. NSA's to review the competencies required to maintain for their licenses. Evidence would be needed to justify changes. 2. Pilot associations to encourage Pilots to consider voluntary hours with instructors to improve proficiency. 3. Pilot associations to recommend/suggest a list of items for the mandatory annual flight with an instructor (refresher training). To include R/T communication and navigation.

EAPAIRR v2.0
Best Practices

EAPAIRR

Best Practices

All of the following best practices are real life examples, kindly provided by contributing stakeholders to the EAPAIRR working group. Please note that the framework, applicability and local circumstances for implementing these recommendations may differ in your own situation.

Section Reference	Best Practice	Source
AD2	Intended airspace changes will be announced to all airspace users in spring each year. Airspace users are involved at an early stage as soon as airspace change proposals are available. Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Airspace changes are implemented in March the following year (with depiction on ICAO VFR chart).	DFS
AD3	Airspace changes are implemented to improve safety (IFR/VFR deconfliction). After implementation, all airspace changes will be validated during the VFR flying season with regard to effectiveness and possible adaptations.	DFS
AD4	It has become best practice over the years to apply clear and easy borders in the airspace design instead of landmarks (railways etc.). There is no general request by VFR users to use landmarks as airspace boundaries (Airspace C, D, TMZ, RMZ etc.). Clear and simple lines are preferred. However, landmark based boundaries are still used sometimes in special occasions (e.g. Glider sectors).	DFS
	To derive the topographical information needed, correlate the existing reporting system with tools like google earth, to ensure topographical relations are identified and local hotspots can be identified.	ACG
AD8	Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Catalogue of Criteria for the Establishment of Airspaces (Airspace Concept Germany), Ministry of Transport and Infrastructure: The aim of this catalogue is to determine generally applicable criteria for the establishment, modification and cancellation of airspaces, especially in the vicinity of IFR aerodromes, considering the interests of the various user groups as far as possible. On this basis, airspace measures can be implemented in a transparent and comprehensible way.	DFS
AD10-11	As a new recommendation from DFS please find the information about the newer established airspace class “D” and “C” (not CTR) with the designation “HX”. This helps a lot in these areas. German AIP ENR 1-15 Airspaces Classes with HX As an example the AIP AIC VFR 01/20, 12.Mar 2020 – Class D airspace (not CTR) EDDP “HX”	DFS

Section Reference	Best Practice	Source
AD12	As a new recommendation from DFS please find the information about the newer established airspace class "D" and "C" (not CTR) with the designation "HX". This helps a lot in these areas. German AIP ENR 1-15 Airspaces Classes with HX As an example the AIP AIC VFR 01/20, 12.Mar 2020 – Class D airspace (not CTR) EDDP "HX"	DFS
	Intended airspace changes will be announced to all airspace users in spring each year. Airspace users are involved at an early stage as soon as airspace change proposals are available. Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Airspace changes are implemented in March the following year (with depiction on ICAO VFR chart).	DFS
	Airspace changes are implemented to improve safety (IFR/VFR deconfliction). After implementation, all airspace changes will be validated during the VFR flying season with regard to effectiveness and possible adaptations.	DFS
AD13	As a new recommendation from DFS please find the information about the newer established airspace class "D" and "C" (not CTR) with the designation "HX". This helps a lot in these areas. German AIP ENR 1-15 Airspaces Classes with HX As an example the AIP AIC VFR 01/20, 12.Mar 2020 – Class D airspace (not CTR) EDDP "HX	DFS
AIM1	ACG runs an integrated system service, which enables its customers to plan a flight, coordinate an inner-European flight regarding air traffic (NMOC) to complete the necessary pilot pre-flight briefing including the MET briefing, either directly at the airport or via internet. www.homebriefing.com	ACG
AIM2	ACG provides two chart types for VFR flights where the lower airspace is depicted. 1) Aeronautical Chart – ICAO 1 : 500.000 and 2) Chart for VFR flights having scale 1 : 250.000 or 1 : 50.000 based on the VFR procedure. The design of these two chart types is already harmonized and it is based on the standards and recommendations of ICAO Annex 4. The additional local information presented by symbols, lines and areas within the charts for VFR flights is designed by ACG and stated in AIP Austria GEN 2.3 (Chart symbols).	ACG
AIM3	ENAIRE has implemented an online service called Insignia (https://insignia.enaire.es) which offers, free of charge, all the relevant aeronautical information to general aviation users updated daily to include NOTAMS, dynamic areas and all the relevant information for the day´s operations.	ENAIRE
	ACGs integrated briefing service www.homebriefing.com is free of charge for customers departing from or flying within Austria. ACG provides online charts, which are freely available to the GA VFR community via https://maps.austrocontrol.at. The "VFR online chart Austria" provides all static information relevant for VFR flights within Austria and gives additional information when clicking on specific items, as well as a direct link to the relevant AIP chapter for most features. Geo services used for the online chart are freely available as WMS and WFS services and can therefore be easily included in external systems as well.	ACG

Section Reference	Best Practice	Source
AIM4	ENAIRE has implemented an online service called Insignia (https://insignia.enaire.es) which offers, free of charge, all the relevant aeronautical information to general aviation users updated daily to include NOTAMS, dynamic areas and all the relevant information for the day´s operations.	ENAIRE
	ACGs www.homebriefing.com and https://eaip.austrocontrol.at are fully compliant with all requirements mentioned here. Additionally, there is a 24/7 helpdesk, where all the information can be obtained verbally or in hard copy.	ACG
AIM5	ACG provides up-to-date Charts for VFR flights where the graphical representation is based on the standards and recommendations of ICAO Annex 4.	ACG
AIM6	Online charts at https://maps.austrocontrol.at allow printing/exporting a previously defined map extend into pdf files including user customized information. Additionally it is easily possible to download specific data via UI in different formats (e.g. KML).	ACG
AIM7	Online charts at https://maps.austrocontrol.at allow the user to search for a specific navaid or any other feature or to directly select it in the chart and provide information about e.g. the exact coordinates as well as a direct link to the respective AIP chapter.	ACG
AIM8	Online charts at https://maps.austrocontrol.at are available on mobile devices and provide a 'locate me' function, which allows the user to receive information at the current position. www.homebriefing.com	ACG
AIM9	Develop a free to use navigation and airspace app for smartphones/tablets with support from the government, service providers and General Aviation. NLD: https://itunes.apple.com/au/app/PocketFMS/id956761709?mt=8https://play.google.com/store/apps/details?id=com.pocketfms.airspaceavoidnl UK: https://itunes.apple.com/au/app/PocketFMS/id669457168?mt=8https://play.google.com/store/apps/details?id=com.pocketfms.airspaceavoiduk www.homebriefing.com	UK & The Netherlands
ANSP1	Best practises e.g. In Germany to deliver emergency situation training to FIC staff and VFR pilots in a coordinated manner.	DFS
ANSP2	EUROCONTROL APW Speciation and Guidance Material is available on SKYbrary. The APW Speciation (community developed) provides help and advice in procuring a new system. The Guidance Material provides ANSPs with a set of best practices to tune the system.	EUROCONTROL
ANSP3	ntroduce a Local Airspace Infringement Team (LAIT). LAITs are run by the airspace owner (APT). Participants from ANSP's, airspace users (both GA and CA), local airports and regulator contribute to a successful working arrangement. Apart from reviewing specific incidents, also more general info on hotspots and way of communication is being shared. Home - Airspace Safety	UK CAA

Section Reference	Best Practice	Source
ANSP6	Add the promotion of implementing VFR routes/corridors in controlled airspace, where simplification is not possible. In GER the responsibility is by the regulator (BMVI Ministry of Transport and Infrastructure)	DFS
	Intended airspace changes will be announced to all airspace users in spring each year. Airspace users are involved at an early stage as soon as airspace change proposals are available. Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Airspace changes are implemented in March the following year (with depiction on ICAO VFR chart).	DFS
	Airspace changes are implemented to improve safety (IFR/VFR deconfliction). After implementation, all airspace changes will be validated during the VFR flying season with regard to effectiveness and possible adaptations.	DFS
	Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Catalogue of Criteria for the Establishment of Airspaces (Airspace Concept Germany), Ministry of Transport and Infrastructure: The aim of this catalogue is to determine generally applicable criteria for the establishment, modification and cancellation of airspaces, especially in the vicinity of IFR aerodromes, considering the interests of the various user groups as far as possible. On this basis, airspace measures can be implemented in a transparent and comprehensible way.	DFS
ANSP7	Develop a Pilot Infringement Questionnaire (PIQ) for asking pilots to provide their perspective on an Airspace Infringement event, i.e. why the infringement happened and what could be done to prevent recurrence.	NATS/ UK CAA
	Facilitate a "season opener", where GA Pilots and ATC/FIS representatives can exchange information, share experiences, and discuss actual topics.	ACG
ANSP14	Mandatory usage of Transponders, especially mode- S, ensures the availability of all relevant information, like registration, altitude, and so on, to provide the best service and feedback available to pilots.	ACG
AU2	Publish leaflets about best practices and advice to prevent and mitigate AI, promoting them through safety promotion days organized in those aerodromes where AI has been identified as a serious issue. Promotion of the SKYclips on Airspace Infringements through the official webpage and social media.	AESA
	Create a website with collated relevant safety information for General aviation, like the UK's Airspace and Safety Initiative website: https://airspacesafety.com/resources/	UK CAA
	Introduce a Local Airspace Infringement Team (LAIT). LAITs are run by the airspace owner (APT). Participants from ANSP's, airspace users (both GA and CA), local airports and regulator contribute to a successful working arrangement. Apart from reviewing specific incidents, also more general info on hotspots and way of communication is being shared. **Home - Airspace Safety**	UK CAA
AU4	It could be recommended that in ramp inspections special attention is paid to oversighting the updating of the GA users data bases, and reminding and encouraging the pilots to keep them updated.	AESA

Section Reference	Best Practice	Source
AU6	SKYbrary features "A guide to phraseology" which can be used both for training as refresher purposes, and is freely accessible via: http://www.skybrary.aero/solutions/allclear/Resources/RTFGuide.pdf	EUROCONTROL
AU7	Introduce a Local Airspace Infringement Team (LAIT). LAITs are run by the airspace owner (APT). Participants from ANSP's, airspace users (both GA and CA), local airports and regulator contribute to a successful working arrangement. Apart from reviewing specific incidents, also more general info on hotspots and way of communication is being shared. **Home - Airspace Safety**	UK CAA
AU8	SKYbrary features "A guide to phraseology" which can be used both for training as refresher purposes, and is freely accessible via: http://www.skybrary.aero/solutions/allclear/Resources/RTFGuide.pdf	EUROCONTROL
REG3	EApart from engaging with all relevant stakeholders on the national level, regulators can also participate in Local Airspace Infringement Teams (LAITs) locally, or promote their establishment if not yet formed. Local Airspace Infringement Teams (LAIT's) are run by the airspace owner (APT). Participants from ANSP's, airspace users (both GA and CA), local airports and regulator contribute to a successful working arrangement. Apart from reviewing specific incidents, also more general info on hotspots and way of communication is being shared. **Home - Airspace Safety**	UK CAA
REG4	AIntended airspace changes will be announced to all airspace users in spring each year. Airspace users are involved at an early stage as soon as airspace change proposals are available. Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Airspace changes are implemented in March the following year (with depiction on ICAO VFR chart).	DFS
	It has become best practice over the years to apply clear and easy borders in the airspace design instead of landmarks (railways etc.). There is no general request by VFR users to use landmarks as airspace boundaries (Airspace C, D, TMZ, RMZ etc.). Clear and simple lines are preferred. However, landmark based boundaries are still used sometimes in special occasions (eg. Glider sectors).	DFS
	Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Catalogue of Criteria for the Establishment of Airspaces (Airspace Concept Germany), Ministry of Transport and Infrastructure: The aim of this catalogue is to determine generally applicable criteria for the establishment, modification and cancellation of airspaces, especially in the vicinity of IFR aerodromes, considering the interests of the various user groups as far as possible. On this basis, airspace measures can be implemented in a transparent and comprehensible way.	DFS
REG6	It could be recommended that in ramp inspections special attention is paid to oversighting the updating of the GA users data bases, and reminding and encouraging the pilots to keep them updated.	AESA
REG8	Although mandatory reporting doesn't apply to light aviation, encourage and to promote voluntary reporting for this type of aviation.	AESA
REG10	The National Regulator forms a National Airspace and Air Traffic Management Advisory Committee. Ensure all airspace users, including GA, take ownership and have a voice.	UK CAA
	Formal Annual Airspace User Conference in autumn with Ministry of Transport, DFS, General Aviation, Commercial Aviation, Military. Catalogue of Criteria for the Establishment of Airspaces (Airspace Concept Germany), Ministry of Transport and Infrastructure: The aim of this catalogue is to determine generally applicable criteria for the establishment, modification and cancellation of airspaces, especially in the vicinity of IFR aerodromes, considering the interests of the various user groups as far as possible. On this basis, airspace measures can be implemented in a transparent and comprehensible way.	DFS
REG11	Encourage GA associations to offer to Wings Scheme for upskilling of pilots. To prevent skill fade and complacency and develop airmanship whilst remaining current with national regulations/changes. AOPA Wings Scheme	UK CAA
REG12	AESA CS-STAN of EASA is developed to allow GA users to easily make modifications and repairs to aircrafts while meeting basic requirements (https://www.easa.europa.eu/document-library/certification-specifications/cs-stan-issue-3). In the specific case of GPS there's a requirement (CS-SC052c — Installation of VFR GNSS equipment) for the installation. The point is that CS-STAN applies only to EASA aircrafts, so a possible recommendation could be to evaluate the possibility of recommending its use to aviation out of EASA scope.	AESA
REG15	Treat those pilots who have infringed controlled airspace under a Just Culture through education/re-training with Regulatory oversight. **Just Culture - Airspace Safety**	UK CAA

References

Occurrence Reporting Data referenced in this document

European Central Repository (ECR) database

The European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS) provides the European Central Repository (ECR) for accident and incident reports in aviation. ECCAIRS implements Directive 2003/42/EC on Occurrence Reporting in Civil Aviation by offering a centralised and standardised way to collect, share and analyse safety data related to aviation accidents and incidents.

EUROCONTROL Airspace Infringement Initiative FIS Survey and Analysis parts 1-3

EUROCONTROL, 2008. Surveys and analysis of Airspace Infringement data within Europe, covering the time period of 2002-2008

EUROCONTROL Annual Summary Template Airspace Infringement (AST) Data

EUROCONTROL document providing a template for annual safety data reporting in accordance with the ESARR 2 requirements. Covering the time period of 2012-2017

FABEC Airspace Infringement Analysis

Data analysis of Airspace Infringements within the FABEC area of responsibility of (ANA Lux, Belgocontrol, DFS, DSNA, LVNL, MUAC, Skyguide), covering the time period of 2013-2016.

NATS (UK) Airspace Infringement Analysis

Data analysis of Airspace Infringement reports in UK airspace, covering the time period of 2012-2015.

IAA Airspace Infringements Analysis

Data analysis of Airspace Infringement reports in Irish airspace, covering the time period of 2012-2016.

ENAV Airspace Infringements

ENAV case study of Airspace Infringements within the Milano CTA-TMA, covering the time period of 2013-2016

Specific regulatory reference to recommendations

AD3

EU IR 923/2012 (SERA)

AD9

EU IR 2017/373, EU IR 923/2012 (SERA)

ANSP2

ICAO 9924, App. "R" for the definition usage (Aeronautical SUR Manual)

ANSP5

SERA.9001, SERA.9005, EU IR 2017/373

ANSP13

SERA.9005, CAO Annex 3, EU IR 2017/373 EU IR 2020/469 (Update 373, Part MET)

AU1

EASA Opinion 04/2010 Implementing Rules for Pilot Licensing, EASA Opinion 07/2010 Medical certification of pilots and medical fitness of cabin crew.

AU6

EASA Opinion 04/2010 Implementing Rules for Pilot Licensing, EASA Opinion 07/2010 Medical certification of pilots and medical fitness of cabin crew.

REG5

EU IR SERA, Section 3, Chapter ff – General rules and collision avoidance, Section 6ff – Airspace Classification

REG8

EU IR 376/2014

EAPAIRR

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