Finance and Corporate Services
Information Management

10 February 2014
FOIA reference: F0001787

Dear XXXX

I am writing in respect of your recent request of 16 January 2014, for the release of information held by the Civil Aviation Authority (CAA).

Your request:

> *"I would like a copy of the report and review of the 2012 ' UK's Regulatory approach to Recreational Aviation'. Known as RA-2. Reference my emails to Mr Mark Stevens dated 20/11/13, 29/11/13 & 7/1/14 and his reply's 4/12/13 & 15/1/14".*

Our response:

In assessing your request in line with the provisions of the Freedom of Information Act 2000 (FOIA), we are pleased to be able to attach the information requested.

If you are not satisfied with how we have dealt with your request in the first instance you should approach the CAA in writing at:-

Mark Stevens
External Response Manager
Civil Aviation Authority
Aviation House
Gatwick Airport South
West Sussex
RH6 0YR

mark.stevens@caa.co.uk

The CAA has a formal internal review process for dealing with appeals or complaints in connection with Freedom of Information requests. The key steps in this process are set in the attachment.

Should you remain dissatisfied with the outcome you have a right under Section 50 of the Freedom of Information Act to appeal against the decision by contacting the Information Commissioner at:-

Information Commissioner's Office
FOI/EIR Complaints Resolution
Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF
www.ico.gov.uk/complaints.aspx

Should you wish to make further Freedom of Information requests, please use the e-form at http://www.caa.co.uk/foi.

Yours sincerely

Rick Chatfield
Information Rights and Enquiries Officer

CAA INTERNAL REVIEW & COMPLAINTS PROCEDURE

- The original case to which the appeal or complaint relates is identified and the case file is made available;
- The appeal or complaint is allocated to an Appeal Manager, the appeal is acknowledged and the details of the Appeal Manager are provided to the applicant;
- The Appeal Manager reviews the case to understand the nature of the appeal or complaint, reviews the actions and decisions taken in connection with the original case and takes account of any new information that may have been received. This will typically require contact with those persons involved in the original case and consultation with the CAA Legal Department;
- The Appeal Manager concludes the review and, after consultation with those involved with the case, and with the CAA Legal Department, agrees on the course of action to be taken;
- The Appeal Manager prepares the necessary response and collates any information to be provided to the applicant;
- The response and any necessary information is sent to the applicant, together with information about further rights of appeal to the Information Commissioners Office, including full contact details.

Regulatory Approach to Recreational Aviation (RA2)

This document was produced during 2012 as a collaborative endeavour between the CAA and industry stakeholders. Although not formally published, the RA2 report has helped provide a foundation for a wider programme of GA activity which was published in November 2013 as a CAA and (separate) DfT response to the UK Government's GA Red Tape Challenge. Of the recommendations included in the RA2 report, a number are underway or complete; a full status will be included in the CAA's GA Programme plan which will be published in April 2014.

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Foreword and Executive Summary

Foreword

The RA2 project was initiated to look at the current approach to the regulation of recreational aviation and the opportunities to take a different approach given the CAA Strategic Objective relating to embracing the Better regulation initiatives.

Industry provided useful input to the formulation of the scope of the project and, through discussion with the various representative bodies, to the description of the individual sectors and the current issues.

In particular the contributions to the programme made by the following are recognised and acknowledged:

- Aircraft Owners and Pilots Association (AOPA)
- British Business and General Aviation Organisation (BBGA)
- British Gliding Association (BGA)
- British Hang Gliding and Paragliding Association (BHPA)
- British Microlight Aircraft Association (BMAA)
- British Parachute Association (BPA)
- British Rotorcraft Association (BRA)
- European Federation of Light and Vintage Aircraft (EFLEVA)
- General Aviation Strategic Forum (GASF)
- General Aviation Safety Council (GASCo)
- Historic Aircraft Association (HAA)
- Light Aircraft Association (LAA)

The report clearly sets out both a review of the historical position and possibilities to consider for the future regulatory model. It is hoped that this can be used constructively by industry and regulator together to address concerns over the sustainability of general aviation but, more particularly, initiative a new approach in relation to sporting and recreational aviation.

Executive Summary

The General Aviation (GA) industry finds itself under increasing pressure as costs of operation rise due to current financial pressures, increasing focus on environmental issues such as Carbon emissions and the growth in the application of the European regulatory framework. Many UK GA stakeholders would use the word 'doldrums' to describe the status of the market as we go through 2012. Recently expressed concerns from industry highlight a noticeable reduction in the number of 'active' aircraft with many owners apparently letting maintenance lapse and certificate renewals lapse, effectively putting the aircraft out of service.

Too much prescription in the rules and a lack of proportionality is claimed to have put Europe's GA industry, including that in the UK, at a disadvantage to other countries around the world. GA aircraft manufacturing has all but vanished in the UK. Whilst there are some microlight aircraft being produced, these are often UK customised versions of aircraft types that have been designed in other States rather than indigenous designs. UK GA stakeholders have also cited a number of reasons why the UK market has stagnated.

The introduction of European legislation, despite its laudable intentions to create a harmonised framework across the EU States, is very much seen by industry as an impediment to the vibrancy and health of the current marketplace. Industry cites the introduction in other States of Light Sport Aircraft, the Sport Pilot's Licence, the evolution of adventurous aviation and the apparent greater freedoms on what aviation activities an individual can pay to undertake as models of opportunity for future UK growth. These are certainly initiatives that have fostered growth in some countries yet in Europe they have attracted more prescription and thereby complexity and cost when compared with the systems in those other States.

There has to be scope for the CAA to undertake a timely, balanced review of the situation in the UK and see whether there is anything that can be done to re-establish some measure of growth and sustainability in the sector.

The term GA covers a wide variety of private and commercial activities and involves a wide variety of aircraft types. Those in the upper end of the GA sector, with business jets seek to use the label to distance themselves from the potential application of the more commercial rules. There are good reasons for this but they are not really interested in flying their business jets as a leisure pursuit. This programme focused upon recreational aviation, not exclusively, but with an eye to looking at industry's concerns. It also sought to address the

perception that the UK's current regulatory approach to GA is inhibiting the way in which aviation can be seen as a leisure, recreational or sporting activity, vis-à-vis other leisure activities or adventurous sports.

The key question is:

'Does the CAA impose too much regulation on recreational aviation such that it inhibits growth?'

The CAA's review of the Regulatory Approach to Recreational Aviation (referred to as the RA2 programme) focused on two particular threads. These were, first and foremost, the issues identified from an analysis of the general aviation (GA) accident and incident data available to the CAA through its Mandatory Occurrence Reporting (MOR) scheme. The second aspect was to look at what activities may be considered as falling under the title of recreational aviation, the current regulatory regime that affects those activities and the way perhaps that a different regulatory approach can be adopted, either nationally or through the UK's influencing of European thinking on GA matters.

There were four fundamental principles that set store for the RA2 programme to work around. These were:

- The CAA's stand for independent or uninvolved 'third parties' was first and foremost
- There was a desire to establish proportionate regulation commensurate with an acceptance of the risks associated with flying in the recreational aviation sector
- The review should take account of the importance of genuine airmanship in participants taking personal responsibility for safety
- To create an environment within those boundaries above where CAA regulation is not unnecessarily stopping the recreational sector from flourishing

With regard to safety, the CAA had already identified the 'significant seven'; seven safety threats or themes that were derived from both UK and international accident data for the larger or commercial aircraft. The RA2 analysis of the GA accident, serious incident and MOR data attempted to identify similar GA related safety threats. However, it was noted during the analysis that there was inconsistency in the collection and categorisation of MOR data that potentially compromised the analysis without further detailed

review and re-categorisation of the data[1].

It is important that the collection of GA incident data, its categorisation according to a more rigorous process and subsequent analysis continue to monitor the effectiveness of the regulatory framework. Recognising that the best safety interventions can be targeted if there is good data to support their identification, the CAA should therefore look to review its method of collection, categorisation and analysis of MOR data relating to GA to ensure that safety threats are identified and monitored.

This review has shown there is some commonality in the nature of the threats vis-à-vis the significant seven but with fundamentally different underlying causes. They may therefore require to be dealt with differently. The information will help improve the focus on the CAA's safety plan, and associated safety interventions for GA, in forthcoming years. This will help allay industry's fears that GA matters are not taken into account by making them more visible in publicly available documents and discussion forums.

The GA related safety themes derived from the analysis performed under the RA2 programme are:

- Airspace Infringement
- Airborne Conflict
- CFIT
- Loss of Control
- Runway Excursion
- Human Factors in the GA Cockpit

It is recommended therefore that the CAA should adopt the GA 'Safety Six' identified under the RA2 programme as focal themes within its Safety Plan to target the key safety threats in GA operations. Such work should be focused through the GA Safety Partnership, a collaborative CAA industry body with the focus on safety matters. It should be noted that there is work already underway within CAA, with industry participation, in many areas related to these safety

[1] There is a caveat given the inconsistency in the categorisation of data means that the results of the analysis. Whilst the RA2 analysis re-categorised some of the occurrences to better refine the data, the scale of the task was such that a full review was not achievable in the time allowed. Further work would be required to provide greater assurance of the data from a more rigorous analysis.

themes. The recommendations and output from this review needs to be integrated with such work.

It should be noted that the CAA MOR database has little safety information on the gliding, hang-gliding and paragliding sectors, largely because these sectors have been de-regulated historically. For example, the British Gliding Association (BGA) has a wealth of incident and accident data and, through their safety management approach has already taken action to target the key threats, such as winch launch issues. The British Hang Gliding and Paragliding Association (BHPA) also monitor incidents within its club structure. It is important therefore that the GA Safety Partnership takes the information that is available outside of the CAA's own MOR database when looking at the safety picture overall.

The RA2 analysis also showed a number of areas that warrant further consideration as regards possible safety interventions to address safety threats. For fixed wing aircraft the biggest threat is seen as airspace infringements, with the consequent commercial disruption that is caused to other operations in controlled airspace and the potential airborne conflict that arises if the infringing aircraft comes into conflict with other air traffic. For helicopters the biggest threat appears to be loss of control, the dynamics of helicopter operations obviously representing a more challenging set of demands on the pilot under certain circumstances.

Other safety threats were identified in the review with recommendations for more detailed work to be carried out. These include mid-air collisions, competence in navigation, aircraft conspicuity and, more generally, consideration of the human factors that may exist within GA operations and human performance issues identified in the incident data. Education, re-education and safety promotion are a key part to any potential response to address these threats. However, it is clear that current initiatives do not have the desired level of penetration among GA pilots to make our present work on safety promotion truly effective. It poses the question as to how the CAA's safety promotion for GA matters can be made more effective.

The CAA should seek to review its policy and practice on safety promotion and capitalise on the use of the General Aviation Safety Council (GASCo) and other industry bodies, e.g. AOPA, LAA, BGA and BMAA, to act as a focal points for that work on behalf of the CAA. This recognises the benefits of industry bodies and the available expertise in industry in taking a leading role in such promotion, capitalising on their experience, the access to their respective membership and any safety initiatives they themselves may have. In some

senses it may be more palatable to have representatives from within their ranks promoting the ideals than having the 'regulator' preaching to them. This introduces the issue of how the various coaching schemes introduce the potential to use incentives to drive a change in the behaviours of GA pilots and improve pilot proficiency.

Although not listed as a GA 'safety six' theme there are a number of occurrences that are listed under the categories of aircraft maintenance, design, aircraft equipment failure and issues related to aircraft technical events. Further work in this area is required to review each MOR in order to establish what other risks or themes may be buried in the data.[2] It has to be recognised that this could be a resource intensive exercise and whilst it will provide a better indication of issues that industry may wish to target the cost safety benefit argument must be considered. It may be better to look to the way in which MORs are dealt with in the future rather than deal with them retrospectively.

It is acknowledged that industry, particular the aircraft engineer community, has expressed a desire to have access to MOR feedback in order to more appropriately target their efforts during maintenance inspections. It is better to look at known problem areas than to hope that a general inspection will always catch any defect. This is also seen as being an essential part of future support given the demise of many of the original manufacturers or the lack of continuing airworthiness support for older products by current manufacturers.

The initial pilot study was clearly focused on recreational aviation although this was later expanded to include sporting aircraft as well. Identifying what may constitute 'recreational aviation' within the GA model was not a simple task.[3] It does not quite accord with EASA's concept of 'leisure' flying which, looking at what sort of activities some States have included in the potential scope for recreational or adventurous activities, could be considered to be too narrow in its scope. There is no argument that it is clearly not commercial aviation. Outside of this, some of the boundaries of the various GA operational sectors and aircraft categories become blurred. The review was therefore extended to include peripheral areas of 'commercial' activity that are potential candidates for a different regulatory approach, if they can be considered recreationally

[2] A cursory review of some MORs showed that there is considerable ambiguity in the way these have been categorised. For example, a pilot leaving the seat belt buckle outside of the aircraft was classified as an aircraft maintenance issue.

[3] The existing CAA document - CAP755: Recreational Aviation Activities Manual does not define 'recreational aviation'.

oriented.

The term ‘recreational’ could be interpreted to embrace all forms of private flying but it is clear that there are some private flights that are arguably or obviously not recreational in their nature, being very much business oriented. Furthermore, the size of aircraft and its intended scale and scope of operation must also be taken into account. A business jet, e.g. a Boeing 737 BBJ, may be owned and operated privately but to all intents and purposes must interface with commercial airliners in controlled airspace and to the same airspace and operational rules. The difficulty in identifying possible alleviations arises when a Cessna Mustang very light jet or 172 four seat aircraft has also to meet the same rules to fly in controlled airspace.

This creates constraints which are potentially incompatible with any proposed alleviation in regulatory approach. It is clear that alleviation may be able to be provided in some areas, for some aircraft, but compliance with specific operational requirement maintained, creating a mix of rules appropriate to the use of the aircraft. Bearing all this in mind recreational aviation is therefore, in the context of the RA2 programme, perhaps more appropriately defined as capturing primarily sporting and recreational flying with the smaller aircraft types.

Industry were also keen to explore whether a different approach to some aviation activities could be achieved by acknowledging that the participants could understand and would be willing to accept the risks, in the same manner as they are willing to partake in other adventurous sports and leisure activities, such as sailing, abseiling, mountain biking, automotive track days etc. This is about the identification and acceptance of the risks associated with the activity whilst retaining a focus on the interests and safety of third parties. The CAA should therefore, in conjunction with the UK industry, explore and consider the issue of ‘acceptable risks’ among participants in GA activities and review the associated regulatory framework in line with the analysis, discussion and additional recommendations in the RA2 report.

In this respect, there was some difficulty in identifying who the ‘third party’ is and how it should be defined. Is it someone who is totally independent of the activity or who may be wholly involved, e.g. a passenger, or partially involved, e.g. a spectator, in it? Preliminary discussions within the GA Safety Partnership touched upon this subject. It is clear that the innocent bystander, not involved in any way has to be ‘protected’ and this was a fundamental datum used throughout the review. This is achieved through the application of an appropriate regulatory framework or requirements that ‘manage’ the relevant

aviation activity. It is however not an absolute protection as it is dependent upon each individual adhering to the requirements and playing their part. Other persons, involved to a greater or lesser extent in the activity, perhaps as a passenger or a spectator, may be able to be better informed about the potential risks and hazards and therefore be more capable of accepting those risks. The level of protection afforded to them may therefore vary.

This creates the possibility of an 'adventurous aviation' framework where it is recognised that the aviation activity is undertaken for sport, recreation, leisure or enjoyment. Two topics for consideration under such a framework are ex-military air experience flights and greater freedoms for the conduct of charity flights. There is also potential to look upon pleasure flights (A to A) as candidates, if the participant's acceptance of risk gains wider acceptance[4]. This potentially challenges some of the hitherto conventional thinking on some areas of commercial activity, the issue of 'valuable consideration' and the limits on what aircraft can be used and the regulatory framework that results.

The review shows, more importantly, that there are many areas of activity such as air displays where the current level of regulation or, where appropriate, the self-regulating status of the sector is satisfactory and show little justification to adopt a different approach in order to provide that fundamental protection of the 'third party'. There may be scope to take a different look at how we can use the experience and expertise within that industry sector to help minimise the need for CAA intervention or involvement.

There are several areas where there is potential to adopt a different regulatory approach to aviation activities that are predominantly recreational or undertaken for pursuing the individual's interest in the sport or activity, e.g. air experience. Sport flying and associated aviation activities such as parachuting and air experience flights could well fit such a regulatory model. Although a number of possible candidate activities were identified during the review, further work is required to explore the topic of 'adventurous aviation' in more detail and to help identify, in conjunction with the relevant interested industry parties, the scope and breadth of the potential 'sector'.

In any consideration of changing the regulatory approach, the effects of the forthcoming European legislation, particularly those on commercial operations, also need to be recognised. The current issues surrounding the future of European legislation development, such as the EASA Management Board's

[4] In this respect, activities such as waterborne pleasure trips 'round the bay' can be used as a comparison.

review of the approach to GA matters and the Part M RIA work, offer a challenge to the current EASA Regulations and rulemaking programme. In line with the CAA's Strategic Objectives, the CAA should ensure that it supports EASA's review of GA related policy and regulations to achieve a more proportionate approach to the regulation of GA and the establishment of a regulatory framework that better acknowledges the nature of the activity. This is very much about how the CAA uses the RA2 work to influence EASA's thinking in the future.

An inherent part of the review was the desire to better embrace the Better Regulation principles. Industry was keen to see some alleviation on the current regulations and restrictions in some areas, believing that the most recent accident data did not support their continued application. The CAA had already embraced some of these approaches, e.g. single seat deregulated aircraft (SSDR) and the LAA/BMAA request for permit aircraft overflight over congested areas. Industry is keen to see further movement, if possible, with submissions and arguments being presented for some further areas of change suggesting the alleviation would create a safer environment, e.g. allowing ex-military and suitably equipped permit aircraft limited flight in IMC hereby moving them to altitudes above the normal GA operating levels.

The review therefore focuses on changing the current regulations, requirements and policies where appropriate to provide greater proportionality providing there is justification to do so, such alleviation does not impact upon third party safety and there are no adverse indicators identified in the available safety data. Accordingly, a number of project topics have been identified for further study and these are listed in the project list in an Appendix to this report. Some of these topics have been in development over the last couple of years whilst others are raised under RA2 as new ideas for exploration. It is clear that, with limited resource, not all of these projects will justify the same priority and as a result the projects may have to be phased if agreement to proceed is reached. The cost/safety benefit argument has also to be carefully considered in prioritising these.

What must be understood is that some of the projects, because of the nature of the change they may seek to enact, automatically extend the provision to GA in the wider perspective and is not limited to recreational aviation alone. Other projects are very much focused upon recreational aviation although, given the potential changes coming about with EASA requirements, there may be scope to extend the principles to other areas of GA although, as noted above, this may not include more complex aircraft or those subject to certain operational

constraints. The potential risk to third parties has to be kept in mind.

A number of recommendations undoubtedly tie into the various initiatives the CAA already has in hand. These include the Airspace Safety Initiative (ASI), Airspace Infringement Working Group (AIWG), Future Airspace Strategy (FAS), 21st Century Class 'G' airspace and Air Traffic Services Outside of Controlled Airspace (ATSOCAS). The recommendations may simply reinforce that work which is already in hand but may, given the nature of the review, bring further focus to the GA related input to that work. The CAA should therefore continue its work on airspace issues through these established working groups, ensuring that GA operations and their needs are given appropriate consideration.

As a result of internal reviews of accident/incident data, the CAA has already carried out work collaboratively with industry on gyroplane safety, resulting in the issue of safety sense leaflets on gyroplane performance and handling. The CAA has also contributed to work within Europe under the European Helicopter Safety Team (EHEST) as well as contributing to EASA's Safety Plan work and support in general. Work is also in hand to revise airworthiness requirements, with the issue of new non-expiring Certificates of Airworthiness, non-expiring Permits to Fly and the associated British Civil Airworthiness Requirements. Personnel licensing issues have not been forgotten either, as there are initiatives in hand to look at the licence syllabus in the light of the various data analyses that are available.

These indicate a willingness within the CAA to react to the risks that the data indicates. However, the true measure of an effective regulator is its ability to work proactively with industry to create a regulatory framework that is fit for purpose but which regulates only to the level necessary to provide safety assurance.
However

Within the detail of the RA2 programme a number of recommendations have been made, specific to the more detailed points that were considered during the review. These are highlighted at the appropriate points in the report and consolidated into themes and summarised in Section 10. The themes have been broken down into issues such as those related to safety, regulatory approach and CAA infrastructure. It is hoped that these will form the catalyst for discussion and collaboration between CAA and industry to find the most appropriate solution commensurate with the regulatory responsibilities of the CAA, the desire to make a difference, in terms of safety and effectiveness, and to address industry's concerns. The RA2 review has not sought to prioritise any of these recommendations other than suggest, as a starting point, an indicative

priority commensurate with the significance of the issue.

There is, as with any recommendation to do further work, a balance to be achieved between the cost of carrying out the work and the benefit to be achieved. As part of each project there is a need to look at the balance between the underlying factors and the way in which a particular approach can minimise the cost and maximise the benefit. As a general rule, the focus under RA2 seeks to reduce the regulatory burden and introduce greater flexibility in recreational aviation operations.

This should lead to a reduction in the regulatory costs, both in terms of the CAA resource being directly applied to activities that can be undertaken by organisations under the principles of devolvement and in the direct costs which industry has to meet to cover that regulatory commitment.

A different approach to recreational aviation offers potential for new areas of activity or creates greater freedoms for industry to undertake certain activities within existing streams. This potentially leads to increased activity and improved income streams but the actual operations have to be balanced by the retention of a regulatory framework that provides for these freedoms without losing sight of the need to protect third parties and provide an acceptable level of safety assurance. Codes of practice may provide enough control without too much formal regulation.

From the private owner's viewpoint, the key issue identified within the report is the potential link between disposable income for most pilots and the ability to maintain currency, and thereby flying proficiency. The cost of ownership for private individuals is therefore a critical issue. Anything that can be done to increase the opportunity to maintain currency is good. Additional expenditure just for the sake of it is not so good. For many leisure pilots this is the bottom line, with many managing a basic level of flying which challenges their ability to retain proficiency.

The cost/benefit issues are explored in more depth in Section 3 of the report.

It is clear that this review seeks to embrace a more proportionate approach to general aviation and recreational activities in particular. This RA2 review is but a starting point for opening up opportunities for the CAA and industry to collectively review current activities, look at a different approach to risk and embrace a potential shift in the regulatory framework. There are undoubtedly constraints on what can be achieved at a national level, simply because of the uncertainty about what will happen in Europe and how far we can influence the

thinking.

It is also hoped that the safety data analysis, the discussion and the recommendations on subjects for future study within this report achieves this aim. Furthermore it is hoped that the report and the actions taken by CAA and industry to deliver the outcomes open up opportunities to create an environment that fosters growth within the GA sector and offers more freedom to individuals to enjoy what aviation has to offer.

CHAPTER 1

Scoping the review: Regulatory approach to recreational aviation

Introduction

In 2009 the UK Civil Aviation Authority embarked on a Strategic Review of Safety Regulation (known colloquially as SR2 or SR2). The aim behind this review was to take stock of the role and functions of the CAA's Safety Regulation Group and to determine what could be done to reinforce that role and to make SRG more effective in its regulatory oversight. This is partly about modernisation but it is also intended to look at and redefine the CAA's role in the light of the continuing development of European Regulations.

The SR2 programme is far reaching and has several sub-sets of activity. One of these has focused on the identification of safety threats. Working with reviews of both National and International accident data the CAA has identified a number of safety threats that are now known as the 'Significant Seven'. These are:

- Controlled Flight into Terrain
- Airborne Conflict
- Loss of Control
- Runway Incursion
- Runway Excursion
- Ground Handling
- Airborne and Post Crash Fire

These threats have been discussed with industry and there is general agreement that they are the key risks for Commercial Air Transport (CAT) and larger aircraft. Actions being undertaken within CAA and industry will help identify future strategies, identified in the CAA's Safety Plan as Safety Interventions, to address these threats.

The work on those threats has also identified a number of human factor (HF) and human performance related factors within the causal factors identified by

analysing accidents and serious incidents. This is obvious as many incidents will have some element of human judgement as part of the process, with the consequent potential for an error to be made under pressure. Considerable work was done in the late 1990's in relation to aircraft maintenance HF issues[5] introducing requirements for HF training and maintenance error management systems (MEMS). This was followed with work on crew resource management (CRM) in the flight deck and subsequently there has been further development on fatigue risk management models for flight crew.

More recent experience, including issues explored under the 'significant seven' suggests that the potential for HF error continues, with further threats developing as the reliance on automation in aircraft systems grows, and there is renewed focus on addressing HF issues. Attention on such issues needs to be re-invigorated. A separate HF Strategic Review is underway within CAA with the intention of refreshing the CAA requirements relating to HF and identifying what future oversight of HF related subjects should be in order to address the risks of error. Part of this is trying to find a common language and approach to HF issues, not promoting the idea that humans fail in different ways in different sectors.

The CAA has also looked previously at how organisations could take greater control of the management of safety issues and risk. This was associated with the work on HF error and clearly identified that organisations had a role to play in looking at hazard and risk management and its affect on safety. This followed incidents in the 1990's such as the Piper Alpha disaster, the Zeebrugge ferry accident and Chernobyl nuclear reactor meltdown where, even with safety management systems, organisational and systemic failures had occurred. These were complex incidents with multi layered organisations and activities and it was the cross discipline interface that failed.

The CAA looked at the potential implications for the UK aviation industry and this led to the publication of several CAA documents around 2001. These introduced the concept of safety management systems (SMS) in the various aviation sectors, recognising that whilst many of the SMS principles were the same their application was made more palatable by having sector specific

[5] The CAA worked with the US Federal Aviation Administration (FAA) and Transport Canada (TC) to look at promoting action to address HF related issues. This led to the issue of several CAA Civil Aviation Publications (CAP) addressing maintenance human factors in organisations and as a module in the engineer licensing syllabus. This work was endorsed and adopted by the Joint Aviation Authorities who included provision for HF in their JAR-145: aircraft maintenance and JAR-66: engineer licensing requirements.

documents. Although not mandated at the time, the guidance was nevertheless adopted by many organisations on a voluntary basis. This picked up on the ICAO requirement to require SMS systems to be in place by 2009, although the UK's ability to meet this deadline was overtaken by the introduction of European regulation. More recently, in order to address the requirements for SMS[6] in operations and aircraft maintenance the CAA has carried out further work to promote the adoption of SMS, particularly in advance of the inclusion of formal SMS requirements in those European regulations[7].

However, the internal reviews being undertaken within the CAA are not confined to the technical requirements alone. A broader review of the CAA's business processes has also begun under a Process and Performance Improvement (PPI) programme. Early indications show that there is scope to adopt a common approach to processes which are similar across all areas of the CAA without losing the individuality of the requirements they apply to. That process review is also aimed at addressing the need to update the CAA's business systems and supporting IT to improve the way that the CAA interfaces with industry and its customers. One particular aspect under review is the move to greater use of IT and web-based technology to allow more use of on-line transactions and to simplify many of our application processes.

In order to ensure that the needs of industry are taken into account during these reviews the CAA has made greater use of stakeholder feedback, taking the opportunity to use a series of questionnaires and briefings over recent years to obtain information from industry about what the key issues are for them and how they would wish the CAA to improve its performance. Such feedback is essential in order that the CAA can identify a future strategy that addresses, as far as it can, stakeholder criticism as regards the regulatory structure, the CAA's working practices and, particularly in relation to small organisations and the general aviation sector, a proportionate approach.

The reviews are all embracing and are intended to cover all sectors of the industry. For example, the 'Significant Seven' addresses safety threats in airspace, airports, flight operations, pilot training and airworthiness. The same is true of the HF Review, analysing the current state of play in the industry,

[6] These stem from the inclusion of SMS requirements in the Annex on aircraft operations issued by the International Civil Aviation Organisation (ICAO).

[7] Although the ICAO deadline of 2009 was not met due to the introduction of European Regulations EASA SMS requirements are now part of the Implementing Rules for Operations and are being prepared under the remit of working group MDM.055 for Part 145 aircraft maintenance organisations.

recognising that there are examples of good practice, e.g. Maintenance Error Management Systems (MEMS) in the aircraft maintenance sector, where the principles of, in this case error management systems, could be used to good effect to help manage HF related events in other sectors. There is a clear safety benefit if incidents can be avoided through the collective learning that such systems can deliver, many experts relating the 'iceberg' theory regarding the relationship of a few accidents being underpinned by a significantly bigger number of incidents.

Obviously the reviews are looking to address these issues primarily in respect of Commercial Air Transport (CAT) operations. This merits a higher safety priority as the consequences of an accident to a large commercial airliner are more significant than light aviation accidents. That is not to say that attention during these reviews should not be given to other sectors. In particular, general aviation (GA) representatives are keen to ensure that their needs are addressed. This was emphasised through representations from the various general aviation representative bodies who felt that the 2011 CAA Safety Plan[8] did not have enough substance in looking at general aviation related safety threats and interventions.

The CAA had conducted two reviews of general aviation in 2005. These were the General Aviation Strategic Review (GASR) and General Aviation Regulatory Review (GARR). The GASR looked at the high level issues that the GA industry was concerned about and the review was conducted with representatives from the UK Department of Transport (DfT), CAA and industry representative bodies. The GARR was much more focused on the regulations and requirements that apply to the general aviation sectors. The reports arising from both the GASR and GARR were published in 2006. The reviews led to many recommendations suggesting areas for further consideration or to be taken account of in future policy making, both by Government and the CAA.

Of particular note was the desire to establish and maintain a closer working relationship between the DfT, CAA and the industry representative bodies. Considerable work has been done since the reviews to take collaboration to a new level. The high level issues can now be focused and discussed through the General Aviation Strategic Forum (GASF)[9], a joint DfT, CAA and industry

[8] The CAA issues a Safety Plan that outlines what it considers the key safety threats to the UK aviation industry and the CAA's strategy to address the issues. This includes working groups to explore safety issues, the identification of safety interventions and, where required, research into safety topics and solutions.

[9] The GASF was set up to provide a high level collaborative body to discuss issues of a strategic

committee that looks at the strategic issues that impact GA. Because of the strategic nature of the issues discussed in that forum, there are often wide reaching ramifications touching upon areas other than aviation, e.g. local planning, environmental controls and business. As such there is a political dimension that extends beyond aviation policy per se with the inevitable challenges that brings in reaching a solution that is acceptable to all parties.

In order to try and provide some clarity over what GA sees as the key high level issues, the industry representatives at GASF drew up a paper in January2012[10] summarising their position, which was then shared with the CAA and DfT. The paper highlights the economic significance of the GA industry, bringing in some £1.4bn per annum, as originally shown in the Lober Study in 2006 conducted as part of the GASR. The paper, and its subject matter, has subsequently been discussed with the UK's Director General Civil Aviation.

These high level issues include topics such as VAT on fuel, training support, GA access to aerodromes and airspace, planning provisions and the absence of a focus on GA in the Government's civil aviation framework are issues discussed at GASF. Many of these, e.g. Government Transport Policy, are not in the direct control of the CAA, although the CAA undoubtedly has a role in implementing any aviation legislation that may fall out of any such policy. Accordingly they have not been considered in any depth within the RA2 review. They will, however, continue to be the focus of the GASF and the CAA remains supportive of many of the issues that industry has raised.

The regulatory issues from GASR and GARR have been progressed under the oversight of the General Aviation Consultative Committee (GACC)[11] where the more detailed discussions on the technical issues affecting the industry can be raised and considered. These include queries about the developing European regulatory framework, environmental modification etc and are more readily resolved, often constrained to activities or areas within the direct control of the CAA.

More recently, the CAA has acknowledged the lack of focus on GA matters in

nature such as the Government's overall aviation policy for General Aviation, the CAA's strategic objectives and similar industry wide issues.

[10] General Aviation: Strategic and Current Issues (January 2012) – A position paper for the General Aviation Strategic Forum (GASF) by the GASF GA Representatives.

[11] The GACC is a longer established consultative body where industry can discuss more technical issues with the CAA. Topics include European rule development, pilot and engineer licensing issues.

the CAA's Safety Plan. To address these concerns a CAA led 'GA Safety Partnership' forum[12] has been set up with representatives from key GA organisations. Its aim is to look at the safety threats that particularly affect the GA sectors recognising that, whilst there are some of the 'Significant Seven' that apply equally to GA, the actions to address the safety threats will often require a different approach. For example, an airline has to cater for a broad spread of operations involving numerous staff whereas many GA operations are often down to a single individual, the pilot. GA is therefore a more personal experience.

As part of the SR2 programme the CAA acknowledged that the GA sectors should not be excluded from the wider review, particularly given the continuing concerns about the current increasing regulatory burden being expressed at both GASF and GACC. A brief overview assessment of GA regulatory matters was carried out to look at the CAA's regulatory approach to GA. The general aviation industry covers a wide range of diverse activities, both private and commercially based. Within that recreational aviation[13], as opposed to business aviation or commercial activity, is a powerful sub-set with many thousands of participants and a considerable net worth to the UK economy.

In order to provide a balanced picture of the issues, a number of stakeholder discussions and interviews were held to help get the industry perspective as to where potential issues lay. In talking to stakeholders about the various pressures on recreational aviation and what may be seen as impediments to growth there are many views as to what needs to be done to stimulate growth and provide long term sustainability. A CAA internal working group was set up and considered some of the issues that were being raised, specifically with a view to consider what could be done in relation to recreational aviation. A preliminary report on that review was drawn up and circulated internally within the CAA.

The initial review identified that many aspects of business and commercial aviation activity were under scrutiny by EASA. Despite this, the review therefore concentrated on what was considered recreational aviation and highlighted a number of potential areas for further, more detailed exploration, noting that where there was a European connection, the CAA may only be able to try and

[12] This is a sub-set of the CAA/Industry Safety Improvement Action Group (SIAG) and allows a wider representation of GA organisations to discuss GA specific issues.

[13] The GASR and GARR covered GA activity across the board. There is a basic definition of GA within the ICAO requirements, suggesting that GA is simply not commercial air transport. There is however no definition of recreational aviation, the specific subject of this review.

influence the thinking in Europe on regulatory matters.

For the purposes of this report recreational aviation consists of private flying by individuals for recreational purposes, leisure or as a hobby. The use of aircraft in sporting scenarios, e.g. aerobatics, air racing and other forms of aviation related competition is also included. The definition also extends to include air display flying and, potentially, to give consideration to pleasure flying, charity flights or air experience, all of which could be considered to be a form of recreational activity.

A number of recommendations were made by the group about what should be done next. It was clear that within the CAA there was an appetite to look at the current regulatory structure to explore whether there was scope to change the CAA's regulatory approach, in line with the UK's Better Regulation principles whilst ensuring that sufficient regulatory structure remained to manage safety. The CAA's Safety Regulation Group (SRG) Leadership Team (SRGLT) agreed that a more detailed review was worthwhile, given the various CAA internal reviews that were already underway and this led to this review. This further review is what is now known as the 'Regulatory Approach to Recreational Aviation' programme (RA2 or RA2).

RA2 Programme

The RA2 programme is focused upon looking at the current framework of regulation and whether there is scope to change our regulatory approach, specifically in relation to recreational aviation. A key element of the review is to consider how risk fits into the regulatory equation and whether risk can be looked at in different ways to create variations in regulatory approach for each sector, or even within a sector[14]. This is all about the proportionality of the regulation.

The RA2 programme would be incomplete if it did not also consider the current safety threats, both to third parties and to participants, which affect the various recreational activities. This is essential in identifying any change in regulatory approach. RA2 also has to consider the way in which the effects of European legislation and the desire to embrace the Better Regulation principles have changed the dynamics of the industry. More importantly, it was felt appropriate to review how these may have refocused industry's perception about what regulation should be and, of course, the role of the regulator.

[14] This follows industry requests for the CAA to consider a different regulatory approach where the participants were willing to accept the risks associated with the activity.

Accordingly, it is believed that the time is right to take stock of where we are and how the CAA and industry may wish to act more collaboratively on safety and regulatory issues in the future. Readers should not expect this report to provide an absolute picture of where future regulation may go. The impact of European legislation is significant[15] but the CAA does not have much scope to determine or influence the final outcome. It is one voice out of the 27 Member States[16] so unless it can elicit additional support on a particular requirement there is little chance of being able to directly influence the final rule. Industry must realise that it is essential that they take an interest in European rule development, even at an individual or personal level, as it is often the user, represented by pan-European bodies such as Europe Air Sports, that has the best chance of highlighting areas of concern in forthcoming regulation and effecting a change.

The RA2 programme sought to review recreational activity across the board and make change where it is possible for the CAA to do so. Where there is a European dimension the programme will seek to establish a UK position and a strategy to influence EASA's thinking on rulemaking. In both cases, the desire behind RA2 is to secure an appropriate regulatory framework that creates an environment that provides as much freedom as is possible bearing in mind the regulator's duty of care to third parties and the general public. Any such duty does not however remove the need for a pilot to be mindful of their own personal obligations towards the safety of anyone accompanying them by taking reasonable care to address the associated risks.

The cost of recreational flying is a key concern and it is not difficult to see that for this industry, where it largely relies upon the disposable income of participants, any increase in costs erodes the available cash to be spent on what, for many, is still a hobby or leisure pursuit. It is difficult to gather substantive data whereby a realistic cost/benefit analysis of any proposed change can be made. The reason for this is that for many private owners the cost has to be spread across a few flying hours. This can make the cost per hour of flying eye-wateringly high! A flying club, since they do more hours flying, may be able to spread the cost across a wider base meaning that the cost per hour becomes more manageable.

[15] The European requirements are now extending into the areas of pilot licensing and operations.

[16] There are 27 European Union Member States that are now legally obliged to follow the European aviation regulations. The remaining JAA Member States have elected to also recognise the European rules although they are not legally binding in the same way.

Cost of ownership therefore becomes a critical factor if such cost affects the extent to which an individual, whether they fly their own aircraft or simply rent one from a local club, is able to maintain their flying currency. It is difficult to pull together statistics that show a direct link between pilot currency and incidents or accidents but it is felt that sufficient anecdotal evidence exists to support such a link.

Looking solely at currency does not always reflect truly upon the individual's proficiency as individual pilots will lose proficiency at different rates, depending upon their recent flying exposure, overall flying experience, aviation related background and basic skills.

Frameworks

It is clear that, in order to provide some form of safety cocoon and protection for third parties, both on the ground and in the air, there is a need for some form of regulatory framework. CAA discussions with industry have shown that few want further regulation imposed on them. Many are also nervous about moving to a wholly deregulated situation, for fear of losing the comfort blanket that some regulation provides. That does not mean that they are happy with what is already in place.

Stakeholder surveys have clearly shown that there is desire to have greater freedoms to encourage growth in the industry and regenerate increased participation. Underpinning this is a growing concern about the implementation of the current regulations and requirements, particularly in relation to the complexity and bureaucracy of the requirements, their inconsistent interpretation and the 'enthusiastic' application of them by the CAA[17]. In some instances, it is clear that there is a measure of variability. However, it is also clear that many non-professional aviators do not understand the regulatory framework, its purpose, or why it is in place, believing instead that it is simply an unnecessary imposition, bureaucratic and self-serving. That is not the intent.

We are all road users and yet few of us are fully aware of all of the various regulatory Acts and requirements that control many aspects of the design, standards and operation of the vehicles that we use. We buy a car and take so much regarding its design and suitability for its intended purpose for granted. Operationally, many of us are familiar with the 'Highway Code' in the UK.

[17] Industry has commented about the apparent bureaucratic approach to the application of the rules that the CAA is applying in its oversight over the last ten years or so. The CAA is claimed to have lost its focus.

Unless you have read it rigorously from cover to cover few will be aware of the multiplicity of regulations and laws that it is based upon. There are some 40 different pieces of legislation over and above the Road Traffic Act 1991 covering a wide variety of subjects.

The same is true for aviation. Few understand the full spectrum of the rules that apply across aviation that even a recreational pilot, albeit operating in a limited manner, must interface with. The complexity of the requirements does not help, nor the way in which the information is presented, often in diverse ways and a multiplicity of formats and locations. A new entrant to aviation, whether engineering apprentice or student pilot, is heavily reliant upon what his instructors or mentors pass on in the way of knowledge. There are syllabi of theoretical subjects available to lead their study but who can read and fully understand a rather dry textbook on a subject that does not fully capture the individual's interest or imagination. How many really learn and understand the subject as compared to get enough information to satisfy a minimum standard to pass an exam?

Most of the older and wiser hands in aviation will tell you that you never stop learning. Knowledge is supplemented by skills, honed by experience as a pilot flies or an engineer performs their function. No two flights or maintenance tasks are the same, even if they appear to be at face value. Every participant is at a different place in terms of their knowledge, skill and experience. Having hundreds of hours of flying below your belt does not guarantee a safe outcome when faced with a rough running engine and deteriorating weather. It does however give you an advantage in the depth of experience you can potentially draw upon to achieve a safe outcome.

It is essential therefore that everyone understands the various requirements and the links between them. It is also important that these are visible, logical and easy to understand. Many recreational users manage only a superficial grasp of that regulatory framework so a key issue is to ensure that the regulations are presented in a way that facilitates ease of use and comprehension. This has to be a goal for any regulator, to make the rules transparent, accessible and understandable. It is also essential that everyone understands the threats and risks so that, through an awareness of them, action can be taken to address them, particularly through the behaviour of those involved and their approach to the activity.

CHAPTER 2

Regulatory Frameworks

Introduction

Aviation, like many activities in life, is the subject of regulation. Aviation is ostensibly regulated in the best interest of the users and the general public. However, in its feedback through the CAA questionnaires, industry has raised the issue of proportionality of the requirements and whether the current regime is too restrictive.

There is also criticism that the CAA regulations and those now coming into effect under EASA are overly onerous and therefore more costly than is necessary to secure the required management of safety and risk in all areas of aviation. Comparisons with other States[18], both within and outside of Europe, have been cited suggesting that the current regulatory structure is inhibiting the sustainability or growth of the UK industry.

The CAA is the assigned regulatory body for ensuring that the aviation legislation is applied and enforced within the UK such that activities from the recreational flying of aircraft through to airline operations are carried out in a legitimate and safe manner. Aviation is however subject to other forms of regulation, by other bodies or agencies including Health and Safety, Working Time Regulations as well as the usual financial and governance rules that apply in respect of tax etc.

As the RA2 programme is conducted under the auspices of the CAA, there is a limit as to how far this review can go in terms of seeking to change the total regulatory approach to recreational aviation. Many issues that industry has raised are outside of the CAA's remit and cannot be resolved within this review. Tax matters, such as VAT on training and fuel duty, are matters for HM Treasury and HMRC and therefore fall outside of this programme.

That is not to say that they are not of interest. As mentioned already, the GA

[18] The USA is claimed to have significant benefit in their Light Sport Aircraft and Sport Pilot licensing programmes. Industry also claims that the US Experimental Category offers much greater freedoms than the UK system. Australia and New Zealand have introduced similar pilot licensing changes in their regulations and New Zealand has also introduced Part 115 covering Adventurous Aviation rules. These will be considered later in this report.

industry continues to table these higher level issues through the GASF, the collaborative industry / CAA / Department for Transport body set up following the GASR. However, these issues have to sit among the other topics that the Department for Transport and UK Government is dealing with and, as a result, do not necessarily attract much interest against matters of greater National importance.

A position paper[19] has recently been drawn up by the industry members of GASF and submitted to the Director General of Civil Aviation at the DfT. This paper, and the suggested programme of topics contained within it, focuses upon those issues that the CAA has more direct control over through its regulation of the industry. The review is timely given the UK Government's expressed intention[20] of carrying out a review of all legislation under its 'Red Tape Challenge' and this equally applies to aviation legislation which will be the subject of review in 2012.

In order to ensure that everyone understand what that regulation consists of, this section will outline the basic regulatory framework and consider what the current regulatory options are. This will help set the scene for later consideration of the various aviation industry sectors and activities and ensure that readers, no matter what their background is, have the same basic understanding of the issues.

In practice the regulatory framework consists of a mix of legislative rules, such as the UK Air Navigation Order, supporting requirements such as British Civil Airworthiness Requirements (BCAR) and any relevant codes of practice or guidance, often issued by the CAA as Civil Aviation Publications (CAP). In addition, to ensure that the regulatory framework is properly applied and effective the aviation industry is also subject to regulatory oversight.

This oversight can be done either directly through the approval of organisations or individuals, e.g. issuing licences, certificates and company approvals and carrying out audits, or indirectly by monitoring the activity of the participants, e.g. aircraft surveys. For example, an aircraft survey can give important indications as to the way in which the owner, his supporting maintenance organisation, the licensed engineers and the application of a continuing airworthiness system are working[21]. The CAA is, however, somewhat unique

[19] General Aviation: Strategic and Current Issues (February 2012).

[20] The initiative, to review existing legislation, was launched by the Prime Minister in April 2011.

[21] The CAA uses aircraft surveys as a sampling tool for various purposes. It establishes the acceptability of the individual aircraft's airworthiness. It also provides scope for then tracing

among aviation regulators in that it has to recover its costs from the users. This means that the CAA must achieve a cost efficient balance between the oversight or the service it provides and the standards it achieves by doing so.

The CAA is under continuing pressure from DfT, UK Government initiatives and industry to become a more effective regulator. This is not something new as the CAA has for many years been seeking to rationalise its approach to regulation through a system of continuous reviews and improvements. This is relatively easy to manage providing the CAA can control the outcome. It is clear, however, that the formation of EASA has impacted the CAA's role and there are now some areas of aviation regulation, e.g. rulemaking for aircraft affected by the European legislative framework, where the CAA is no longer master of its own destiny.

Notwithstanding this, the CAA remains the aviation authority for the UK and has made it quite clear in its strategic objectives and its business and safety plans that it continues to see itself having a substantive role in ensuring that aviation activities in the UK are conducted in a safe and responsible manner. The CAA is also determined to go beyond simply verifying that we are compliant with the national and European rules.

The CAA believes that it remains highly respected by aviation authorities across the world and has actively sought to partner EASA in establishing a European framework. UK Government initiatives on Better Regulation and the CAA's desire to stay ahead of the game, as far as moving to a more proactive approach to aviation regulation and in particular safety matters, means that it has to take a lead and, where it deems it appropriate, challenge the status quo.

If the term 'authority' in the CAA is an indication of legitimacy, competence and resolve the CAA is looking to move to a position where it is 'leading beyond authority'. This may result in the CAA looking to address safety threats by influencing EASA or other worldwide aviation authorities in order to safeguard the safety of UK citizens and aircraft. Aviation is a truly global activity and it is foolish to restrict one's horizons to a historic geographical boundary when UK aircraft operate worldwide. This may appear to be outside of the CAA's core remit but there is considerable benefit to be had in working collaboratively with other bodies at all levels to secure a common approach to the key issues.

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maintenance actions back into the maintenance organisation which then opens up opportunities to sample various working procedures within that organisation. The way in which the CAA interacts with approved organisations etc. is under review through the CAA's SR2 programme.

The intention behind this RA2 programme follows on from that premise and was set up to evaluate the opportunities for adopting a revised regulatory approach in respect of what could be determined as recreational activities. To do this the programme looked at the current regulatory framework for recreational aviation to establish what the current situation is and to set a background context against which any proposals for changing the future regulatory approach could be made.

Part of the review centres around a fundamental need to understand the purpose of regulation and why it is there. To provide some sort of context against which readers may gain a better understanding of aviation regulation it is worthwhile providing a brief summary of the way aviation regulation has developed.

Aviation and Regulations

The need for aviation regulations, requirements and any additional codes of practice are long established. For example, the first requirements for pilot and engineer licensing were introduced in the UK in 1919, following the end of the First World War This recognised that certain individuals were critical in ensuring that aircraft were fit to fly (the engineer role) and safely operated (the pilot role).

Basic design codes were also introduced as countries woke up to the potential for non-military use of aircraft, recognising the rapid development of the technologies over a short space of time, moving from wood and fabric to tubular steels, and how aircraft could potentially be used beyond the military applications that had been seen during the war years. All this was positive movement for the future, despite the still somewhat embryonic nature of aviation and aircraft designs.

As operations grew, in scale and scope, it was identified that additional controls were necessary. The need to set down standards for aerodromes, local air traffic services (by light signals in the first instance) and flight operations themselves quickly followed. Whilst the early rules were simple, and somewhat experimental, the increasing number of accidents due to poor design and a lack of pilot skills led to political intervention to protect those involved and third parties. The growing complexity of aircraft and the increasing population of aircraft also demanded the formation of some basic rules.

As an example, fairly detailed requirements for airworthiness, structural strength etc, had been established by 1933, very much based upon the knowledge of wood and fabric, basic steels and the growing use of Aluminium. There were

even basic provisions for performance. To use a simple example to show this, Design Leaflet F.1 in 1933[22] stated that, for aircraft in the 'normal' category:

a) 'They must clear an obstacle 66 feet (20 metres) above the level of the aerodrome of departure without covering more than 546 yards (500 metres) in a horizontal projection.

b) They must reach an altitude of 1,378 feet (420 metres) above the level of the aerodrome of departure in less than three minutes.'

This is obviously a much simpler way to demonstrate compliance against than the complicated performance data and information that is now presented to pilots, even for light sport aircraft. However, a simple demonstration of performance does not satisfy the desire to 'prove' the aircraft's capability up front. The increasing performance of today's aircraft, even the homebuilt types, requires the pilot to be ever more aware of the issues he has to consider regarding how to operate the aircraft and its limitations.

The basic principles established 100 years ago have subsequently evolved over the years to provide a framework that meets both international and national expectations on how aviation matters ought to be managed. The establishment of the ICAO Standards and Recommended Practices (SARPs) is clear evidence that a consistent global framework is desirable to ensure consistency and visibility of some measure of safety forethought. There is no doubt that there has to be some form of aviation regulation to ensure that the interests of third parties are protected, particularly fare paying passengers that dominate the customer base for the airline industry.

The UK Civil Aviation Authority

The UK CAA was established by the Civil Aviation Act 1971[23] to become an integrated aviation regulator for the UK. This pulled together a number of disparate bodies, such as the Air Registration Board, Air Transport Licensing Board and Board of Trade, with the aim of providing a more effective regulator for the modern aviation industry. This followed recommendations made in the

[22] Part of Air Publication 1208: Airworthiness Handbook for Civil Aircraft which was originally published in 1929. This actually incorporated the Air Navigation Order (ANO) of the time. A comparison with the current ANO shows that the content may have changed but the format and basic provision s are very much the same.

[23] The Civil Aviation Act 1971 was given Royal Assent on 5 August 1971 and the CAA was established as a public corporation on 1 April 1972.

Edwards Committee Report of 1969[24].

In the 1969 White Paper on civil aviation policy the Labour government at the time accepted the Edwards Committee's recommendation for a civil aviation authority:

- The encouragement of structural changes on the lines now envisaged calls for more purposive regulation of the industry than the present legislation and licensing system permit. The Government accept that the tasks should be carried out by a Civil Aviation Authority charged by Statute to act in accordance with the objectives and policies laid down in the Government's formal policy statements.

Since it was established in 1972, the CAA has carried out its role and discharged its statutory obligations, developing and amending the regulatory provisions and framework to suit the continuing evolution of the industry. The resulting regulatory framework is therefore a mix of high level primary legislation such as the Civil Aviation Act, managed by the Department for Transport (DfT) and enacted by Parliamentary process and secondary legislation managed by CAA in conjunction with DfT and enacted by Parliament.

As noted in the previous section there is now a different perspective to aviation regulation, that of the EU and EASA. The CAA covers all aspects of civil aviation and, whilst there are some general aviation organisations that look after specific sectors of the industry, e.g. the Light Aircraft Association (LAA) and the British Microlight Aircraft Association (BMAA), these organisations operate within the regulatory framework laid down by the CAA. There are other organisations that voluntarily look after other forms of aviation activity that sit beyond the CAA's regulatory framework as the activity is unregulated, e.g. the British Hang Gliding and Paragliding Association (BHPA).

International Civil Aviation

The International Civil Aviation Organisation (ICAO)[25] was established to look at issues with international civil aviation as countries began to realise the importance and significance of aviation in a post war environment. One of the first tasks was to set out a series of standards and recommended practices to govern the development and conduct of civil aviation operations. This was very

[24] British Air Transport in the Seventies: Report of the Committee of Inquiry into Civil Air Transport, May 1969.

[25] ICAO was set up through the signing of the Convection of International Civil Aviation and its headquarters was established in Montreal. It is a specialised agency of the United Nations.

much focused on international operations between States.

The aim to harmonise civil aviation across the various Contracting States to the International Convention on Civil Aviation (the 'Chicago' Convention) signed in 1944[26] was well intentioned. Each State is required under its ICAO obligations to put in place National legislation to enact the various ICAO Standards. By establishing standards through a series of Technical Annexes[27], Contracting States have been able to rely upon compliance with the Convention to allow foreign aircraft to operate into and within their airspace. It does however rely heavily upon States having an aviation system that is effective in meeting the Standards set out.

There is provision within the ICAO Annexes for General Aviation such as Annex 6 Part II which covers International general aviation operations. These tend to be rather generic standards and do not replicate all of the rigour that is set out for the management of commercial operations. However, general aviation activity today is considerably different to the basis upon which the original ICAO rules were drawn up. In many instances, the executive jet end of the GA market has the same capability as airliners and interfaces routinely with commercial flights. It needs therefore to adopt a similar rigour in carrying out its activities as commercial operations do.

Recreational aviation however, due to the simpler nature of its operations fits readily within more basic provisions but, more importantly, it needs to be considered in relation to the fact that many recreational aircraft and pilots will never leave the airspace of the State in which they are registered.

States have been encouraged to comply with the Annexes to the fullest extent possible, including adoption of the Recommended Practices. Whilst the standards were wholly intended to address international aviation operations, many States have adopted a similar 'standards driven' approach to their National aviation needs. It is therefore possible that a Contracting State may decide, for justifiable reasons, to file differences against the Standards so, despite the best intentions of ICAO, the actual rules from State to State can vary. This is also true of the actual standards achieved.

A key element of ICAO's principles is for States to review and where necessary improve their regulatory structure in the light of experience. There have been three significant drivers behind this pressure to evolve. The primary driver for

[26] The Convention was signed in 1944 but not ratified by many States until 1947 or later.

[27] There are 19 Annexes in existence or proposed.

change can arise from the learning that comes about from accidents and serious incidents. Many of the current rules are very much based on such learning to eradicate the potential for an unsafe act or condition to arise. At a fundamental level, this escalation of the rules was often done in the belief that more regulation can provide a solution to operational shortfalls.

A second aspect is the growth in airline operations and, for example, the greater capabilities of aircraft to conduct longer flights, requiring a different approach as operational scenarios develop. An example of this is Extended Twin Range Operations (ETOPS) procedures. The third driver is the advances in technology and their application to aviation. This is particularly true of aircraft avionic systems with fly-by-wire, flight control computing, GNSS systems and glass cockpits being very much part of any new aircraft. However, the same evolution can be seen in general aviation aircraft, with many manufacturers taking advantage of the new structural and avionic technology.

There is an expectation that, in order to demonstrate that the regulatory structure is fit for purpose and that aviation organisations and stakeholders are in compliance, States will carry out oversight of their industry. This is achieved directly by CAA audits of approved organisations such as airlines, maintenance organisations and aerodromes. It is achieved indirectly through sampling the product or output of the system, e.g. for pilots by periodic assessments such as the biannual checks with an instructor. In relation to engineers, standards are monitored through the oversight of the organisations that they work for or through aircraft airworthiness monitoring under a CAA sampling survey programme.

States are also obliged to identify any safety or regulatory issues and, where appropriate, take action to address any adverse safety trend or safety concern[28]. Safety Improvement or intervention is therefore very much part of the CAA's role as an aviation regulator for the UK.

It is important that the lessons learnt from monitoring the performance of industry, and to an extent the adequacy of the requirements in managing safety, is used to revise the requirements so they remain relevant. It can be seen therefore that there is a balance to be struck between the imposition of legislation and requirements to meet ICAO's obligations, particularly to address a national environment, and the evolution of the resulting regulatory framework

[28] This has greater focus in the recent revisions to ICAO's requirements on States for them to develop a State Safety Programme. The UK's SSP is presented in CAP 784, which is presently under review to comply with the latest changes.

that is appropriate and proportionate.

A European perspective

Over the last twenty five years or so the face of legislation as it affects the UK has changed. The Joint Airworthiness Authority was established in the 1970s with the participation of the five major aviation manufacturing States in Europe to look at a common and harmonised approach to aircraft certification across Europe. This managed to achieve a common approach by working on behalf of the member States on certification projects but it did not wholly achieve its objectives.

Despite the aim to harmonise standards the member States were not bound by law to adopt the resulting certification codes as their only standard. Many States, the UK included, continued to identify issues with designs and impose additional requirements, the principle behind which was laudable on safety grounds since each State's view of its safety risks differed. It negated however some of the benefits of a common, joint approach.

The Joint Airworthiness Authority was nevertheless seen as a success in many ways. As such the member States decided in 1990 to widen the scope of this desire to harmonise technical standards and this resulted in the formation of the Joint Aviation Authorities (JAA). The acceptance of the JAA requirements was more successful but, once again, the lack of legal authority for the JAA meant that States adopted the Joint Aviation Requirements on a voluntary basis.

Some States took the line that they could not be applied unless they were written into their National legislation. Accordingly, the situation evolved where States were applying the requirements at different versions or amendment states. This did not really demonstrate full buy-in to the JAA system or principles. It created a significant divergence if, for example, States did not adopt major changes in the rule such as Amendment 5 to JAR-145.

This was a significant change in that it introduced stronger requirements for quality assurance and importantly a need for a means of capturing and addressing human error. The JAA system was therefore better than each State going its own way but was let down by the differing legal approaches which failed to achieve the desired level of harmonisation.

The European Union (EU) Treaty places certain obligations on the EU Members. One key element is the acceptance of EU legislation (EU Regulations) as legally binding and which override national legislation for the same provisions. Since 2000, the EU has taken a greater interest in aviation

matters and in 2003 established the European Aviation Safety Agency (EASA)[29] based in Cologne. EASA took over the role of the JAA for the EU Member States although the JAA continued to exist for some time to serve the interests of the non-EU JAA Members. The JAA has now ceased operations so non-EU JAA Member States have now adopted the EASA regulatory framework.

The EU also introduced some essential requirements[30] for aviation through Regulation (EC) 1592/2002 and some supporting Implementing Rules for aircraft certification (Regulation (EC) 1702/2003) and continuing airworthiness (Regulation (EC) 2042/2003).

EASA are now in the process of introducing further Implementing Rules for Operations and Licensing and ultimately will do the same for Aerodromes and Air Traffic Management. The UK Civil Aviation Authority is designated the Competent Authority for the purposes of implementing EASA requirements.

The European Commission published a document in January 2008[31] outlining their view of what ought to be done to help provide for the sustainability of General and Business Aviation. The paper clearly established that there is a lack of definitive data against which to measure those sectors. It also concluded that it was difficult to accurately define what general aviation in particular consisted of. However, of key importance was the Commission's belief that 'one size does not fit all'. This is clearly suggesting that there must be proportionality in the rules, and their application.

At the time of compiling this report, following a consultation exercise with industry and NAAs in 2011, EASA has established a working group to look at the implications of the regulatory structure of Part M, the continuing airworthiness requirements. Industry and NAAs have been critical of the perceived heavy handedness of the requirements of Part M as currently written and EASA has committed itself to a review. This subject is discussed in more

[29] EASA holds responsibility to act as the interface between the European aviation industry and the European Commission (the executive arm of the EU). EASA helps develop proposals for European aviation rulemaking but it is the EU that enacts the legal change. EASA also acts as the 'de facto' State of Design for the EU member States.

[30] The Essential Requirements establish a broad baseline, in the same manner as UK Primary legislation, under which Implementing Rules (UK secondary legislation equivalent) can be placed, providing greater technical detail on the requirements to be met.

[31] An Agenda for Sustainable Future in General and Business Aviation: Brussels, 11 January 2008

COM (2007) 869 final.

detail later in the report.

The EASA Management Board has also expressed concern about the lack of proportionality in the EASA regulatory framework towards general aviation across all disciplines. It has been decided to set up a working group to look at this issue, covering all GA activities and this may well lead to a radical change in EASA's regulatory approach.

Although this is not discussed in detail within the report, the RA2 work itself is likely to throw up subject matter that may influence the thinking in that group. The opportunity has therefore been taken to use the research from this programme to contribute to the UK's input to the discussions within the working group. The future strategy that comes out of the Management Board's deliberations may well have scope to revisit some of the issues in this RA2 review.

Our UK regulatory framework is therefore inevitably impacted by this significant change in the hierarchy and scope of the legislative provisions that affect aviation. Industry is clear that they desire a regulatory framework that is proportionate and fit for purpose. This programme has taken account of all of these different facets.

The UK Regulatory Framework

As noted above, the UK aviation industry is now subject to two sources of aviation regulation. These are UK legislation, such as Acts of Parliament[32] and other Statutory Instruments[33], and the increasing proliferation of European legislation, typically in the form of European Regulations and European Directives. It is important that these divisions are understood when looking at any potential change in regulatory approach.

European legislation derives from the UK's membership and obligations under the treaty that establishes the European Union (EU), its goals and its legitimate authority to allow the European Parliament and the European Commission (EC) to establish law. That legislation, in the form of EU Regulations, affects all EU

[32] An Act of Parliament such as the 'Civil Aviation Act 1982' is a form of primary legislation and usually establishes a high level framework for other legislation or subsidiary requirements to sit within.

[33] A Statutory Instrument such as SI 2009 No. 3015, the 'Air Navigation Order 2009' is a form of secondary legislation and sits under the higher level framework of the Civil Aviation Act. The 'Act' has provision for the establishment of the Civil Aviation Authority and for it to establish an Air Navigation Order.

Member States and supersedes the equivalent provisions in UK law. An EU Directive, however, must be enacted through UK law in order for the intended requirement to become effective.

In its own right, the UK has a long established national legislative framework stemming from the beginnings of a more formalised approach to civil aviation in 1919. The backbone of this is the primary legislation that is the Civil Aviation Act. The Civil Aviation Act (the 'Act') contains provision for the establishment of the CAA. The Act also has other provisions on the regulation and conduct of many aviation activities. The Act provides for the CAA to put in place other regulations and these can be seen in other aviation related Statutory Instruments such as the Air Navigation Order, the Rules of the Air (SI 2007 No.304), The Air Navigation (General) Regulations 2006 (SI 2006 No. 601) and The Civil Aviation Authority Regulations 1991 (SI 1991 No.1672).

Of course, even the ANO is fairly high level in its approach in some areas so it is supported by other requirements, instructions and guidance. Most of these requirements can be found in Civil Aviation Publications (CAPs) issued by the CAA. These include airworthiness requirements such as CAP553 and 554: British Civil Airworthiness Requirements (BCAR) and CAP747: Mandatory Requirements for Airworthiness and operational requirements such as CAP660: Parachuting and CAP403: Flying Displays and "Flying Displays and Special Events: A Guide to Safety and Administrative Arrangements.

Many of the CAPs, although they lay out the requirements to be met, are not strictly law but represent an effective way of satisfying the legal requirement that sits in the ANO.

The European system differs slightly. Aviation legislation is provided for at the highest level in two or three lines in the EU Treaty[34]. This allows for the establishment of essential requirements, much the same as the UK's primary legislation. The essential requirements for aviation safety are now provided for under Regulation (EC) 216/2008, known as the 'Basic Regulation'. This continues the provisions originally made under Regulation (EC) 1592/2002, which set up the European Aviation Safety Agency (EASA) to act as the administrative body and executive body for civil aviation safety on behalf of the

[34] Although European collaboration has been around for some time, the concept having been discussed in the aftermath of the Second World War, the EU in its current form was not set up until the Maastricht Treaty was signed in 1993.

EC[35].

The Basic Regulation sets out EASA's remit for scope of operation. Originally this was very much limited to aircraft certification and continuing airworthiness matters but, with the most recent changes that scope now extends into the areas of flight operations and flight crew licensing, with further provision for air traffic management and aerodromes to follow.

The regulation of industry activity is conducted under the provisions of Implementing Rules (IR), such as Regulation (EC) 1702/2003 covering aircraft certification matters. These regulations are supported by Acceptable means of Compliance (AMC), Illustrative and Explanatory Material (IEM) and Guidance Material (GM). The IRs take a slightly different approach than the previous UK legislation and there is greater prescription giving less scope for a flexible interpretation to be made.

The UK therefore operates a mix of European and national rules at present according to the type of aircraft and its use and the introduction of further EU legislation implies that there will be a continuing transfer from national to EU law.

[35] The European Commission is the administrative body of the European Union. It can create legislation which is then adopted by the European Parliament and the Council or Europe acting on behalf of the Member States.

CHAPTER 3

Regulatory Approach

Forms of Regulation

One further aspect to be considered in this review is of course the regulatory approach itself and the form that regulation takes. This is important as it determines the role of the CAA and how much oversight is applied directly, indirectly or even not at all, trusting the participants to adhere to whatever rules may be applied within the framework.

This Chapter seeks to provide some information on what regulatory structure exists, and why, so that readers are aware of the various options in later discussions.

Under the CAA's current regulatory philosophy, this falls into the following categories:

- Regulated
  - Organisational approvals
  - Certificates
  - Licences
  - Permissions
  - Exemptions
  - Authorisations
- Devolved
  - Organisational approvals
  - Licences
  - Qualified Entities
- Deregulated
  - No regulation
  - Self-Regulation, or voluntary standards

- Assessment Bodies

These terms reflect a gradual shift from the direct involvement of the regulator to industry and the individuals involved. These are explored further in the next sections.

Acknowledging the way that UK aviation regulation works and the current focus on better regulation by UK Government, there is scope to look at the suitability and effectiveness of the current regulatory structure. This may help identify options as to how that may possibly be changed if a different approach is taken to the way in which the risks of the activity are considered and the regulatory framework used as mitigation.

There are also non aviation regulatory requirements that need to be met. These include, but not exclusively:

- Health and Safety at Work
- Employment legislation
- Working Time Regulations
- Financial Governance

These have not been accounted for under RA2.

Regulated

Under the pre-EASA framework the UK CAA regulated organisations and individuals in a number of different ways. By regulation we mean the imposition of a set of requirements that individuals or organisations have to meet or comply with in order to have the authority to conduct their business within the regulatory framework or to perform a particular function, such as piloting an aircraft. Under the EASA system the same concept of approving organisations or licensing persons has been adopted.

For example, organisations performing aircraft maintenance could be approved to work within a certain capability, or scope of approval, which had been assessed and agreed with the CAA. Such capability was based upon competence, part of which is the need to have qualified engineering staff which in turn touches upon the need for engineer licences.

Commercial Air Transport operators were certificated by the issue of an Air Operator's Certificate once their intended operating rational, scope and scale of operations was accepted. This included not only the actual flight operations

element but also the need to manage the airworthiness of the operator's fleet of aircraft, currency of pilots and cabin crew.

Aerodromes are licensed by the CAA, although a number of airfields could operate successfully on an unlicensed basis if they were solely used for non-Commercial Air Transport or non-public transport flights. Flight training too had to use licensed aerodromes until fairly recently when the Light Aviation Airport Study Group[36] decided to review the requirements. This review very much focused upon opening up the regulatory mindset to 'new ideas of how safety objectives may be met in the changing operational and legislative environment'[37]. The subsequent revisions following the group's review allow flying training to be conducted from unlicensed airfields under certain conditions[38]. This was introduced into Article 208A of the ANO. This is felt to be a good example of how a more proportionate approach to regulation can be taken.

Individuals are also licensed for the purposes of performing as a licensed engineer or as a pilot or a member of the flight crew. In this respect, the licences granted underpin a basic competence assessment that the individual, at the point of issue of the licence, met some defined criteria in terms of knowledge, skill and experience. The ongoing competence is however measured by periodic assessments or tests. Where individuals are concerned it is more difficult, with any form of regulation to achieve much consistency in performance simply because each person is different.

A 'Permission' can be issued to allow someone to carry out an activity subject to the CAA normally being satisfied that the individual is capable of doing so, e.g. parachuting. These provide another way of creating some form of regulatory environment although with perhaps less prescriptive processes and procedures that full approval or certification would appear to imply. This could support the greater use of codes of practice rather than a hard and fast regulation.

'Exemptions' are very much as they suggest and provide an exemption and waiver against the normal provisions of the regulations. An exemption may be

[36] LAASG was formed jointly with industry in 2005 to consider changes to regulation specific to light aviation, whilst meeting safety obligations and maintaining the satisfactory safety regime established in UK general aviation. This followed the 2005 Joint Review Team (JRT) review of the CAA's charging regime.

[37] From the LAASG terms of reference.

[38] There still needs to be some form of assessment that the activity can be conducted in a safe manner.

temporary in nature, allowing transient operations for a limited period of time without full compliance. It is possible for the CAA to issue a longer term exemption of a more general nature, allowing an activity to take place without the need for individual exemptions to be applied. An example of the latter provision is the general exemption issued to allow non-ICAO compliant foreign amateur built aircraft to visit the UK. Obviously, it should not become the norm to 'exempt' individuals, companies or aircraft from the requirements as that suggests that the requirements may no longer be appropriate.

An 'authorisation' can be used to cover various forms of activity. A licensed engineer may be authorised by the CAA to carry out and certify work that sits outside of their licence privileges. In this example the engineer is authorised directly by the CAA. An approved organisation will authorise its engineers to certify for work that is carried out under the terms of its CAA approval. In this case, the engineer is subject to an indirect authorisation by the organisation, which acts as an intermediary. There are similar examples in the other aviation sectors that could be cited, such as authorised examiners for pilot licensing activities.

Inevitably, non-aviation specific regulation also cascades and has its effect on areas of aviation and impacts upon the way that aviation organisations conduct their business. A typical example understood by many is the Health and Safety at Work Legislation. This impacts almost everyone, even down to an individual level but is not a matter for the CAA to regulate.

It does however create a potential area for conflict as Health and Safety regulation does not apply in the air but does on the ground. CAA requirements can apply both in the air and on the ground. As a result, the CAA has a memorandum of understanding with the Health and Safety Executive on the interface between the two agencies, particularly in respect of aerodromes and ramp safety issues. However, it clearly shows the potential complex suite of requirements that apply although it is unlikely that those affected understand the distribution of responsibility between the two bodies.

The effectiveness of any of the above the regulation depends upon the level of prescription in the requirements, the complexity of the relationship to other rules and regulations and the willingness of the regulatees to play their part in meeting their obligations. If any proposed change in regulation is to be successful and achieved without any degradation in safety then everyone involved must be prepared to play their part.

Since 2003, the European Commission and EASA have introduced a series of

European Regulations which are increasingly marginalising the national provisions as the European law takes precedence. In this sense, the ability for the CAA and other NAAs to determine their own regulatory framework and requirements is reduced. Even where EASA has no legitimate authority[39] the NAAs still have to submit proposals through the EC system. This ensures that no conflict exists with European aviation law or the basic principles of the European Union as regards free trade and rights are concerned. For the end user, it does produce a more complex regulatory framework where the requirements may now arise from three different sources, National aviation, National other and EASA. And given that many aircraft are subject to mandatory insurance requirements set out in a European Commission Regulation, a fourth source is to be found.

The regulated environment can therefore be complex and difficult for a layman to understand. For example consider the following scenario:

- A pilot wishes to hire an aircraft to conduct a cross country flight.
- The aircraft must be:
  - Registered under the ANO (National regulation)
  - In possession of a valid Certificate of Airworthiness (EASA or National regulation)
  - The aircraft must be insured (European regulation)
  - The aircraft maintenance must be up to date to an approved schedule and properly certified by an approved organisation or licensed engineer (EASA or National regulation)
  - Properly equipped and approved for 'hire' under EASA requirements and ANO Schedules (EASA or National regulation)
  - Any Airworthiness Directives complied with along with any restrictions on engine overhaul (maximum 20% extension beyond TBO if hired out etc. (EASA or National regulation)
- The pilot must be:
  - In possession of an appropriate pilot licence (National regulation becoming a mix)

[39] The remit of EASA is specifically defined as part of the essential requirements outlined in the Basic Regulation (Regulation (EC) 216/2008).

- Have a valid medical (National regulation becoming a mix)
- Satisfy the provisions for equipment for the flight, e.g. maps etc.
- Satisfied with the planning for the flight, the fuel on board and the weight and balance of the aircraft
- Satisfied that the weather is suitable for the intended flight
- Current (90 day rule) if intending to carry passengers
- Current (28 day rule) if the club requires it for their insurance
- Responsible for completion of the pre-flight check

- The conduct of the flight must account for:
  - Rules of the Air
    - Heights
    - Congested areas and the ability to glide clear in the event of engine failure
    - Visibility etc
  - Avoidance of other aircraft
  - Compliance with Airspace restrictions and Air Traffic requirements, where appropriate
  - Deteriorating weather and the need to divert or return
  - Potential technical problems

It is easily seen that even a simple flight can involve dealing with the multiplicity of rules and regulatory requirements that are dependent, not only upon the pilot being aware of and complying with them as necessary, but upon a myriad or other individuals and organisations that are also subject to regulation, although it may be different to that which directly affects the pilot.

In looking at the regulatory approach the potential for putting forward a change to individual requirements or regulation must be considered against the total system. There is little scope in reducing regulation or adopting a different approach under one rule if another regulation simply fills the void that would be created.

Any change in regulation has an impact. This may be simply to reduce the

bureaucracy of the process without changing the fundamental way that the process works or the end product. For example, a pilot licensing process may be changed to allow the conduct of on-line exams through controlled exam centres around the country, or even abroad. This would allow potential candidates a more flexible approach as to where and when they take the exam, reducing the cost. It also offers a benefit in terms of the difficulty in getting to and from a venue if there are more of them to choose from.

However, the cost/benefit analysis of the change can be difficult to quantify, often because the cost is dependent upon the individual's circumstances and not something that broad assumptions can necessarily do justice to. This issue of cost/benefit cannot be ignored. It is part of any regulatory impact assessment but, in the absence of definitive data or substantive analysis, having to make assumptions can distort the true benefit.

Where the regulatory change is associated with a safety related issue the situation can be even more difficult to predict, particularly where the evidence that there is no safety issue is predicated upon an analysis of information that is driven by the very fact that the existing rule may influence behaviours. It may not therefore be a predictor of what may happen if the rule was changed or abolished.

Devolved Activity

In certain cases, an activity that is subject to regulation under the ANO may be devolved to or provided for in the scope of an organisation that has been approved for the purpose. This devolution means that the tasks are transferred to the organisation although the CAA retains the ultimate authority for the activity. This can be accommodated by approving an organisation to carry out work under a predetermined scope of approval.

The former system of 'regulated' approval allows the organisation relative freedom to carry out the activities within a defined scope of activity acknowledging that the company has a competence and capability to undertake the work. It allows the organisation to transact directly with potential customers, for example in the supply of aircraft maintenance services for an airline.

Alternatively the CAA could consider a specific 'contracted' arrangement where tasks are given to an organisation to undertake against a basic competence, but on a contracted task by task basis, if that is felt to be an appropriate mechanism. The organisation undertakes a task ostensibly on behalf of the CAA and then makes a recommendation to the CAA to take some action.

This latter alternative scenario suggests that separate, perhaps less flexible, arrangements that are contractually based are used. These would require that the CAA 'contract' the organisation, a 'qualified entity', to carry out a task, for example a design assessment of an aircraft, based around the organisation having demonstrated an basic competence to do so. However, being a 'contracted' activity a different governance mechanism would be required and this would be less flexible. A customer would apply to the CAA who would then contract the qualified entity to carry out the assessment, prepare a report and submit the results to the CAA. Whilst this has some value in exercising control of the tasking and the resulting output from the organisation it could constrain the freedoms we would ideally like to see.

As an example, consider the fact that many aircraft must have a Certificate of Airworthiness (CofA) and the CAA requirements will generally stipulate how such certificates are issued and under what conditions they can be renewed. In the past, the CAA sent its airworthiness surveyors to personally review the aircraft's airworthiness documentation and history and to physically survey the aircraft. The CAA may however decide that, under certain conditions, an activity such as the renewal of the certificate may be 'devolved' to industry rather than require that the CAA carries the task out itself.

This allows the CAA to step back from direct involvement in some activities where it can be satisfied that industry can perform the required work and, with suitable processes, ensure that an equivalent standard is achieved. This can be looked at as 'regulated plus' as it goes further than the minimum necessary to allow the company to function by embedding something that the CAA would otherwise do. In some instances it can easily be argued that industry, having performed the maintenance on the aircraft and being much closer to the owner or operator, is better placed to carry out the renewal activity as they should possess a more in-depth knowledge of the aircraft type, its airworthiness status and its documentation. However, there is a counter argument that requires confidence that the organisation can carry out the two activities in parallel with the requisite degree of integrity and avoid the potential conflict of interest.

In the case of the example of the CofA, the CAA does not usually allow organisations to issues certificates that are prescribed in the ANO, e.g. CofA, Permit to Fly or pilot licence. In other words, the CAA believes that the certificate must still be issued by the CAA. In the example of the CofA, the CAA has used a CofA with a fixed period of validity moving increasingly to a situation where renewal recommendations are made by approved organisations to allow

the CAA to renew the certificate[40].

However, if the philosophy of managing the certificate is changed so that it becomes a non-expiring certificate[41] which is periodically validated by an airworthiness review and issue or extension of an Airworthiness Review Certificate, the activity of renewal effectively becomes one which could be wholly devolved by having another form of certificate that sits at an appropriate level below the CofA. It therefore becomes an activity, i.e. renewing a second tier document, capable of being undertaken by industry providing certain criteria and processes are observed.

It should be noted that a devolved activity is not the same as it being delegated or deregulated. A delegated system would allow industry to issue the certificate as well, instituting a regulatory process that would be wholly conducted by industry. In extreme circumstances, this would remove the CAA from the oversight of the activity entirely. It is arguable as to whether this is a truly practical option for most activities as there is often the interests of any third party to consider and therefore the CAA still has to provide some assurance that standards will be kept in place. However, as will be seen later with the case of single seat aircraft, it is possible to deregulate certain aspects of the activity where the third party interests are not compromised.

The EASA Basic Regulation acknowledges that, in some circumstances, the regulator may wish to 'contract' the expertise of an organisation in the industry, or a specialist organisation. There is provision for the concept of a Qualified Entity (QE)[42], with a pre-determined scope of expertise and capability, which could be contracted by EASA, or an NAA, to perform certain tasks and to provide reports. This avoids EASA or the NAA having to carry out the detailed work itself. The emphasis is however on the 'contractual nature of the activity and therefore the work undertaken by the QE differs from scope of work that

[40] This was a key principle of the Light Aircraft Maintenance system under BCAR A8-15 (the M3 approval). Based upon the experience of the M3 process the CAA extended the principles of renewal recommendations to all CofA aircraft.

[41] This is the system which the CAA had adopted for certain Permit to Fly aircraft, primarily those operated under the Light Aircraft Association or the British Microlight Aircraft Association. The non-expiring CofA is now embedded in the EASA Part 21/Part M requirements and is being introduced nationally into BCARs for Annex II CofA types.

[42] A Qualified Entity has to have the expertise but the activity it undertakes must be separate from any activity that may be done under an approval. This is to avoid any potential conflict of interest or compromise on the tasks that are being undertaken under a contract between EASA (or NAA) and the QE.

may be granted to an approved organisation. This concept has been carried over into BCAR A8-22.

One organisation has been approved as a QE to date to carry out assessments of Unmanned Aerial Systems on behalf of the CAA. This organisation has not yet had any business of substance such that the viability of the concept for application to RA2 related organisations can be tested. This 'QE' based system is very much the alternative scenario discussed above and has its place in the regulatory environment.

Delegated

Under a delegated system, compliance with requirements or a code of practice is handed over to individuals or organisations that hold delegated authority to work on behalf of the NAA to carry out certain functions.

The US Federal Aviation Administration (FAA) makes considerable use of delegated representatives under the aircraft engineering requirements. This includes the ability to approve repairs or to issues certain certificates, e.g. Certificates of Airworthiness for Export, rather than have the FAA do the task themselves.

The UK and EASA system does not have a comparable provision to the US model. Repairs and modifications can be conducted and approved through CAA or EASA approved design organisations. However, there are limits as to what can be cleared without reference to the regulator.

The CAA has not felt to date that delegated functions offer considerable benefit over the current system of approving organisations or devolvement of activity to industry as delegation effectively excludes the CAA from the activity[43]. If such an approach is desirable then deregulation may be the better option, e.g. the recent deregulation of single seat microlights as noted above. The CAA will however, continue to consider whether this presents a viable way forward against other options when reviewing the individual projects that follow on from this review.

Deregulated

Deregulation speaks for itself.

[43] The driver is the obligations of the CAA under the Civil Aviation Act and how these affect the CAA's ability to withdraw from the process of being directly involved, either partially or completely.

However, the deregulation may extend only to part of the regulations that apply to the aircraft or aviation sector.

If we talk about an activity being deregulated it is effectively not subject to a particular regulation. This means that the CAA will take no direct involvement in the activity or carry out any oversight. That does not mean that the CAA will not have any interest in what goes on. For example, as will be seen in more detail that hang gliding is deregulated in relation to many aspects. There are still some rules, e.g. The Rules of the Air, which need to be followed. However, it will also be seen later that the CAA is still interested in the accident statistics and the relative level of safety that is achieved within that sector.

It is perfectly feasible for a regulated activity to be looked at and moved to a deregulated basis. As will be seen later, this was the case with the deregulation of single seat microlights. On the other hand, the safety record of a deregulated activity may become such that it again comes under public or political scrutiny and becomes subject to pressure to come under some form of regulation. An example of this is the original imposition of airworthiness requirements and permits to fly for microlights, introduced in 1984.

EASA Framework

No discussion on the regulatory framework would be complete without some inclusion of the European rules which has already been touched upon briefly. As mentioned above, they are becoming increasingly relevant as EASA's remit extends into areas other than airworthiness.

The fundamental premise that gave rise to EASA and the EC's interest in aviation safety matters is the issue of harmonisation across Europe. This first focused upon aircraft certification and airworthiness but as EASA has developed so too has the breadth of activities that now fall under their control. The principle of common standards and systems and the freedom to move and work across EU Member States is a key feature of what EASA is trying to capture in its rules.

The rules themselves are drawn partly from those that were in place under the Joint Aviation Authorities (JAA) and partly from EASA filling the gaps with new rules where the JAA had no provision. Where there were JAA rules, the requirements are therefore quite mature. Where no JAA rule existed the EASA requirements are perhaps less mature, or unproven, even if they pick up on the combination or rationalisation of national practice that existed in the Member States.

There is a risk that, in developing new requirements, EASA will put in place a requirement that is not the minimum standard that already exists as that required by ICAO but seek to legislate at a higher level. This immediately introduces an issue for some States where they have to raise their game to comply, whilst others can afford to relax their pre-EASA rules to match the new standard.

There is also a risk that, in adopting a common approach, EASA will not give adequate consideration as to the economic burden placed on industry by requirements, perfectly suited to large complex aircraft and operations, being applied indiscriminately to less complex aircraft and operations. In this sense, one size definitely does not fit all. It also does not account for moving to a higher standard of compliance where there is no justification to do so on safety grounds. In other words, the additional requirements cannot be supported by evidence of improvement to safety levels although their do require more investment to comply.

It is clear that, in this respect, the EASA Implementing Rules have been widely criticised by industry and aircraft owners as being disproportionate, particularly for aircraft operated privately and for recreational purposes. Industry claim EASA has introduced considerable additional cost without any of the identifiable benefit in aircraft safety alluded to above. This view is reflected across many of the EASA regulations and their provisions.

It is particularly true however of the introduction of Part M which is seen as overly bureaucratic, as it takes away the historic authority held by licensed engineers to manage the airworthiness of an aircraft without imposing a need to approach an approved organisation. This inevitably is seen as introducing additional cost as the organisation’s overheads need to be met. Part M did not exist under the JA system and therefore was not a proven or mature requirement.

EASA reluctantly agreed as Part M was being launched to the need for a Regulatory Impact Assessment (RIA) and this was written into the regulation when it was first issued. This required the RIA to be conducted by March 2005, two years after the rule was introduced. The RIA was carried out, albeit later than intended, by Air Eurosafe and several recommendations were made to EASA in Air Eurosafe’s report which, if adopted, would have provided alleviation against the perceived prescription in the rules for private aircraft that now exist.

It is understood that the recommendations were not adopted as proposed and EASA sought to carry out a further review under the auspices of two working

groups, entitled M.017[44] and MDM.032[45].

The group's terms of reference were widely based and included pilot licensing (a review of the JAR-FCL rules[46]), the development of operational rules that were proportionate to the complexity of the aircraft, the potential extension of certain EASA rules to third country aircraft and, importantly with regard to airworthiness, to rethink the implementation applied to the airworthiness of simple aircraft. In hindsight, it would have perhaps been far more effective to adopt the recommendations made by Air Eurosafe for Part M whilst setting up a group to look at the higher level or regulatory proportionality for GA. In any case, it is clear that EASA failed to take the issue of proportionality seriously and industry has paid the price (of having to comply with the additional disproportionate requirements) as a result.

Although there has since been some movement in terms of meeting its aims to simplify the regulatory framework, there have not been the changes that industry believes would represent a proper proportionate response. The requirements therefore continue to give cause for concern. There is also pressure from the EC which had declared its own position in a paper which looked at the issues surrounding the sustainability of general and business aviation. Whilst not focused wholly on recreational aviation, the EC paper clearly advocates a more proportionate approach requiring legislation only where necessary and some sense of scale in line with the complexity and nature of the operation. In this sense the aims are wholly consistent with the UK Better regulation initiative.

EASA has bowed to continued pressure from industry and taken this on more recently. It undertook a snapshot review of the airworthiness regulations that affect general aviation by inviting comment[47] from industry, aircraft owners and NAAs alike. The resulting feedback was analysed and EASA's summary of the response and their intentions were outlined at a workshop in Cologne in

[44] WG M.017 was instituted in April 2006 to take the Air Eurosafe RIA (transposed into NPA 7/2005) forward.

[45] WG MDM.032 was set up in February 2006 to look at the 'Regulation of aircraft other than complex motor powered aircraft, used in non-commercial activities'.

[46] JAR-FCL rules are still applicable at the time of the review. EASA Implementing Rules for flight crew and pilot licensing is due for entry into effect in April 2012.

[47] EASA invited comments on Part M to be submitted to them in time for a 'Part M General Aviation Workshop' held 27 October 2011.

October 2011[48].

EASA clearly accepted many of the arguments put forward and have agreed to look at further alleviations and revisions to the rules. However, this creates a divergence between the actual rule at this time and the potential alleviations that may be agreed in the future. It also does nothing to address the costs already incurred. A proposal for future change may be too late if the costs of compliance are forcing owners and organisations out of the marketplace. The outcome of those deliberations is not known at the time of writing this report.

Moving on from the issues discussed above, there is also potential for EASA to impose regulation that sits at odds with comparable rules in the rest of the world. This brings into focus the question of overregulation, either intentionally or by a lack of consideration of the consequences. Other aviation authorities such as the FAA cannot have got it completely wrong and yet EASA faces considerable criticism from industry about the lack of proportionality in the European requirements. The inclusion of requirements in Part M which require compliance with the manufacturer's recommendations for continuing airworthiness, without exception, unless an alternative proposal is accepted by the NAAs, also add cost without any clear safety benefit. If the issue was truly of safety significance it ought not to be simply a recommendation. It should be mandated.

EASA's position on this sits at odds with the comparable requirements of Federal Aviation Requirements in the USA under FAR-43 for private aircraft. This means effectively that EASA has created a barrier to the import[49] of older US and similar non-EU products where the manufacturer's recommendations may not have been complied with under the provisions of the applicable US or other State law. Industry has lobbied hard to both the European Commission and EASA over this subject but has seen little acknowledgement from EASA about the practical implications of the requirements although it does seem to form part of industry's most recent submissions for consideration.

It is clear that additional cost to embody manufacturer's 'recommendations' means that an aircraft owner, flying group or flying club has less money available to fly. As a consequence, a pilot's ability to maintain recency of flying experience is compromised. Licence statistics show a steady decline in pilot numbers and aircraft owners are beginning to lay aircraft up as the costs mount

[48] The information can be found on the EASA web-site at www.easa.europa.eu.

[49] Aircraft imported from the USA may not be in compliance with the manufacturer's recommendation, including engine overhaul lives.

and the continued affordability of flying that aircraft comes into question. Within a club environment the costs are absorbed into overheads which are part of the charge out rate for the aircraft. However, this cannot be ignored either as it ends up making it more expensive in turn to rent. Industry representative bodies have expressed their concern at the apparent drop in new entrants learning to fly and the gradual decline in aircraft ownership and flying.

This may well be seen in the future safety statistics if a lack of recency increases the risks of having an incident. It is not known if it is a feature of the currently available accident and safety data as information on pilot recency at the time of the incident is not always available. It is recognised that EASA has agreed to look at non binding guidance on TBO intervals[50] but this does not adequately address industry's concerns about parity with the US situation.

EASA has also assumed responsibility for all certification tasks on aircraft that fall within the Basic Regulation. The cost associated with getting EASA approval of a modification is significantly higher than that applied under previous national rules. There is concern therefore that some modifications may be carried out without the proper approval being obtained. This does not mean that the work is unsafe but the lack of approval does invalidate the CofA and will probably invalidate the aircraft's insurance in the event of an accident.

The various NAAs had the competence to approve modifications in the past, prior to EASA. There is therefore potential to minimise the bureaucracy of the system if EASA was to allow NAAs to approve modifications directly for certain types and classes of aircraft, at least covering the majority of GA aircraft. Perhaps this is something for industry and NAAs to persuade EASA to look at without compromising their overall philosophy of common and harmonised standards.

An opportunity to do so has now arisen with the EASA Management Board (MB) agreeing to look at the strategic issues of what the regulation of GA under the European system should look like. This is very much in line with this RA2 programme and there will likely be much useful input that can be submitted to the working group, derived from the analysis conducted under RA2.

[50] WG MDM.038 was set up in June 2009 to look at non-binding guidance in TBO intervals. Stemming from differences between NAAs in the control of engine TBO the group is tasked with looking at the wider issue. However, there is still concern that this will still result in an imposition of manufacturer's recommendations irrespective of the non-mandatory nature of them.

Risk Based Regulation

So far the discussion on types of regulation has looked at the baseline provision of a regulatory framework that allows companies or individuals to do certain things under the oversight of the aviation authority. A lot of this sort of activity is covered by a compliance based philosophy. This fundamentally assumes that a good outcome, in terms of an organisation's performance and safety, is guaranteed simply through complying with the requirements. It also assumes, often incorrectly, that a simple compliance will achieve the desired outcome.

This is not quite true as many, if not all, organisations have to address a variety of influencing factors and have operational pressures to balance in order to comply. An example of this is clearly apparent at the point of writing this report. The global financial crisis quite clearly depresses activity within the recreational aviation sector as it is heavily dependent upon an individual's disposable income being available to finance their flying activity. Less finance means less flying and therefore creates a general impact on many of the industry's players, flying clubs, maintenance organisations etc.

For example, aerodromes see fewer aircraft movements so to cover costs their landing charges increase. They may also seek to cover their costs by imposing additional charges on pilots, e.g. increases in hangarage and parking, to cover the reduction in income from flying. There may also be the imposition of charges for aircraft performing a go-around, e.g. as at Shoreham, bringing in additional income over and above the fees that would be expected for landing or touch and go manoeuvres.

This latter income helps the aerodrome's financial performance in part but creates the potential for an unsafe situation if a pilot continues an approach into an unsafe situation, landing long or in an unstable condition resulting in a bounce on landing. There may also be a subconscious desire on the part of the pilot not to incur that go-around fee. A continued focus or belief that they had to land after a serious bounce rather than go-around may result in a nose leg overload and undercarriage collapse. Whether the pilot has time to think along these lines, when trying to recover from the bounce, is open to argument.

From this, it can be seen that what makes sense for one purpose can have unintended consequences in another area. Most organisations have that balance to achieve.

Another example may be a desire to cut operating costs in time of financial constraint by reducing staff numbers. Does this impact upon individual workload

among the remaining staff? Does the increase in workload put pressure, real or perceived, on the individual to work to unrealistic timescales? If they do not have the freedom to complete all aspects of the work without undue pressure, are the standards of completion compromised?

The answer to how the effect of the conflicting pressures impact upon an organisation's performance may be risk based regulation. In its broadest sense this means looking not only at compliance with regulations but performance against the desired or intended outcomes. This can be achieved by looking at and analysing performance against pre-determined criteria.

From a regulatory oversight perspective, a risk-based approach allows the regulator to focus his resource in the activities that offer the greatest safety benefit. This benefit can vary, dependent upon the nature of the activity that we are talking about. Clearly for organisational approvals, being able to assess the relative risk of one company against a benchmark offers the opportunity to reduce or increase the oversight as appropriate.

Oversight could be reduced to the minimum to establish compliance with the requirement and to be confident that the organisation's performance was continuing as expected. However, there still needs to be some means of capturing any change in the organisation's circumstances so that any threat to maintaining the level of performance can be assessed.

Oversight would be increased if there were contra-indicators that suggested the organisation's performance was in question or at risk. Examples of this could be an increasing incidence of occurrences, changes in personnel or the addition of a new aircraft type.

From a regulatory framework perspective, risk based regulation is about how much needs regulating, how much can be devolved to industry through appropriate mechanisms and how much can only be done by the regulator. It is also about how much confidence the regulator has in organisations and individuals so that they are given some autonomy and what may undermine that. Devolution of activity requires each individual and organisation to play their part in the total system with the appropriate degree of integrity.

Risk based regulation is therefore a mix of risk based oversight of organisations, making periodic assessments of their compliance with the requirements as well as their performance in delivering the expected outcomes. Risk based regulation further extends into identifying the scope for the proportional application of a regulatory framework, from the full regulated model

explained above through to some measure of particle or full deregulation.

This proportional application of regulation, and how much 'freedom' to give individuals and organisations, is at the heart of the RA2 programme.

The Cost of Regulation or Cost/Benefit

Regulation inevitably involves some degree of cost[51], whether directly or indirectly incurred. Looking carefully at the cost of regulation usually vis-à-vis a cost/benefit analysis has to be part of the work that follows on from this RA2 programme. It ought to be done as a matter of course.

In talking about the cost of regulation, for many the primary issue is the financial cost of ownership where recreational aviation is concerned. Many pilots will never aspire to actually owning an aircraft, even an amateur built LAA type, as it simply stretches their disposable income too far. Others are far better situated with an income that freely allows them to pick the best without having to 'mind the pennies'. At either end of the spectrum, changes to regulations may affect an individual's propensity to own or fly an aircraft. Understanding these impacts is essential, in particular to ensure the suitability of that regulation at the entry level.

The breach of regulatory requirements, such as an airspace infringement also incurs a cost, in this case non-financial, partly in respect of the erosion of the safety margins that the regulation provides for. For example controlled airspace is defined to create areas where there is greater segregation of different types of operation and therefore reduction of safety risk. For the purposes of this review this is seen as the cost to industry or cost to third parties.

The other issue is the trade-off between putting regulation in place and looking at alternative non-regulatory solutions, intended to achieve the same outcome, where the individual is incentivised to act in a particular manner, for example through reduced oversight or greater freedoms. For the purpose of this project the use of incentives or incentivisation could provide opportunities to do something different than simply add to the regulation or regulatory burden.

These three issues are part of the cost/benefit issues explored within this programme and are discussed further below.

[51] The cost can be financial or non-financial. Financial costs can be determined quite readily. Non-financial costs can include restrictions on operating freedoms and may be more difficult to quantify.

Cost of Ownership Issues

The potential to change regulation or react to safety threats inevitably involves the aircraft owner and the associated costs of ownership. If an individual has a fixed budget to allocate to their flying then the effect of an increase in the costs associated with aircraft ownership upon the other various elements cannot be ignored.

As noted before, increased cost of ownership could potentially undermine the individual's willingness or ability to maintain a good level of flying such that, recency, pilot proficiency and interest are marginalised to some extent or other. Conversely, if a cost reduction can be achieved, through the move towards more proportionate regulation or removal of additional requirements then the individual may be able to increase their flying with the benefits that provides. Cost-benefit analysis exists to make sure that any change is appropriate, proportionate and not just an arbitrary imposition of something extra. This is at the core of the better regulation principles.

Owning an aircraft involves the capital cost and this varies considerably from a few thousand pounds to hundreds of thousands. That actual capital cost of an aircraft is dependent upon so many different factors. Is it an older aircraft? Is it amateur built? Is it for leisurely local flights or continental trips? Is it the latest technology? What seating or payload capacity does it have?

These factors mean that the capital cost is largely down to the individual's preference and intended scope of use. The capital cost of a small aircraft, which can range from a few hundred pounds for a second hand hang-glider or paraglider to hundreds of thousands for an ex-military aircraft or a more modern high performance aircraft such as the Cessna Corvallis is only part of the equation.

Although the capital costs vary significantly this is not unlike other hobbies or leisure pursuits, such as sailing, where the capital costs of entry to the activity range significantly from few hundred pounds for a small dinghy to hundreds of thousands for a new 38 metre or longer yacht. The capital cost can be spread by seeking finance or distributed across several individuals by establishing a group. This helps share the overheads whilst still leaving the individual responsible for the direct costs associated with the flying they actually do.

The mandatory requirements for insurance, brought about by European regulation substantially increased the costs to be borne by many owners. This may be a reflection of the lower level of insurance cover held by many prior to

the introduction of the European requirements. It may however be equally a reflection of the over onerous imposition of levels of insurance that are disproportionate. The insurance premiums are, at least nominally linked to the costs the insurers have to meet.

Too many aircraft accidents leads to a myriad of repair bills and given the costs of maintenance and replacement parts highlighted above anything that can be done to reduce incidents and accidents has to have a beneficial effect for all. Safety interventions can therefore be seen as beneficial if they have an effect on insurance payouts. Shopping around for insurance is not as easy as for motor car insurance as aviation insurance tends to be dealt with by fewer specialist organisations. The quotes for a group operated Cessna 172 for 2012/13 ranged from £1700 (albeit with some conditions on excess) to £4700 (up from £2400 for continuing with the existing provider who obviously did not want the business). Hangarage or airfield parking adds to the annual costs, typically £250 - £400 and £150 – £250 per month respectively.

Each aircraft must be certificated and this can vary according to the type of aircraft and whether it needs to meet the full requirements of a CofA system or whether there is, for example, an ability to make use of the sporting organisation type support that LAA or BMAA can provide. The certificate, whether it is a CofA or Permit to Fly, needs periodic revalidation or renewal. In some cases, this is done directly by the CAA as the regulator and involves a cost, over and above that incurred in maintaining the aircraft.

In recent years the CAA has moved towards a model for such activity that is focused on more devolution, allowing approved organisations greater freedoms to carry out the renewal without CAA involvement. This shifted the responsibility for the activity to industry and consequently the CAA reduced its fees for the validity periods associated with the certificate. However, in many cases, industry is charging an additional sum for carrying out the exercise that has now been devolved to them. In part this shift in regulation could be seen as an incentive to take that responsibility on.

Whether the resulting effect on the cost of ownership is more or less depends upon the charge levied by industry. This is based on the fact that the organisation, if it is doing its job properly, is already carrying out the airworthiness review work as part of the maintenance regime. In principle this is little more than the organisation is doing, or should have been doing anyway, but because it is a new ‘function’ and results in the issue of a ‘certificate’ for many the charge for doing the work is now openly recoverable.

How much does it cost to issue a ‘certificate’ on the strength of what was already being done? In practice we have seen that this has added £300 - £1000 per year to the operating costs. Whether this is simply an opportunist approach or has some substance in that it requires additional work to be done is open to argument. The example does however show that a change in one sense does not always provide the benefit we would wish to see.

An aircraft must be maintained periodically to assure its airworthiness. Unless the aircraft is an amateur built aircraft or the owner is a qualified engineer this will require the involvement of a qualified engineer. The costs of maintaining even a luxury car often seem insignificant against the cost of aircraft maintenance, particularly if the owner has to pay the engineer on an hourly basis. Although many aviation maintenance organisations charge manpower rates that are often significantly lower than the equivalent automotive servicing organisations the time to perform aircraft maintenance is often considerably longer as the inspections involve much more. Cost of spares is another large expenditure with the smallest components costing many times what the local auto store would charge for an equivalent part.

Another issue that routinely comes to the attention of the CAA is the poor airworthiness standard of some aircraft. There is clear evidence that some owners shop around for maintenance at the lowest cost and this eventually leads to a discernible effect on the aircraft’s condition. There is also a risk that engineers, in trying to accommodate an owner’s difficulties in meeting the cost of maintenance, will ‘defer’ some items for a further period until the next inspection. This is always based upon a judgement call but when viewed in conjunction with the shopping around there is every possibility that something may get missed. In any case, such deferral can often lead to added cost when the task is eventually done.

With the increasing age of much of the GA aircraft fleet, the needs for maintenance inspections, repairs or replacements of components are often more demanding and costly than more modern types. Cessna, for example, have just introduced ‘ageing aircraft’ requirements with additional inspections to be performed on the aircraft structure. Although adherence to a good maintenance regime may offset some of these ageing aircraft requirements there is likely to be more to be done or inspected. This adds to the number of hours that an annual inspection will take to complete. With many GA aircraft being manufactured over 30 years ago this is not an issue to dismiss lightly and something which is actively under review.

Many of these costs cannot be avoided as the required maintenance is

necessary to ensure the airworthiness of the aircraft. However, if the regulation also makes it a requirement to comply with all manufacturer's recommendations irrespective of whether there is a real safety issue or just the manufacturer covering the potential for a product liability suit, then the additional costs of complying with those extra, but not essential safety requirements, can be significant. Recognition that they are only recommendations and are therefore discretionary significantly eases the financial burden of arbitrary compliance. If there is safety significance to the task then it ought to be an Airworthiness Directive.

In taking this approach, the system becomes more proportionate. True safety issues are addressed but the owner is left with the freedom to decide on how much extra they want to do. Unless an owner flies frequently during the year, offsetting such maintenance costs over a higher number of flight hours, it can be seen that the consequent distribution of the annual costs again significantly impacts the actual hourly cost. For example, an annual bill of £3000 spread over 100 hours equates to an hourly cost of £30. If the level of flying is halved to 50 hours then that hourly cost is doubled.

Over and above the maintenance issues, safety Interventions to deal with specific identified threats may result in the recommendation of a technological solution. The proposal to fit Mode 'S' transponders to all aircraft provides a possible solution to airborne conflict. It adds to the cost of ownership, particularly if the cost of the equipment cannot be reduced. It also adds to the costs of maintenance as well as it possibly introduces a requirement to add inspection requiring separate expertise, e.g. the radio or avionic engineer, in addition to the normal inspection regime.

However, the cost/benefit equation for such a proposal must also take into account the simple fact that the technological solution is only wholly effective if every aircraft has the equipment fitted, switched on and those transmissions are being made use of by a radar facility that is in communication with both aircraft that are within the area of a potential conflict. Assuming that the aircraft may be working different air traffic providers and still meet the VFR/IFR rules then the use of a further technological solution that introduces on-board traffic information display for the pilot is the only logical step. Once again, further extra cost to the owner. How to ensure that individual pilots react appropriately to the on-board warnings is another issue to be thought about.

The overall cost has then to account for the direct operating costs such as fuel, landing fees, navigation charges and the routine costs of aviation maps etc. General aviation aircraft also find themselves unable to avoid handling charges

at some airports, adding significantly to the cost of using that airfield but where, for the leisure pilot, the handling function actually adds little value. This is a growing concern as the charge, often around £30 - £50, is effectively becoming a barrier to general aviation if such handling charges are applied to GA aircraft.

This may be a deliberate ploy on the part of the airport operator, who may see general aviation aircraft as a nuisance rather than recognise the importance of such activity to aviation overall or to accommodate all comers. This latter scenario is an issue that has been discussed as part of the GASR and within the GASF. It has therefore been excluded from the RA2 review.

In looking at safety initiatives and regulatory changes to satisfy a response to safety issue, it is essential to think about what benefit it offers and show how this influences the cost of ownership. With regard to the adoption of changes to accommodate the Better Regulation principles, consideration has to be given to the costs associated with any transfer of responsibility, assuming that there will still be some level of control required, just not the direct involvement of the CAA as the regulator.

The Cost to Industry or Third Parties of GA Actions

In many instances the actions of a GA pilot can have limited or far reaching effects. For example, in the case of two aircraft flying in class G airspace, e.g. uncontrolled, each navigating under VFR rules there is heavy reliance upon a good visual lookout. If one or both pilots are not keeping a look out for other traffic then it creates the potential for an airborne conflict event.

At best this results in the two aircraft coming in close proximity to each other before they recognise the conflict and take avoiding action or simply are lucky enough to miss each other. At worst the potential conflict escalates into a mid air collision, with the inevitable threat to the safety of those on board and, although relatively rare, the potential for third party injury death or damage to property.

No one wants to contemplate any loss of life but it is an inevitable risk in any form of transportation in a mechanical vehicle. Safety Interventions can be developed to try and manage the threats that are identified, through events that actually occur or by analysis of occurrences or supporting data (the concept of pre-cursor data). However, how do you balance the cost of that intervention against the benefit that can accrue? Is it reasonable to expect that owners or industry should accept safety interventions at any cost? The issue of what is an acceptable level of risk and how that affects the decision to change the

regulatory environment is discussed at length later in this report.

Given the limited disposable income among many of the participants, as it is not the 'rich man's sport' that it is often perceived to be, the imposition of additional equipment or further regulation which introduces cost to achieve absolute safety would destroy the viability of many organisations and cause many owners to question the affordability of their hobby. In other words, we are back into the cost of ownership arguments in section 3.8.1 above.

However, the actions of a GA pilot in certain circumstances may not be so obvious or limited to an aircraft in close proximity. Take the case of airspace infringement. In most cases the infringement is down to a GA pilot passing too close to the controlled airspace or simply not being aware of it due to poor planning and preparation. When an infringement takes place, air traffic is obliged to activate restrictions on operations within that area. This may mean stopping take-offs and landings, ordering aircraft to go-around and hold, diverting aircraft to other airfields etc.

Stopping take-offs involves the cost of the additional fuel burnt on the ground by the aircraft that are affected. An aircraft ordered to go-around and hold suffers the same cost of the additional fuel and the consequential costs of delays etc. An infringement is not therefore simply a matter of going over an invisible line in space.

It is easy to talk qualitatively about the cost of such impact should an infringement take place. It is more difficult to quantify the actual cost of an individual event. An infringement at Bournemouth may not affect many aircraft due to the traffic density. A relatively short term infringement on the Northern edge of the Heathrow zone by comparison may involve many aircraft, including the Airbus A380 and Boeing 747. How do you begin to quantify the cost involved in such situations?[52]

The consequential effects are a back log at the airport, delays to departures, inconvenience to the passengers and subsequent delays and cancellation to

[52] A single aisle Boeing or Airbus will use a few hundred kilograms of fuel when holding for a 20 minute period. For a Boeing 747 or other wide body aircraft this could rise to approximately a metric Tonne of fuel for the same period. An infringement that stops operations for 20 minutes until the threat abates would mean that several aircraft could be affected and need to hold at the end of the runway. There would also be a consequential impact on departures with further delays until the backlog dissipates. A go-around, which involves higher power settings than the on-ground hold further escalates that cost.

the flights that are dependent upon the affected aircraft being in the right place at the right time. With some 400 passengers on a Boeing 747, perhaps with business commitments and connecting flights to make, the potential cost rises further.

It is clear that the response to a safety threat such as airspace infringement, airborne conflict or loss of control seeks to mitigate the risk of further incidents and the effects of the threat on industry and third parties. Whilst that response may impose some additional restriction or requirement on the individual pilot it has to be offset against the overall cost to industry or third parties as noted above. It is not acceptable to suggest that the threat can remain just because it has an effect on the cost of ownership as discussed above. However, the response should consider all available strategies to deal with the threat and the cost of ownership issues. If, however, the plots are exercising the appropriate competence and airmanship such events should be much rarer than they actually are.

The proportionality of the regulation can have a cost to industry too. Imposing inappropriate requirements, e.g. arguably the assignment to the oversight of small organisations of standards more appropriate to large aircraft, adds cost and complexity where the nature of the work or the technology of the aircraft does not warrant it. There is a minimum standard to be achieved so that the necessary airworthiness and operational standards are met. The degree to which the requirements can be revised to accommodate the Better regulation principles is dependent upon those involved playing their part and not seeking to circumvent the requirements or compromise those standards.

For small and medium enterprises, where the actual capacity to do work is limited and the margins involved in such work are small, the additional bureaucracy can be the difference between survival and cessation of business. This is exacerbated by the potential impact of the business by increasing costs of ownership which reduces the amount of flying being done overall within the GA sectors and can result in owners and pilots choosing less costly hobbies.

Incentivisation

It is possible to create a system where some of the benefits of regulation can be gained by encouraging industry to act in a certain way rather than try to force them by means of regulation, requirements or a rigid approach to enforcement. The use of incentives could therefore be a useful tool in the change of approach under consideration in RA2. Such an approach is not intended to directly impact upon costs but provide a benefit based upon changing the behaviour of the

participants.

This has been an effective tool in many other business areas but not something that naturally falls into a safety regulator's arsenal. The aim of incentivisation is to create something that everyone wants which serves for example, in the context of the RA2 programme, the functionality of addressing a safety intervention whilst offering the individual something that gives them additional benefits.

For example, using the threat of enforcement to reduce airspace infringements is a form of incentive but does it offer the individual additional benefits. What alternative strategy could be adopted?

The focus on managing airspace infringement led NATS to work with Airbox Aerospace Ltd to develop the 'Aware' airspace warning device. This relatively inexpensive piece of hardware provides on-board real-time information to the pilot about his position in relation to controlled airspace and has undoubtedly helped reduce the number of infringements in the UK. Simplicity of operation and indication is a key feature. The Aware team recognise the proliferation of personal electronic devices (PED) that are in use now and have now launched the software on the iPad and other devices.

Building on what is a simple product for indicating the proximity of controlled airspace Airbox have gone on to add extra functionality to the device and the software. Rather than simply being a warning device it now provides a more comprehensive suite of functions, including planning, radio frequency data, and emergency information and, with the latest updates, the ability to add aerodrome charts to the device. In essence it is capitalising on the functionality of the PED and is limited only by the degree of innovation from the developers, and the on board memory of the PED.

There are other devices available which offer similar functionality, e.g. Skydemon. There are also a large number of iPad Apps which are aviation focused although many of these are oriented at the US market and therefore may not be so user-friendly for the UK and Europe.

How far can this technology go? What extra features would make it such that everyone would want one and willing to pay a reasonable cost for it? Go to any airfield and you will find that many pilots have invested in this sort of technology, a clear indicator that if the product is right it will find a willing market. The challenge is therefore to offer something that the 'consumer' wants.

Having a GPS position based display of where controlled airspace is in relation

to the aircraft is great. Being able to plan the flight in advance and get access to NOTAMs, danger area information and adjust the flight plan accordingly is better. So what offers further capability that would attract pilots to invest in the product?

The current suite of products offers situational awareness and additional information linked to that. It does not however tell the pilot where other aircraft around it are. How can we provide aircraft relative positional information to a pilot? That would be a true benefit as it would help give useful information without the necessity of having to rely upon an air traffic radar service acting as a middle man, reducing the volume of traffic that each air traffic unit has to deal with. What are the impediments then?

General aviation aircraft using modern avionic technology, e.g. Garmin and Avidyne, already provide an integrated system where the pilot can have pictorial displays of the planned routing, real time tracking, traffic information and the ability to connect this to the aircraft's autopilot. There are stand alone traffic information devices available to the private pilot. These portable devices vary from providing a basic relative bearing indication to displays that are consistent with the built in systems. However, it does not integrate with the newer navigation displays discussed above.

Automatic Dependent Surveillance-Broadcast (ADS-B) technology is a potential solution. It provides that relative position information and, given the adaptability of software solutions could be integrated into an iPad or similar PED display. The advantages and benefits are obvious, providing a greater awareness of traffic and enhancing visual acquisition in VFR or marginal visibility. It can also provide a cockpit accessible weather display, and all in real-time. However, it requires the additional equipment to be fitted, including the transmitter/receiver and the display. And at what cost?

Incentivisation is all about how that sort of solution can be turned from a simple idea to a technological solution that is adaptable to any recreational aircraft at reasonable cost. It should be remembered that for sporting and recreational aviation the majority of pilot's budgets are tight and therefore the cost/benefit argument has to fare favourably against those constraints.

In looking at the costs, the airworthiness or equipment standards that would ordinarily have to be met should be considered. It we are talking about carry on equipment (PED) that is for VFR use only then does it have to meet all of the rigour that is imposed for installed equipment and flight under IFR and in IMC or poor weather. This is not about providing a total solution but does lay out the

ground for easing the path way to get access to technology at a reasonable cost.

CHAPTER 4

Risk, responsibility and regulation

The Regulatory 'Fit'

The diversity of the activities and interests of the various industry sectors and the interaction between the different regulatory provisions potentially creates a complex requirement structure. There is always a risk that a natural solution to a safety problem or concern will be to develop and introduce further regulation or restrictions.

This is the easy option but the need to do so relies heavily upon the way in which industry and individuals embrace compliance with the additional rules to achieve the desired improvement in safety. Most of us will know of rules which do not appear to have any logic to them and therefore their very being is called into question, e.g. the myth of the EU 'straight banana'. Pursuit of a single, uniform standard may not be practical or appropriate never mind proportionate. The EU position on 'sustainability' makes this quite clear[53].

Adding to the regulatory burden by making more prescriptive rules often simply adds complexity without achieving the desired aim, particularly if the individuals affected cannot see the purpose of the change. There are many examples of this in the history of how we come to our present regulations. Added complexity is almost always associated with additional cost and for small organisations this economic burden can be prohibitive. It is essential that any rule set takes account of all of the organisations it is going to be applied to and should ensure that some degree of proportionality can be applied. There is no point in requiring airline type standards to be met for a small amateur built aircraft operating out of a farm strip because that aircraft will not be operating in the same controlled airspace as airliners.

It is also sensible to make sure that, if there are rules, they can be enforced. There is no point in creating a rigorous regulatory framework if action to address regulatory abuse is not also part of the equation. However, equally, just because it is difficult to enforce does not suggest that the regulatory framework

[53] An Agenda for Sustainable Future in General and Business Aviation: Brussels, 11 January 2008

COM (2007) 869 final.

should be completely abandoned or ignored.

Better Regulation

In 1997 the UK Government established a Better Regulation Task Force (BRTF). This looked at the issues associated with regulation and rulemaking and the economic and social burden that this often introduced. The BRTF published their findings in a report entitled: 'Imaginative Thinking for Better Regulation' (2003).

The fundamental principles upon which the UK Better regulation work is focused are:

- Proportionality – Fit the remedy to the risk, only regulate when you need to.
- Accountability – to Ministers and Parliament, to users, to the public.
- Consistency – Be predictable, people should know where they stand.
- Transparency – Be open, keep it simple, and be user-friendly.
- Targeting – Regulation should focus on the problem, and minimise side effects.

The principles and supporting guidance were published in a document entitled: 'The Better Regulation Guide – and Regulatory Impact Assessment'. The foreword by the Prime Minister of the day, Tony Blair, made it clear that:

- A fair, decent and safe society depends on good regulation. People look to Government to ensure that they receive benefits such as fair terms of employment, a cleaner environment and safer products. Often regulations are the only or the best way to pursue such aims.

The Better Regulation initiative does not mean doing away with all forms of regulation. For aviation, the challenge is to put in place a regulatory framework that is fit for purpose, accounts for the societal expectations[54] as well as those of the user[55], yet it remains one which continues to meet the UK's ICAO obligations and the standards expected[56]. There is no reason why, as a public

[54] The fact that aircraft fly over individuals introduces complexity to rulemaking in that the interests of the third parties, whether on board or on the ground need to be accounted for.

[55] It is accepted that, where possible, as individuals users should have the freedom to carry out aviation activities without undue regulation.

[56] This is important. ICAO Contracting States rely upon the UK CAA to put in place safeguards within the UK for the conduct of international aviation flights, and commercial air transport

corporation, the CAA should not embrace the better regulation principles in its work. The CAA has openly and readily agreed to do so.

Following on from the BRTF guidance, Philip Hampton was tasked by HM Treasury in 2004 with carrying out a review of regulation, particularly in respect of 'the scope for reducing administrative burdens by promoting more efficient approaches to regulatory inspection and enforcement, without compromising regulatory standards or outcomes'. An interim report was produced in December 2004 with the final report being issued in March 2005. The Civil Aviation Authority contributed to that review.

The Hampton Report made several recommendations that would influence the UK Government's future thinking on regulation and the associated processes of development, amendment and implementations. With particular reference to the CAA, the Hampton Report identified that the CAA used risk profiling in some areas. In other areas, rather than applying risk profiling, businesses are required to achieve set standards that control risks. It did recognise that the frequency of inspections may be reduced as auditors become more familiar with businesses and gain confidence in the people and the organisations.

That does not mean that as time progresses and familiarity with an organisation is gained that oversight will always be reduced. Organisational changes, additions or variations in the company's business model, the loss of key staff will create a situation where oversight must be maintained or even increase for a period. The volatility of the industry will always impact the extent to which oversight can be reduced.

As noted above, the CAA has declared that it will take account of the Better Regulation principles in its policy and regulatory framework as it moves forward. To that end, there is a revised approach to the preparation of any regulatory proposals with greater emphasis on Regulatory Policy Committee (RPC) review of Regulatory Impact Assessments (RIA). This has increased the workload within the CAA in making any proposal for regulatory change, even where there is sound, justifiable reason for the proposal. It is also important however that regulatory proposals be given an airing in public so a proper consultation process is essential. What has proved difficult for the CAA is the often diverse spread of interest parties across the industry which makes effective consultation a challenge. For some requirements, almost all areas have an interest. The CAA has therefore adopted a widespread approach to consultation and this is

undertakings in particular. We cannot simply ignore ICAO obligations.

increasingly reliant upon the use of web technology[57] to facilitate this.

More recently, in December 2010 the Better Regulation Executive issued a further document[58] which laid out the approach that the UK's coalition Government wanted to adopt on the issue of better regulation. This very much followed the original principles outlined above but, importantly from a European perspective, clearly stated that the UK Government's intention was to look again at how it interfaced with Europe and the European rulemaking process. It states that reducing regulation has a role to play in supporting the Government's overarching objective of achieving sustainable economic growth.

With specific reference to Europe, the UK Government's policy states that:

To improve European regulation and to reduce the burdens it imposes, the Government will:

- Work with European partners to encourage smarter regulation by applying more rigorous use of evidence in the EU;
- Ensure UK policymakers are involved in the development of European directives at the earliest stage;
- Avoid gold-plating to ensure that EU directives are not transposed in such a way that they disadvantage UK businesses relative to their EU competitors.

The first two points are very much part of the methodology that the DfT and CAA has adopted in its approach to collaboration on aviation matters within Europe. The UK CAA works in conjunction with the other major EU Member States to ensure that a common understanding of what the end goals should be is maintained. The CAA also seeks to be involved in many of the EASA rulemaking task forces. It is a simple fact that EASA has not invited the CAA to participate in every working group, which in some instances is disappointing as the CAA believes it has a real contribution to make. However, in the absence of participation in the drafting process, the CAA does turn its attention to making full use of the European consultation process[59].

[57] The use of web technology makes it easier for individuals and organisations to sign up for consultation documents using RSS provision. The availability of comment forms and mailboxes for responses also helps ease the process of making a submission.

[58] 'Reducing Regulation Made Simple: Less regulation, better regulation and regulation as a last resort' BRE, December 2010.

[59] The European rulemaking process puts forward any draft proposals through a Notice of Proposed Amendment (NPA). This is open to anyone to offer comment on the proposals and

Industry has however been critical of the way in which the European regulatory system conducts its consultation on rulemaking and the way it uses or frames RIAs to support any proposed change. The European system does not necessarily align with, or have the same rigour, as the UK Better Regulation system. It does however, have an open approach to consultation and there is visibility about the way the system works through the CRD process. This difference of approach needs to be understood so that individuals fully appreciate what must be done to influence European thinking on rulemaking.

The UK Government has also been criticised for gold-plating the European rules and this applies equally to the CAA's implementation of the aviation rules. In fact, the Government's policy statement above specifically mentions EU Directives whereas the majority of aviation legislation is the subject of EU Regulation. Directives need to be transposed in to National law to put them into effect and that is where the potential for gold-plating arises.

The European Regulations are not open to the same degree of interpretation since they automatically supersede National law and apply "as is" to every EU Member State. The CAA has, however, recognised that there are a number of issues which appear to be driving a somewhat pedantic approach to implementation of the regulations. Through its standardisation audits of the Member States EASA appears to have a fixation on the level of detail and prescription that they expect NAAs to apply in their implementation of the rules. That standardisation process, and the insistence on what is essentially the imposition of greater bureaucracy has been criticised by the UK industry, the CAA and many of the other NAAs.

As noted earlier, a further aspect on how regulation is developed that is being given greater consideration is a desire to move away from compliance based auditing systems to one where oversight is much more risk focused. This means that the performance of an organisation is equally as important as a baseline compliance with a set of requirements. It is early days in developing a strategy that embraces this risk based regulatory approach and the CAA is keen to foster such development for its own, and EASA's subsequent adoption.

A greater challenge perhaps is recognising that the regulatory approach could vary with the acceptance of a different level of risk in the sector or activity. This goes beyond a simple proportionate approach as it seeks to redefine the rules

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to suggest revisions if they think it is appropriate. The comments received to an NPA are then subjected to scrutiny and the results of that scrutiny published in a Comment Response Document (CRD), which is also open to comment by any interested party.

against which we may seek to impose regulation. In principle this means that it may be possible to look at greater freedoms and the potential relaxation of some of the existing rules and requirements.

This is one of the key foundations upon which this RA2 review is based. However, the CAA continues to hold an obligation to protect third party interests and that is a key driver in determining whether regulation is required to manage the freedoms of the participants. This subject will be explored when we look at the classes of aircraft and the types of operation.

The General Aviation Strategic Review (GASR)

The principles of Better Regulation apply to the CAA and therefore future regulation would need to align with the better regulation principles. In June 2005, the CAA Chairman invited the UK General Aviation community and representatives of the UK Government to join the CAA in carrying out Strategic and Regulatory Reviews of GA[60].

The aims of the Strategic Review were, inter alia:

- To describe the GA sector and explain its existing policy context;
- To examine the interfaces between GA and commercial aviation, GA and the CAA and Government, and GA and the wider community;
- To discuss the major issues likely to affect GA in the future; and
- To liaise closely with the regulatory Review as necessary and to make appropriate recommendations.

The Strategic Review examined the high level issues affecting GA in the UK and led to a report being published in June 2006[61].

It was recognised early on in the review that GA was a diverse sector, serving many purposes, including business usage, sports and recreational activities. It also saw parts of the GA usage being a means of personal transport, much like a car. GA was seen to be perceived by some as purely a leisure pursuit but the value of the business related elements of GA is significant, estimated at £1.4bn[62] of direct economic contribution.

The GASR report made a number of recommendations. With regard to the RA2

[60] The review in 2006 looked at GA across the board, not just recreational aviation.

[61] Strategic Review of General Aviation in the United Kingdom, June 2006.

[62] Terry Lober, General Aviation Small Aerodrome Research Study, UCL 2006.

programme some of these are of direct interest. These include the following:

- There is a need for a more effective dialogue between GA and CAA and Government – with all parties needing to work to improve this.
- CAA, Government and GA to work better at all levels to influence legislative changes emanating from the EU with the aim of maintaining a fair balance for all aviation interests.
- GA-related policy at all levels to be developed in accordance with the Better Regulation Task Force's five principles of good regulation.
- Responses to the increased public sensitivity to environmental issues to include:
  - GA redoubling efforts to be considerate neighbours;
  - CAA issuing all new pilots with guidance about noise;
  - A joint CAA-industry working group to be set up to review whether there are regulatory barriers preventing technological solutions to the environmental impacts of GA, such as noise and emissions.
- There is a need for increased awareness of GA by air traffic controllers and continued GA pilot education and awareness in relation to the risks of infringing controlled airspace.
- CAA to set up a working group, with GA representation, to look at options for improving the data that is available to GA activity.

Of particular note regarding the response to these recommendations, a General Aviation Strategic Forum (GASF) was set up, the primary purpose of which was to facilitate the dialogue between GA, CAA and Government. The UK CAA, in its own right, and in conjunction with industry has continued to lobby EASA for more proportionate regulations for GA. The infringement issue has been, and continues to be the subject of the Airspace Safety Initiative (ASI) with the establishment of greater focus on what the issues are and the setting up of the flyontrack.co.uk web-site.

A considerable amount of work has been done since the GASR report was published but there are still areas that merit further work and, perhaps symptomatic of the evolution in approach that RA2 represents, require to be revisited.

The General Aviation Regulatory Review (GARR)

The CAA also invited GA and DfT to join the CAA in carrying out a regulatory review. The objectives of the review were to agree and record, amongst others:

- A description and definition of GA in the UK.
- The history of regulation within the UK, the existing UK policy on GA regulation and best practice guidelines.
- Sectoral trends and major and future developments which are likely to affect UK GA.
- The accident rate for UK GA over the past 10 years compared with the rates in selected other European States and the USA. Appropriate safety targets for GA were considered.
- Other regulatory models used within Europe and elsewhere.
- The effects of the European Aviation Safety Agency (EASA) through Regulation (EC) 1592/2002 upon future UK regulation of GA.
- Methods and effectiveness of consultation and dialogue between GA interests and CAA/Governmental/regional bodies.

The GARR report[63] was issued in June 2006 and nineteen recommendations were made.

Since the report was issued actions in response to the recommendations have been progressed under the oversight of the General Aviation Consultative Committee.

A number of these recommendations are particularly relevant to this RA2 review and are listed below:

- Recommendation 3
- The Regulatory Review Group recommends that the CAA approach to regulating non-EASA aircraft should be investigated as part of the GACC's review of the EASA proposals.
- Recommendation 4

[63] Regulatory Review of General Aviation in the UK, June 2006, CAA.

- The Regulatory review Group recommends that the CAA, with input from industry, investigates methods for improving safety education amongst the GA community generally.
- Recommendation 13
- The Regulatory Review Group recommends that, following completion of the MDM.032 activity and associated EASA Working Groups, the CAA should review its Certificate of Airworthiness (CofA)/Permit to Fly (PtF) policy to establish, where possible and appropriate, compatibility with future EASA policy.
- Recommendation 16
- The Regulatory Review Group recommends that Industry considers further devolution, in conjunction with the CAA, in the issue, renewal of PtFs or CofA, modifications and reissue of Certificates of Validity (CofV) for non-EASA aircraft.

Again, there has been considerable work done to pursue the recommendations from the GARR. The RA2 programme potentially represents a further significant step change that the GARR could not envisage, given the impending constraints of Europe and its implications that prevailed at the time.

Regulation and Risk

The GASR clearly identified a desire to see GA related policy developed in line with the Better Regulation principles. Better Regulation guidance suggests that with any form of regulation, the first step should be to ensure that you identify as clearly as possible the issue that you are seeking to address. As part of this it is appropriate to pose the question as to whether regulation is genuinely the most appropriate way of dealing with the issues.

Our ICAO obligations expect that we put in place legislation and regulatory provision to enact the Standards and Recommended Practices. The UK practice has long been to have overarching legislation, e.g. the UK ANO, supported by requirements, civil aviation publications and guidance. Whilst these supporting documents are not legally binding, in the sense that the ANO requirements could be met by demonstrating compliance with an equivalent standard, they represent the most effective way of achieving some measure of consistency across industry sectors.

The CAA has considerable discretionary power in how it assesses compliance with national requirements. This is not the case with EU rules. One of the issues

with this discretion is the simple fact that, in the absence of prescriptive guidance which provides clear information on how the requirements will be met, it is all too easy to end up with a system where there are multiple solutions. That can lead to a wide divergence in the way that compliance is achieved. It also opens up the door to the regulator being criticised over inconsistent application of the rule.

The CAA has made use in the past of codes of practice (normally via the means of a Civil Aviation Publication - CAP). A CAP will often provide a means of compliance, but not the only means, and builds upon the use of discretionary powers. That avoided prescriptive legislation or requirements and maintained a degree of flexibility in how operations could be conducted. It does however have a down side in that differences can result from the application of different degrees of flexibility between CAA staff.

In some instances the CAA has maintained a minimal approach to regulating certain sectors, e.g. hang gliding and paragliding where there is a reliance on the sporting body to manage the sector. Of course, not everyone wants to be regulated, even if it is by a sporting body who are simply trying to establish some form of minimum standard. There are some who, for whatever reason, wish to sit outside of any system, either through partial or full deregulation. It is essential, however, that their activity is still conducted such that it does not undermine the good practice that is achieved elsewhere in the sector.

With the advent of EASA, European legislation and the supporting requirements are seen to be much more prescriptive, apparently withdrawing some of the flexibility that CAA had applied previously. However, the manner of its introduction, particularly with respect to a shifting set of requirements for Part M, the requirements for continuing airworthiness matters, meant that different levels of compliance were applied at different times during the transition period. There is also a widespread view within industry and NAAs that Part M is overly prescriptive for the GA sector. NAAs and industry alike have lobbied EASA to review their regulatory strategy for GA so that it restores its proportionality in application.

With respect to the RA2 programme this introduces a challenge about what part our view of the risk of an activity has to play in determining the need for regulation and the form that regulation should take. One of the fundamental principles behind RA2 is that there is potential for regulatory alleviations, even to the point of de-regulation of some activity, where the participants are able to understand the risks involved and accept the inherent risk that an activity poses. In accepting this as a principle it creates scope to look again at the regulatory

framework and the burden that can potentially be imposed by over-regulation.

In October 2006, the Better Regulation Commission issued a document[64] discussing the relationship between risk and regulation. A statement in the foreword is quite appropriate to the RA2 programme and the concept of taking a different regulatory approach to recreational aviation.

- 'There is a sense that the current public debate around risk places an over reliance on Government to manage all risks, at the cost of eroded personal responsibility. Contradictory pressures on those in the regulation business – they are criticised both for intervening and failing to act – have served to emphasise classic regulation as the default response. It is time to step back, explore these dynamics and think differently about the interaction of risk and regulation[65].'

It is felt that the sentiments expressed in this foreword are apt given the growing concern from the UK GA industry about the apparent over-prescription in regulation, particularly with respect to those requirements introduced by EASA. What is also significant is the continued discussion at the General Aviation Strategic Forum and General Aviation Consultative Committee around the current level of regulation, particularly that stemming from EASA, being an impediment to the growth of the industry, particularly in relation to the recreational aviation sectors.

The Better Regulation Commission also believes that all policy making should start with a simple principle:

- 'When informed adults choose voluntarily to expose themselves to a risk and/or take responsibility for managing that risk and their behaviour does not harm others, the government should not intervene.'

This is very much the baseline against which the RA2 programme has been progressed.

A Proportionate Risk

The title recreational aviation suggests that this is all about sport and fun, not the use of aircraft for business purposes or as part of a business. From that

[64] Risk, Responsibility and Regulation – Whose risk is it anyway? BRC October 2006.

[65] Extract from the foreword to 'Risk, Responsibility and Regulation – Whose risk is it anyway?' Ray Haythornthwaite, Chair of Better Regulation Commission

perspective, recreational aviation is very much an optional activity in the same way that any other hobby, leisure pursuit or adventurous activity is undertaken. The actual discussion on what constitutes recreational aviation will be covered later.

Any activity, however benign it appears, carries with it some element of risk. However, people will always wish to undertake activities that involve some form of sport, or physical challenge such as water sports, horse riding, rock climbing, mountain biking etc. The potential list of such activities is almost never ending and whilst some of us may limit our aspirations, e.g. a gentle hill walk rather than abseiling down a mountainside; every activity carries some element of risk. That risk is, for whatever reason, the individual may sustain an injury.

How many of us have turned an ankle whilst walking on uneven ground? Many, if not all of us, have experienced that at some time, or know someone who has. And yet it does not stop us participating in the activity and accepting the risk. It is also clear that if the sport or activity involves some form of mechanical device, e.g. car or motor cycle, the issue of speed comes into the equation.

Many of us will therefore look to mitigate the risk in some way. Conscientious cyclists will wear protective clothing, such as a cycling helmet, protective pads etc. just in case they lose control and suffer a fall. Even at low speed there is always a potential risk as to the manner of the fall, e.g. sideways or over the handlebars, and the potential impact with other objects, e.g. a tree at the side of a cycling path. The conscientious cyclist will also wear high visibility clothing so that they increase the chances of being seen, particularly at night. How many times, however, do we witness cyclists of all ages cycling without helmets and with no lights at night, clearly ignoring the best advice and guidance that helps mitigate the risks? Is it ignorance or a conscious acceptance of the risks?

It is important therefore that the individual taking part is able to clearly understand the risk in order to make an educated judgement as to whether the risk is such as to prevent their participation. This understanding of the risk and whether it is tolerable, in their minds, is a key issue. A cyclist may know that there is a chance that, when mountain biking, they may hit a rabbit hole or rock and come off the bike at speed. They may have seen the television programmes about the emergency services where such an incident happened. With luck, the individual involved will have come out of the accident without being seriously injured or disabled.

In 1993 four teenagers drowned whilst on a kayaking trip at Lyme Bay, off the Dorset Coast. At the time, providers of outdoor activities could opt into a variety

of voluntary codes of practice. However, the incident provoked an emotive campaign and led to the establishment of the Activities Centres (Young Persons Safety) Act of 1995. This in turn led to the creation of the Adventure Activities Licensing Authority (AALA). The regulations require all activity centres to apply for a licence, very much based around the organisation having a system of risk assessment and mitigation, and to be inspected by the AALA. In fact, the regulations apply only to those who operate an activity centre commercially. They do not apply to voluntary associations, private clubs or to situations where the activity is being carried out under the supervision of a child's parent or guardian.

When regulation is introduced, it inevitably fails to solve all of the problems and there are often unintended consequences. In addition, the regulation is often put in place, as is the case above, as a result of public or press pressure. However, people then complain that liberties and enterprise are diminished and criticise the 'nanny state'.

Taking the AALA case above, Lord Young of Graffam recently conducted a Whitehall wide review of the operations of health and safety laws and the growth of the compensation culture. His report[66] contained a foreword endorsed by the Prime Minister David Cameron in October 2010, where he said that:

- 'all too often good straightforward legislation designed to protect people from major hazards has been extended inappropriately to cover every walk of life; no matter how low the risk. As a result, instead of being valued, the standing of health and safety in the eyes of the public has never been lower'.

Lord Young opened his own foreword to the report by stating:

- 'I believe that a 'compensation culture' driven by litigation is at the heart of the problems that so beset health and safety today'.

The perception, or reality, of a compensation culture results in real and costly burdens for businesses up and down the country. This is as true of the aviation industry as it is of any other walk of life. Lord Young continued on to say:

- 'Clearly, it is right that people who have suffered through someone else's negligence should be able to claim redress…. What is not right is that some people believe that they can absolve themselves from any personal responsibility for their actions …'

In some sense, the statements above lend themselves very much to the

[66] Common Sense Common Safety, published y HM Government in October 2010.

discussion of aviation risks and whether and how they can be accepted by the participants to allow a revised regulatory approach to be adopted.

It is interesting to note that, having considered the relative merits of legislating for the management of risk, Lord Young's report made a clear recommendation in respect of the AALA. That was to:

- 'Abolish the Adventure Activities Licensing Authority and replace licensing with a code of practice'.

His rationale was very much focused upon the belief that:

- 'the licensing regime, which is overseen by the HSE, is seen as a cost and burden on business that adds little to the health and safety of young people undertaking adventure activities. The HSE believes that effective enforcement of the requirements of the 1974 Act[67] and the Management of Health and Safety at Work Regulations is sufficient'.

It is certainly true that the licensing regime, as it currently stands, does not reflect the wide range of adventure activities that are now available. The cost of licensing is also seen as a disincentive to new entrants, especially small companies. All of these comments resonate with the feedback that the CAA has had from stakeholders during this review. As a consequence of Lord Young's recommendations, the HSE set up a consultation on the 'Proposed replacement for the licensing regime for adventure activities established under the Activity Centres (Young Persons Safety) Act 1995 in England[68]. The proposal is to abolish the Act and put in place a code of practice.

It is also interesting to note from Lord Young's report a comment that relates to children's play areas. Whilst not of direct consequence to this review, it does raise one point that may be worthy of consideration. Lord Young stated:

- 'There is a widely held belief within the play sector that misinterpretations of the Act are leading to the creation of uninspiring play spaces that do not enable children to experience risk. Such play is vital for a child's development and should not be sacrificed to the cause of overzealous and disproportionate risk assessments'.

Lord Young recommended a shift from a system of risk assessment to a system of risk-benefit assessment. This could fit into the intent behind RA2 if we try to

[67] The Health and Safety at Work Act 1974.

[68] HSE Consultation Document (CD) 236 : 2011

balance the regulatory approach against the participant's willingness to accept that there is some risk in order to have the ability to participate.

These examples quite clearly show that, in the Government's mind, risk does not have to be regulated out in all circumstances. It does however need to be appropriately addressed by some mechanism, such as a code of practice under some higher level regulatory provision.

This is an important backdrop against which we may seek to adopt a different regulatory approach to recreational aviation.

Aviation Risk

What therefore do we mean by aviation risk and how does it apply to the RA2 programme?

There are many risks that affect aviation activity. These include weather, the potential for a mechanical failure, issues of pilot competence etc. and all of these are present at all times to some degree of other.

The risk from weather is not just about weather deterioration and the potential that creates for controlled flight into terrain, there are occasions where the visibility is perfectly all right but there is a strong cross wind component or wind gusts and turbulence.

Likewise, an aircraft is a mechanical device and like all such devices has the potential to break. Whilst the aircraft will often be designed to withstand the rigours of flight, there is the issue of general wear and tear. A succession of heavy landings can lead to eventual failure of the undercarriage and a loss of control upon landing. For the majority of powered recreational aircraft there is one engine and any failure or loss of power means that a forced landing is inevitable. However, an aircraft is required to be kept airworthy whether it is on a CofA or a Permit to Fly. This requires that it be maintained and checked periodically for signs of damage.

Pilots are trained for such events as engine failure since there is a likelihood that they will occur. The basic premise against which light aircraft are designed is that the space required for a landing is not so great that an engine failure, in itself, poses an unacceptable risk. However, there are circumstances where the risk may be increased because suitable landing places are simply not available. Flight in mountainous terrain or long flights over water are two such examples.

A simple recreational flight in good weather with light winds, which does not involve any unusual or aerobatic manoeuvres, can obviously be considered

relatively low risk but not risk free. Add a reduction in visibility or strong winds and the potential hazard scenarios increase with the consequent increase in risk. For example, the reduction in visibility requires greater discipline to avoid flying into tall objects such as radio masts or to fly into high ground that may be partially obscured in cloud or mist. Likewise, a strong wind may create turbulence in the lee of a hill, over trees on the final approach to land or introduce a cross wind for the pilot to deal with.

There are mitigations for each of these, starting with the basic premise that, if it is bad enough, don't fly. Other mitigations are pilot competence, recency and pre-flight preparation.

Aerobatic flight introduces additional hazards into the equation. Incorrect technique, manoeuvring too close to the ground and inadequate lookout are all aspects where the hazard can be identified. We have seen this on occasion at air displays where, despite best preparation accidents do happen. The mitigation is to ensure that the pilot is trained and competent to perform aerobatics, they are conducted at safe height and in less densely populated areas (both from aircraft movements and habitation or congested areas). At air displays additional rigour is required to avoid overflying the crowd (learning from the lessons of past accidents) and by imposing clear guidelines on the conduct of displays.

We should be able to expect that the pilot is aware of these risks, but what of the passenger. How far is it possible for them to understand what the risks are? Can we provide them with sufficient information that they can be aware enough of the risks so that they can make an informed decision? Is there a sliding scale of risk associated with recreational activity, for example as it moves towards a more adventurous form of aviation, e.g. aerobatics or simulated aerial combat? Is there an upper limit as to how many people can be carried on board an aircraft during such sessions?

These are perfectly valid questions which must be considered if we are to begin to explore some of the potential changes in regulatory approach that industry would like to see. Can aviation ever be risk free? It is unlikely. What is needed therefore is to reach an understanding of what risk may be acceptable if all parties 'buy into' the activity and the fact that risk may be present. Let's call that adventurous aviation.

The US FAA has also started to take a different perspective on the subject of risk. There is closer attention paid to commercial transport operators under the FAR-121 requirements with more use of statistical data and audit reports than

was done historically. This allows the FAA to build up a risk picture of the operator and decide what this means in terms of the need for additional regulatory intervention or provision for a relaxation of the same. The system is not perfect however as there have been some notable failures that have occurred, despite the 'risk based' analysis system being in place. These have been widely reported in the global aviation press.

General Aviation in the US has also come under the spotlight so far as 'better regulation' initiatives are concerned with the FAA introducing a 'Wings' system whereby pilots attending certain safety seminars or participating in webinars (web-based) sessions can be granted relief on the need to undertake the biennial flight reviews. Whilst this is a good initiative in the sense it helps get across the safety messages we all want to promote, it does away with the physical interaction that the biennial flight otherwise provides. What is important within that system is the FAA statement that the main purpose of their Wings programme is 'to give pilots an incentive to maintain proficiency, not just currency'. Is that the sort of risk based approach the CAA should consider?

Adventurous Aviation

A key driver in the stakeholder feedback that set the scene for the RA2 programme was their desire to see greater freedoms to undertake adventurous aviation activities without being encumbered by unnecessary legislation or requirements. The only issue is that there was no common agreement on what adventurous aviation consists of.

The New Zealand CAA issued a Part 115 requirement in October 2011. This is focused upon adventurous aviation activities and covers certain things that can be considered very adventurous to the layman, e.g. aerobatics, and other activities which are not so adventurous as such, e.g. ballooning air experience flights, but which are very much recreationally oriented. This is not necessarily the same list of activities that the UK would wish to see included.

For example, the New Zealand CAA (NZCAA) classifies A to A operations in an aeroplane or helicopter that conduct formation flight, aerobatic manoeuvres, and similar non-standard flight manoeuvres as adventure aviation operations. A simple straight forward A to A flight not involving those aspects of flight is not adventurous as such but could demand a different regulatory approach be taken against the current norm.

An A to A flight in a Class 2 microlight aircraft[69], a hot air balloon, a glider flight, a parachute drop aircraft operation, a tandem parachute operation or a tandem hang glider or paraglider flight are also deemed to be adventure aviation operations. These too fall within the RA2 definition of recreational aviation but not necessarily 'adventurous' as such.

An adventure operation in New Zealand requires an adventure operation certificate issued by the NZCAA. The issue of the certificate is dependent upon management structure, personnel, competency, procedures, maintenance programmes and basic requirements for SMS. There are undoubtedly some elements of the Part 115 rules that are in place for similar activities in the UK; however some of the NZCAA designated adventure aviation operations are not currently regulated in the UK, e.g. a tandem parachute jump.

To simply adopt a similar approach in the UK would therefore impose considerable additional regulation on industry but, as will be seen later, there is not necessarily the adverse safety evidence to suggest such controls are necessary. The CAA needs therefore to carefully consider the NZCAA system in the round to see whether the concept of having a code of practice and some form of recognition has merit. There may be other options to look at too.

During the stakeholder interviews for the RA2 programme, UK industry asked for some activities to be considered in the context of having them included in any potential shift in regulatory environment. These include:

- Trial lessons
- Pleasure flights
- Ex-military air experience flights
- Charity flights in Permit to Fly aircraft

For the purposes of this review, they have been considered as potential candidates for a UK 'adventurous aviation' framework. Obviously, these could be extended to include simulated military operations, e.g. formation flying, mock dogfights or tail chase similar to activities under Part 115 in New Zealand or that are openly advertised in the USA and can be undertaken on a commercial basis. The issue about pleasure flights and charity flights is whether it is possible to take another look at what the activity involves and whether a

[69] A class 2 microlight in designated by the NZCAA as being 'two seat aircraft that have a design gross weight of 544kg (landplanes) or 614 kg (seaplanes or amphibians)'

different approach can be taken, whilst managing the risks associated with the activity.

Regulation often supposes that the risk is unacceptable and that the individual, no matter how willing, should not be exposed to it. As noted before, risk is very much determined by the individual's perception of it and their willingness to expose themselves to the hazards associated with a particular activity. An individual may decide that horse riding carries a risk that, for them is unacceptable yet they may openly welcome the chance to do aerobatic flights. The individual should therefore be placed in the position whereby they are capable of deciding for themselves whether they are willing to 'take the risk'. However, the individual has to be provided with sufficient information to understand what the activity involves, their part in it and the potential hazards and mitigation that may be present.

It can appear that the regulation often tries to impose a one size fits all approach to risk rather than lay out a basic framework of regulation that recognises there are some elements of the activity that must be constrained, in the interests of safeguarding third parties not involved in the activity. It is not unreasonable therefore to have, for example, minimum height rules to avoid nuisance noise from aircraft impacting upon third parties. But do they need to apply when there is no one around? In such arguments there are other, indirect, benefits in such rules. For example, in the event of a rare engine failure the additional height allows a more considered approach to a forced landing to be made.

In respect of regulation, consider for a moment what third party means and whether a third party is simply an innocent bystander or potentially a participant in the activity.

A third party may clearly be a member of the public, not involved in any aviation activity. For example, consider someone who is enjoying the summer sunshine in their back garden whilst aircraft fly overhead. They clearly have little control over the aviation participants. The regulator has to afford them some protection by 'regulating' the activities of the aviation participants sufficiently to mitigate the potential threat to the third party. Airworthiness standards, pilot licensing, minimum height rules, 'glide clear' provision are all examples of such mitigation.

A third party may also be a member of the public who is not directly involved in the activity but may be an active spectator to the aviation activity. The air show enthusiast is a typical example of such a third party. Their knowledge and understanding of the activity and risks to the spectator may however vary

significantly and cannot be taken for granted. Once again there are forms of control such as pilot higher levels of pilot competence, display authorisations and permissions and air display conduct requirements, e.g. flight line separation distances, not overflying the crowd, that help provide some mitigation.

A passenger is also a third party, albeit with the opportunity to be better briefed by the pilot as to the risks of the flight they are about to undertake and the actions to be taken in the case of an emergency. With a proper briefing the passenger should be able to decide whether to take part or not rather than simply assume that all will be well. However, how many pilots properly brief their passengers prior to beginning a flight? This is important if consideration is to be given to reviewing and potentially changing the requirements associated with pleasure flying or charity flights.

A pilot is not a third party in relation to the flight in the aircraft that he or she is in. However, the pilot and their aircraft are third parties in relation to the threat from other aircraft, such as may be the case in a mid air collision.

It can be seen therefore that there is some complexity with regard to determining who needs to know what the activity involves, and therefore can decided to accept it, and those who sit innocently outside of the activity who need some third party protection.

Making provision for adventurous aviation is possible but requires close liaison with EASA, industry and the public to develop the concept. An essential element will be the framework, the degrees of freedom that can be permitted and the mitigations that may be required to ensure there is sufficient control of the activity to avoid abuse of the freedoms that may be agreed.

Regulatory Controls

The current UK legislation has several different levels of control to provide increasing levels of assurance about standards of aircraft and operations. These are private, aerial work and public transport. Obviously public transport, or commercial air transport under JAA or the EASA rules, demands the highest level of attention to the way in which the operation is conducted to provide the highest level of safety possible. However, even private flight is regulated so as to manage a safe outcome although this is not absolute. A pleasure flight in a single engine aircraft still carries an inherent risk, no matter how meticulous the maintenance and operation of the aircraft is, that of an engine failure.

At the other end of the spectrum, it is a mistake to think that an aircraft operating on a Permit to Fly is not airworthy. The whole premise of the Permit

regime is based upon the fact that the aircraft is airworthy. It does not, however, demand that it has been built to a specific standard to provide long term assurance of continuing safety. Transport aircraft are built to such a standard, as are business jets, with built in design redundancy and features that offer additional comfort for the passengers involved.

Likewise, the actual use of the aircraft for adventurous purposes introduces additional elements of risk. Aerobatic flights are a typical example of the way in which an aircraft can be used to provide excitement for the individuals involved, and a means of allowing an individual to develop their flying skills beyond the normal operating limits. Aerobatics are, however, not for everyone. Does adventurous aviation cover other activities?

There is no doubt that, as seen in the NZCAA Part 115 rules, some of their defined activities are indeed adventurous and, even for non-participants, draw crowds to watch some of these events. Are the risks controlled? Yes, but there is always some scope for the unexpected to occur. The crash of a racing aircraft into the crowd at Reno in 2011 occurred despite the industry and organiser's best efforts to manage the event. Whilst the final outcome of the investigation is awaited the initial analysis suggests that the aircraft trim system failed leading to a loss of control such that the pilot could not maintain a flight path as intended.

The crash of an ex-RAF Lightning jet fighter aircraft in South Africa also indicates that flying ex-military aircraft carries a risk. The investigation into that accident revealed a number of anomalies that meant the crew were unable to eject following technical problems with the aircraft. It appears that the ejection seat cartridges may have passed their useful life. There is also a question as to whether the technical problems were avoidable as there is some evidence that the maintenance regime may have been inadequate.

These two examples alone show that, even where it is deemed that there is the risk of the individual participating in the activity being injured or killed, there should still be some safeguards to mitigate against the unnecessary exposure to risk by taking suitable precautions. The Lightning is classed as a complex aircraft in the UK requiring additional support from the manufacturer or a suitably approve design organisation, a BCAR A8-20 approved maintenance organisation and an operating approval under CAP632[70]. The aircraft would

[70] The CAA designation of the Lightning as ‘complex’ under BCAR A8-20 meant that the provision of continued of manufacturer support was a condition of any Permit to Fly. The potential applicant decided that this was too much of an imposition and exported the aircraft to South

also be required to have 'live' ejection seats which would be subject to the same maintenance regime as they would have been in service. If the UK maintenance regime had been applied and the occupants able to eject would the outcome have been different?

The UK Government has committed to increase people's responsibility and choice. The identification of potential candidates for classification as adventurous aviation activities and the review of the rules associated with the regulation of these activities are wholly in line with Better Regulation principles, the Government's commitment to proportionality and the simple view that most individuals can decide, with the right information, on the acceptance or not of the risks involved.

The work under RA2 therefore seeks to strike a balance between the need for an underpinning regulatory framework to provide assurance that third parties will be protected and to create an environment where the risks will not go unchecked. In other words, at the end of the process the idea is that the system will still seek to manage the risk of an accident whilst allowing the individual to exercise their freedom of choice as far as possible.

Adopting a different regulatory approach to adventurous aviation is perfectly possible, as is the potential to take a different regulatory approach to aviation activities based on greater acceptance of the risks involved and the safety data showing no adverse trend or contra-indicator. However, any regulatory change must embrace a corresponding change in how the activity is monitored, perhaps through a revised data capture methodology, which shows safety is not being adversely affected.

Africa.

CHAPTER 5

Recreational Aviation

What is Recreational Aviation?

In considering what regulatory approach may be appropriate for the recreational aviation sectors we must first try to define what recreational aviation is. The GARR considered GA in the broader sense, covering a wide mix of private and commercial operations. This is perhaps too broad as there are definite areas where the activity is not recreational. However, this programme is aimed at and looks specifically at recreational aviation. It is therefore narrower than the GARR.

At present, there is no consensus view of what recreational aviation is or consists of. This is one of the impediments to getting agreement on common issues and developing a strategy that addresses industry's wishes without compromising safety. There are obviously activities that can be considered recreational in their nature whilst others, perhaps taking a more liberal view on what recreational aviation may encompass, straddle the boundary between a private flight and what constitutes commercial operation.

In the context of the RA2 review, we ought to consider two aspects so that potentially define elements of what recreational aviation is. The first is the nature of the operation and why it is being undertaken. There are three main sectors of the aviation industry, driven and defined by the nature of the operation. These are Commercial Air Transport (CAT), aerial work and private flights. If we separate out the key operational functions, we arrive at the following breakdown:

- Commercial (including Public Transport (PT) and Commercial Air Transport – CAT)
  - Scheduled flights (CAT)
  - Intensive tour charter flights (CAT)
  - Ad-hoc charters including business charters (CAT)
  - Company business operations (PT)
  - Air Taxi (PT)

- Pleasure Flying (PT)
- Aerial Work
  - Flying Training
  - Banner Towing
  - Parachuting
  - Aerial Photography
  - Glider Towing
  - Air Displays
- Private Flying
  - Recreational
  - Sporting and competition
    - Air racing/rallying
    - Navigation competitions
    - Aerobatic competitions

Commercial Air Transport (CAT) activity is relatively easy to define, particularly if the European approach is taken into account. There is a difference between the way that Europe has drawn up their regulations and that which has existed within the provisions of the ANO for some time. Consequently, we have areas which are commercial in their nature, but not CAT, and which have been deemed in the UK to be public transport. This includes pleasure flights (fixed, rotary and balloon), hiring of aircraft to pilots, charity flights and some business flights.

Perhaps, given the current work on developing implementing rules for commercial operations in Europe, there is a need to look again at the Air Navigation Order definitions of public transport and aerial work. Both of these centre on what is termed 'valuable consideration'[71]. However, valuable consideration can be determined to take place a considerable time after the actual transaction takes place. If there is no legal impediment or pressing

[71] The ANO definition of 'valuable consideration' means any right, interest, profit or benefit, forbearance, detriment, loss or responsibility accruing, given, suffered or undertaken under an agreement, which is of more than a nominal nature.

reason to maintain the UK terminology perhaps alignment with the European definitions would be appropriate.

Taking the issue of valuable consideration further and how this impacts upon the way in which some aspects of recreational aviation may be conducted at present there are a few scenarios that are worthy of further consideration. Although 'Pleasure Flying' does not match the definition of CAT it does require an Air Operator's Certificate, even for A to A flying or 'trips round the bay'. If a pleasure flight is carried out for recreational, leisure or air experience purposes, can it be looked at in a different way?

Likewise, parachuting is classified as aerial work. There is no doubt that the majority, if not all, parachutists jump out of aeroplanes for the sport and the adrenalin rush that it provides. As such the activity is recreational but the use of the aircraft at present is determined to be aerial work requiring additional requirements to be met from both airworthiness and operational perspectives. A tandem jump, where a member of the public is attached by harness to an experienced parachutist, introduces a further aspect as it is clearly an extension of the recreational aspect of the activity. However these take place with commercial undertones as many are associated with raising money for charitable purposes.

Glider towing is also deemed to be aerial work as there is valuable consideration exchanged for the purposes of being towed to altitude before commencing a gliding flight. There are arguments that suggest glider towing could be regarded as a private operation, particularly within a club environment where the tug aircraft are owned and operated by the club and the fees are used and reinvested in the club for the benefit of the members.

These issues will be explored later.

The second aspect to be considered in relation to the definition of recreational is the actual class or type of aircraft that is being flown. The various classes of aircraft give rise to the following industry sectors:

- Hang gliding (including powered hang gliders)
- Paragliding
- Paramotoring (foot launched powered parachutes)
- Gliding (including self-sustaining sailplanes)
- Model aircraft

- Unmanned Aerial Systems (Line of Sight (LoS) and beyond LoS)
- Single Seat Deregulated aircraft (SSDR)
- Microlight aircraft (type approved and including paramotor trikes)
- Amateur Build aircraft (including amateur built microlight, aeroplane, helicopter and gyroplane aircraft)
- Gyroplanes (type approved)
- Ballooning
- Ex-Military aircraft
- Ex-Type Certificated aircraft
- Certificated Aircraft (EASA and Annex II including touring motor gliders etc.)

These categories will be briefly examined later. It can be seen that many aircraft can be used for a variety of different purposes which can cross the boundaries between private, aerial work and commercial use.

In this review, it is the use of the aircraft and the intentions of the user that has primarily determined whether the activity is recreational or not. An individual may carry out a private flight for the purpose of conducting his or her own business, e.g. using the aircraft as a means of transport to get to a place of business. Is this recreational? If the user is looking at the flight being for recreational purposes, for enjoyment or to provide a means of transport to facilitate some form of adventurous sport or activity then it is clearer and has been considered. This does not exclude future consideration of applying the principles of change developed under RA2 to other sectors excluded from the review initially.

Accordingly the current types of operation that could be considered recreational in purpose are considered in relation to the RA2 principles. The aim here is to identify what activities do not really need to have that stringent framework of rules or controls in order to operate at an acceptable safe level, taking account of the nature of the activity, the risks associated with it and the willingness of the participant to take part.

It was felt that, if we look at the participants undertaking the activity the same as if it was a similar ‘red letter day’ experience or adventurous activity, e.g. a motor car or motorbike ‘track day’, there was scope to look at these as a recreational rather than a commercial activity. These have therefore been given some

coverage under this RA2 programme. There is certainly a discussion to be had about the potential overlap between these areas of commercial and recreational use depending upon how the National definitions of public transport and valuable consideration are interpreted.

However, the duty of care that a regulator owes to the participants, outside of the pilots themselves, needs to borne in mind throughout and this is where the need to balance the consideration of risk and the appropriateness of the regulatory structure becomes important.

Commercial Aspects and Recreational Aviation

If we first look at aviation from a commercial perspective, where the organisation or individual concerned is using aviation or an aircraft to make money, there are many different facets. Some clearly offer a service or product to the customer that is not recreational in terms of the way that the individual interfaces with the aviation industry. In other words, the participant (an airline or charter passenger) has little input into or control over the activity.

For example, a passenger using a scheduled or charter airline to go on holiday is not seen in the context of this review as a recreational user even though the end purpose of the flight may be for leisure or recreational purposes. That customer also has little interface with the operation of the aircraft. The paying passenger is expecting safe carriage and a certain level of service. Consumer choice may play a part in how the paying passenger selects their airline but does not fundamentally change the expectation in terms of safe carriage.

An alternative example at the other end of the spectrum is a pilot who is undertaking flying training on a microlight, currently classified as aerial work, with the sole intention of thereafter enjoying the sport of flying as a recreational activity. Quite clearly, this customer and his interface with the aircraft (the learning experience with a defined qualification, the licence, as the outcome) is very much the focus of the activity. These are important factors as, whilst the term ‘recreation’ features in both, there is a clear difference in the customer’s expectations and therefore this can help determine the likely regulatory framework that we may wish to apply.

It is more difficult to easily categorise a pilot undertaking flying training, again aerial work, for the purpose of obtaining a commercial licence. There may well be an element of enjoyment during the training being undertaken but it can be argued that it is not truly recreational. The end purpose of the training is clearly not recreational in its nature as the qualification is very much aimed at providing

the individual with an income.

The same is true of the pilot flying his own aircraft in order to attend a business meeting. Would the flight have been undertaken if there was no meeting? In both these examples there is clearly some level of commercial imperative. This is the area that is most difficult to determine if it fits within the RA2 programme.

Commercial Air Transport is well defined in the EU/EASA rules, having its origins in JAR-OPS and latterly EU-OPS and these mature requirements encompass both scheduled and charter flights. Charter flights of course include intensive tour (IT) operations to holiday destinations, business charters and non-scheduled air taxi services. Air Taxi operations generally cover flights into airfields that are not within the coverage of the airline schedules and, in any case, offer greater flexibility to the paying passenger. They have been regarded as a non-recreational activity, irrespective of the nature of the charter and as such have not been addressed within the RA2 review.

What are less clear are the implications of the developing framework for commercial operations under the EASA proposals. The output from these activities is very much aligned with recreational aviation purposes or intent, despite the fact that they may be commercial in nature in the sense that there is a cost. There is scope for some of them to be included within this review. Even now, as we come closer to the effective date for the introduction of the operations requirements arguments continue to range over the scope and the fine detail of the EU proposals. It may well be a case of too little too late however to effect any last minute change.

Within this RA2 programme thought has been given therefore to the issue of influencing EASA and the Commission's thinking on general aviation matters in the future, and in particular those that fall within the recreational aviation spectrum.

The original work on RA2 considered the pleasure flying scenario; those that currently operate A to A pleasure flights and who operate balloon flights. For example, pleasure flights, are currently conducted under a UK Public Transport AOC and tend to operate from the same airfield, the classic A to A operation. The proposals being developed in Europe continue to be the subject of discussion in respect of how far it is necessary to apply the rigid controls associated with CAT or our own public transport requirements. A change in approach in Europe would also challenge our own public transport rules, raising questions as to whether they were sustainable in their current format.

The forthcoming EASA Implementing Rules also cover what has historically been classed as aerial work or special operations; for example glider towing appears to be classed as aerial work. Some of these can be argued to fall within the definition of recreational activity when considering a revised approach to regulatory aviation, if the activity is undertaken within a club environment and without any intentions to profit from the activity as a business.

We have already seen France take a fairly strong line in declaring that such activities and even flying training are not commercial in their nature, very much conducted within a club environment for the benefit of its members.

Such influencing is an inherent part of the rule making process as the CAA, and other NAAs, seek to comment on draft proposals and ensure that their scope is both appropriate and realistic in the regulatory framework Europe seeks to establish. The CAA has often been accused of blindly following, and even gold-plating, the implementation of regulations and requirements. One aspect of the RA2 project is therefore to look at whether we need to put a rigid and overbearing set of rules in place to govern the activity, in essence creating the belief that we are a 'nanny' State?

If nothing else, even if we cannot do anything to change the forthcoming rules at this stage, the RA2 programme should look at the issue with a view to developing an opinion on a potential line to take in negotiations on the forthcoming EU rules and the longer term strategy.

This is timely as EASA has openly declared its intention to move towards a more pragmatic approach to general aviation. A clear strategy on how to influence EASA's thinking on some of the issues arising from this review may help EASA to refine its regulatory model.

Aerial Work

At present, with the exception of remunerated aerial work consisting of flying training or air display flying an aircraft used for aerial work must hold a CofA. This provides additional safeguards where aircraft are involved in some aerial work activities.

These include pipeline or electricity distribution network inspections, largely carried out by helicopters as a relatively low speed close in pass is required in order to conduct the required inspections. Other aerial work activity includes glider towing, parachute dropping and banner towing. These will be looked at in further detail when we consider the activity itself.

Stakeholder feedback has however requested that the CAA consider the possibility of allowing certain aerial work to be undertaken by microlight and gyroplane aircraft. These aircraft do not hold a CofA but operate under a Permit to Fly on a type approved basis.

Industry foresees economic benefit in using microlights for certain aerial work activity such as aerial photography whilst gyroplanes have a potential use for pipeline surveys etc.

These requests will be reviewed in later Chapters.

Private Flying and Recreational Use

Private flights cover a wide variety of scenarios and involve many different classes of aircraft. Much of this is for the flying experience and sensory enjoyment of the individuals and therefore represents recreational aviation in its purest sense. These flights are easily designated as private and recreational.

There is an area of overlap however where the aircraft is also used by the private individual in pursuit of their business commitments as noted above, e.g. using the aircraft to fly to a specific airport to then conduct a business appointment. This can be argued to be something other than recreational aviation as there is an ulterior motive behind the journey. In addition, in many cases the cost of such flights is recoverable against the business, negating any consideration that it is voluntary and purely for the enjoyment of the activity.

With regard to what can be construed as private flying there is a dilemma. One industry body has argued that the owner of a Cessna Mustang can operate the aircraft recreationally in addition to undertaking flights in connection with his or her business or to carry friends to destinations for the purposes of enjoying, for example, a weekend away.

This argument has some merit, however, the complexity of the aircraft, the nature of the way the flights are conducted and the interaction with other airspace users in particular suggest that it is rarely recreational aviation in the true context of this project. Few owners of such aircraft just go for a 1 hour ‘jolly’ just for the sake of it. In any case, how do you differentiate between when such an aircraft is being used for a recreational purpose?

In other words, such aircraft are subject to many of the normal constraints required of larger more complex aircraft and, although considered in passing within this programme, there is considered to be little scope for alleviation of the rules or regulatory structure is deemed to exist. This is supported by the EASA

view on complex aircraft, which captures many of these types. Such aircraft have not therefore been considered under the RA2 programme.

A further area to be considered is where the individual has to interface with a commercial organisation in order to get access to an aircraft to pursue their recreational desires. This includes hiring aircraft from a club.

Recreational aviation is not just about piloting an aircraft. It ought to account, as outlined previously, for the use of the aircraft to support aviation related recreational activities. It is important therefore to move on and look at the different sectors of the industry and how aircraft are used within those sectors. Is there scope therefore to look again at how regulation about the hiring of aircraft may fit within the RA2 principles and any regulatory change?

CHAPTER 6

Aviation industry sectors

Recreational Aviation and Aircraft Categories

There is a wide diversity in the nature of recreational aviation with many distinct sectors, different aircraft types, varying requirements relating to airworthiness and levels of operational controls. Some activities are deregulated, either partially or in whole, whilst others enjoy varying levels of devolvement of authority through company approvals and other arrangements. There is also a level of direct regulation by the CAA for some activities.

EASA requirements have impacted on many of these sectors with the imposition of more prescriptive standards. It is difficult to address these directly through this review other than to identify areas where the new rules, as they currently stand, may be disproportionate. However, account has to take account of European developments in regulation and EASA in order to fully appreciate the pressures on each sector. In addition, the European Commission's paper on the Sustainability of Business and General Aviation is worthy of note.

The RA2 review therefore considers the European impact and looks at the issue of proportionality of application and impact on each sector. If nothing else, this would help identify a strategy for influencing EASA's thinking on these issues. The following briefs summarise the key sectors along with a short description of the principal elements affecting them.

Hang Gliding and Paragliding

This sector is not regulated by the CAA with respect to airworthiness controls or operational standards although the pilot may still have to comply with the Rules of the Air[72].

Activities in this sector are managed through the auspices of the British Hang Gliding and Paragliding Association (BHPA). According to the BHPA web-site, the organisation ‘oversees pilot and instructor training standards, provides technical support, such as airworthiness standards (albeit there is no specific code to be met), runs coaching courses for pilots, and supports a country-wide network of recreational clubs and registered schools, providing the

[72] The Rules of the Air Regulations 2007.

infrastructure within which UK hang gliding and paragliding thrive'.[73] In this sense, the BHPA is essentially self-regulating.

No pilot licence is required but the BHPA do advocate that training is undertaken, sensible precaution. BHPA registered schools provide a range of training for the prospective enthusiast ranging from elementary training and pilot qualifications to more advanced training, even to competition standard. The BHPA recreational clubs do not provide training but maintain access to hundreds of flying sites in the UK, as well as providing a 'supportive flying and social environment'. Entrants are made aware of the risk and benefit from the training provided, thereby reducing the likelihood of self-induced injuries through a lack of experience.

The BHPA publish 'Skywings' a magazine dedicated to free flying in the UK. This is distributed to some 7000 BHPA members. The BHPA also provide automatic third party insurance for its members. The BHPA handbook provides information on the rules that apply to the sport and how to access aviation information such as NOTAMS[74]. As such BHPA provides a good level of support to its members and helps embed the need to be considerate users of the airspace that they operate within. The RA2 programme considered whether there is any need for the imposition of any regulation or whether to continue the status quo.

Information on accident rates is available from BHPA but the nature of the activity, which is dependent upon the participant launching themselves from a hillside, is not without some element of risk. A quick review of the available information does not indicate a particular problem other than the light weight of these aircraft making the pilot particularly susceptible to the potential impact of turbulent weather. The data also suggests that the current regime of training is sufficiently robust to achieve a suitable standard without any formal licensing requirements being put in place by the CAA.

Although this organisation is not directly approved by the CAA, experience has shown that BHPA does a good job of managing the activity through its clubs and schools. Many clubs operate from selected sites and exercise good oversight of flying activities from these and provide an active monitor on safety. The high density of hang gliders and paragliders in the vicinity of a good site in favourable weather conditions demands an awareness of the risks among the participants and a degree of discipline in their flying. Even to the layman on the

[73] Extract from the BHPA web-site.

[74] Notices to Airmen, providing up to date information on local airspace restrictions or changes.

ground the activity can sometimes appear chaotic under such circumstances. There is nothing in the BHPA data that suggests this is not the case.

Most training in hang gliders is conducted by the entrant being the pilot from the outset (single occupancy) albeit in tethered flight initially, moving on to more challenging flights as experience builds. There is a dual air experience (tandem flights) element to paragliding where a person can experience paragliding flight with a competent and experienced pilot. Again, the data does not suggest that there is any need for additional control or regulation, providing the BHPA continues to manage or self-regulate the sport.

This is very much in the ethos of the RA2 approach. The aim should be to put regulation in place only where it is felt necessary to do so, mainly to provide third party protection. Where a sector has a proven self-regulating model, by code of practice or a more comprehensive management system, it should not be necessary to introduce regulation just for the sake of it. It is recommended that no change be made to the current approach to the BHPA, hang gliding or paragliding and that the present self-regulation system continue.

One of the key issues for the sector is the threat of increasing restrictions on airspace and the growing proliferation of wind turbines in the pursuit of renewable energy sources. BHPA take an active interest in airspace matters and how proposed changes potentially could impact their activities. However, the creation of more and more ‘controlled’ airspace is a concern not only to BHPA and its members but to the recreational aviation community at large.

It is felt that the current system of consultation can cater for such concerns and therefore no specific recommendation from the RA2 review is made on this subject.

The wind turbine issue is also very much a concern to the whole of recreational flying as they tend to operate within the lower levels where such wind farms are established. This is catered in part through the existing consultative mechanisms. Recent discussions for example have taken place through GACC, although the issue of greatest concern relates to the approval of wind turbines or the setting up of larger wind farms under local planning regulations. However, the CAA has limited powers or scope to become involved in such matters. This demonstrates the potential conflict that can arise through planners not always taking into account the potential safety risk they present to aviators. It also highlights the unintended consequences on aviation of a headlong, and perhaps blinkered, desire to be seen to be environmentally friendly.

The change in the planning regulations in 2012 appears to offer considerable simplification in the process and should help ensure that all representations get proper consideration. However, at the time of writing this report, the full impact of the changes had yet to be evaluated and, more importantly, time will tell if the changes will have any impact upon local authorities and the way they consider applications.

It is understood that EASA has no plans at this time to bring hang gliding and paragliding within their remit either and therefore there is felt to be no further CAA action required in this sector at this time. This continued freedom is something that CAA should ensure it promotes within the European strategy for GA.

Paramotoring

A paramotor is a foot launched Powered Paraglider (PPG) and falls under the definition of a Self-Propelled Hang-Glider[75]. As such it is a powered aircraft. The paramotor has the added advantage that it can self-launch from level ground enabling the pilot to pursue his involvement in the sport when there are no suitable hills around. An added advantage is that the motor can be used to prolong a flight by climbing under power back to altitude, avoiding the early landing which might otherwise have been necessary.

Historically, Paramotoring activity has sat between the organisational capability of the BHPA and the British Microlight Aircraft Association (BMAA). Until fairly recently, both organisations offered training programmes. The BMAA completed a review of the BMAA Foot Launched Microlight Pilot training system and had identified a number of issues relating to standards and controls exercised within its ranks. Some recommendations were made and following an apparent failure by the paramotoring sector to embrace the changes and safeguards that the review sought to put in place the BMAA have withdrawn their support and consequently the related training programme. Although the reasons for the BMAA stance are understood, this is an unfortunate situation as the PPG is regarded as a microlight so far as competition and records are concerned.

This withdrawal of support has resulted in the potential drift of some schools, previously qualified under the BMAA system, to sit outside of any formal system as they do not want to become part of the regime overseen by BHPA. This

[75] ANO Article 255 (1) provides a definition of a self-propelled hang-glider: 'means an aircraft comprising an aerofoil wing and a mechanical propulsion device which is (a) foot launched'. The definition also has some further limitations.

creates a situation where little is known about the standards of training being offered or the continuing management and control of the activity. The BHPA continues to have some oversight through its clubs and schools but this does not capture all activity. Once again, no pilot licence is required but pilots are required to comply with relevant aviation legislation such as the Rules of the Air.

During the discussions with industry stakeholders there was some inference that a number of instructors and pilots were operating outside of either the BMAA or the BHPA and this does question whether the training standards and oversight that may be applied are suitable for the intended purpose. This extends to the potential for these individuals to act less responsibly in the way that they approach their flying as they sit outside of an established safety based system. Concern was expressed about the potential abuse of the Rules of the Air, particularly in respect of the low flying rules and several examples of such abuse were cited during stakeholder discussions. This was discussed with the CAA Aviation Regulation and Enforcement Branch as part of the RA2 programme.

Whilst the operation of paramotors remains subject to regulation through the Rules of the Air it is recognised that compliance is often difficult to police. These aircraft are not registered. The absence of clear identifying marks therefore readily leads to difficulties in tracking down pilots who are creating public concern or disturbance through their actions. It is recognised that although these individuals are in the minority, their actions potentially undermine the good reputation that can be achieved by the BHPA or any remaining activity under the BMAA. One potential solution would be to require such aircraft to be registered so that any incidents could be helped through some means of identification.

Recommendation 1: It is recommended that the CAA enter into discussions with BHPA and BMAA regarding what can be done about concern over allegations of abuse of the Rules of the Air by pilots of powered paragliders who are not members of either organisation.

It is recognised however that, despite this posing a nuisance to the public and in extreme cases a potential safety threat to third parties, the need to register these aircraft may be a ‘taking a sledgehammer to crack a nut’ scenario.

The CAA was recently approached about the amount of fuel that could be carried given that the fuel tanks on some modern machines being brought into the UK could contain more than the 10 Gallons permitted under the UK rules. One solution was to draw a line where the 10 Gallon limit would be. However,

the more pragmatic solution was to remove that limit, given the simple fact that the maximum weight of the machine is limited to 70 Kg so the extra bit of fuel that could be carried was not going to make much difference. The ANO definition was therefore changed accordingly. It is hoped that this is an example of good regulatory practice at work.

As for paragliders, the BHPA maintain statistics in relation to some paramotor accidents. There are few events to analyse so a review of these does not identify any particular safety issue. Accordingly, other than the recommendation above, it is not felt necessary within the RA2 review to take any other particular course of action with regard to paraglider safety.

Gliding

So far as non-powered gliders, or sailplanes[76] and similar aircraft are concerned, this sector was not regulated by the CAA until the introduction of the European and EASA regulations. Oversight of the majority of UK gliding activities was provided through the British Gliding Association (BGA) which, over the years, had established an effective safety management system across the whole of the sector, a form of self-regulation. There were a few aircraft and owners who sat outside of BGA and therefore were excluded from the benefits of the BGA system.

The BGA maintained a register of UK gliders for tracking purposes, and for competition use, although this did not form part of the formal UK civil aircraft register. BGA also managed gliding operations through an array of clubs and facilities dispersed around the UK but working within the BGA's established processes and guidelines.

Airworthiness matters for the gliders were controlled within the BGA, through a Headquarters staff and volunteer based technical committee. This established a range of protocols to deal with initial entry to the BGA register, the control of modifications and repairs and the inspection and maintenance of continuing airworthiness aspects of the aircraft. A system of engineering support, through BGA Headquarters and a system of BGA qualified engineering inspectors throughout the UK, was available to BGA members and this was well regarded with regard to the standards achieved.

Aside from this airworthiness management, most modern gliders are designed

[76] Historically the UK has referred to these aircraft as gliders but Europeans have used sailplanes. The UK is gradually changing its requirements to align with the European definition to avoid ambiguity but the ANO definition of glider now references the European position.

and manufactured in Europe certified under the Joint Aviation Requirement (JAR) system and which now comply with CS-22[77], the equivalent EASA certification code for sailplanes.

One area of the BGA's airworthiness activities was regulated by the CAA. Powered aircraft, namely glider towing tugs and self launching motor gliders (also including Touring Motor Gliders and Self Launching Motor Gliders or Sailplanes) were subject to the normal rules for aircraft with a CofA. This did not include self-sustaining sailplanes which, not being capable of taking off under their own power, were still regarded in the same vein as unpowered sailplanes.

Gliding in many other European countries was subject to more formal regulation, creating a precedent in the eyes of the European rule makers. Accordingly, the UK system of self-regulation did not match the European mindset. Despite the best efforts of the BGA, in conjunction with representation from Europe Air Sports, gliding was not excluded from the application of the EASA rules. With the advent of EASA the gliding sector (overall some 2000 + aircraft) is now subject to the application of European regulation.

Accordingly, gliders now have to be registered and issued with EASA CofAs. To do so, the BGA is fully approved to the EASA continuing airworthiness rules in Part M[78] subpart G (CAMO) and Part M subpart F (maintenance). The CAA has however interpreted the implementation of these regulations as far as it can to permit the BGA to continue their operations with a similar organisational structure as before. This means that the BGA continues to exercise a considerable degree of control over gliding standards and operations in the UK. However, the introduction of EASA rules has added complexity and cost to the BGA system of airworthiness.

The European rules also mean the introduction of the EASA requirements under Part 21[79] for the approval of designs and modifications. Unless the BGA obtain and maintain a design approval the BGA’s previous self sufficiency in the approval of modifications has to end. The deregulated aspect of the UK gliding system prior to 2003 required EASA to carry out a review of the BGA system. Fortunately, due to the standards set under the self-regulated environment maintained by the BGA, glider modification and technical standards and BGA procedures were accepted by EASA, with a few exceptions, enabling an easier

[77] CS-22: Certification Specifications for Sailplanes and Powered Sailplanes. This was previously issued as JAR-22.

[78] Part M is Annex 1 to Regulation (EC) 2042/2003: Continuing Airworthiness Requirements

[79] Part 21 is Annex 1 to Regulation (EC) 1702/2003: Airworthiness and Environmental Certification

transition into the European framework than might otherwise have been the case.

Feedback from the BGA during the RA2 discussions indicate that the sector has incurred considerable cost as a result of the EASA requirements being introduced and the detail of the EASA rules means that considerably more bureaucracy exists. For a large organisation such as the BGA, which relies heavily upon its members and the support of volunteer inspectors, this is an issue that cannot be ignored. It is recognised that the more formal arrangements of gliding in Germany and Austria may have influenced the initial thinking as to whether the sector needed to be included in the EASA framework. However, it is clear that the sector believes that the rules are disproportionate to the nature of the activity.

Recommendation 2: Part M RIA - It is recommended that, where possible, the CAA ensure that suitable input is made to the present EASA Part M RIA review and the work on the regulation of GA being conducted under the auspices of the EASA Management Board. The aim should be to restore some measure of proportionality to gliding activities and the impact of EU regulation based upon the UK's pre-EASA experience of the BGA and the success of the self-regulation model.

A small number of the more vintage gliders (around 250 or so) are designated as remaining under the Annex II provisions to Regulation 216/2008 (excluded from the EASA requirements). As noted above, these were already deregulated under the pre-EASA requirements in the UK and within the RA2 programme it is believed that it is appropriate to continue this arrangement, particularly as it is still covered by the pre-EASA self-regulation controls of the BGA.

Turning to licensing matters, at present the training and qualification of glider pilots, instructors and the subsequent revalidation is carried out under the BGA's oversight. Glider pilot licences are not required to be issued by the CAA. However, of particular importance for the sector is the transition to the EASA requirements for pilot licensing. The forthcoming EASA rules for pilot licensing will require glider pilots across Europe to hold licences issued by the UK CAA or another EU Member State NAA if the pilot intends to fly an aircraft that is regulated under the EASA framework.

Instructors will also have to comply with the European requirements, which the BGA believe is a significant shift in terms of the bureaucracy and the rigour of the licensing process. The BGA club system is also potentially affected, having to hold formal pilot training organisation approvals in the future. This all adds

cost and complexity with no identifiable improvement over current standards or safety benefit.

Early discussions with BGA suggest they would like a similar approach for the introduction of pilot licensing and training schools to be taken as the CAA did for airworthiness under Part M. This would take account of the previous BGA system and the prevalence of clubs under their control rather than treating each club individually. This is an important facet of the UK's implementation policy being considered by the CAA's L&TS[80] staff. A manageable solution is required in order to constrain the costs of EASA-FCL implementation for UK gliding.

Recommendation 3: The CAA should seek to explore whether the system of approval for the BGA under Part M subparts G and F provide a suitable model for the introduction of the new European pilot training and licensing requirements. This reflects consideration of a pragmatic solution to the impending EASA rules.

Glider maintenance also faces the further imposition of European legislation, over and above Part M, as EASA seeks to establish a licence for glider maintenance engineers under Part 66, the engineer licensing requirements. It is essential that these engineers are presented with a licensing system and syllabus that is realistic, avoiding the unacceptable situation whereby when Part 66 was introduced the licensing requirements for large aircraft, e.g. the engineering systems found on aircraft such as the Boeing 747, were simply rolled out to engineers dealing with general aviation aircraft.

Many of the current BGA inspectors are not licensed at present but operate under the BGA system having established their competence under BGA procedures within the unregulated environment that the BGA operated in. The way that 'grandfather rights' are agreed for such staff is critical as many have no current CAA licence qualifications under the previous UK National system that can be ‘converted’ to the new standard. The CAA is however satisfied that the individual who have been authorised by the BGA are competent to continue to hold their existing approvals without having to meet the full requirements of Part 66.

Recommendation 4: The CAA should seek to ensure that there is adequate provision in any forthcoming changes to Part 66 and its implementation for the recognition of ‘grandfather rights’ for the licensing of BGA glider maintenance staff.

[80] CAA Licensing and Training Standards

There are other issues in respect of gliding that can be considered under RA2. Many clubs use aircraft to tow gliders to a suitable height to commence their gliding flight. There are two key issues that have been considered under the RA2 project. These are the continued use of ex-type certificated aircraft for towing purposes. This includes Annex II types. The other issue is the desire to use more environmentally friendly aircraft with smaller noise footprints and lower fuel consumption.

For example, some aircraft types that possess a towing capability are likely to move from an Annex II CofA to a UK National Permit to Fly due to De Havilland Support Ltd (DHSL) surrendering the type certificate[81] for certain aircraft types. The CAA has already agreed to the use of such ex-TC aircraft from other manufacturers, e.g. Austers. Although DHSL are talking about having type responsibility agreements in place for some of these types, which would allow aircraft to continue holding a CofA or to transfer to a Permit to Fly, the removal of a significant subsidy from the original type certificate holder, British Aerospace, means DHSL now have to charge owners a fee to provide the service. This may prove to be too costly for the BGA clubs, and private owners, as it has the potential to add a significant additional overhead to the running costs.

There is also a new issue surrounding the introduction of kit built aircraft, such as the Eurofox, and LSA aircraft types that may have a glider towing capability[82]. It is important to safeguard the economic viability of aerotow services for the sector and the newer aircraft types, using more modern technology engines, offer real benefits in the direct operating costs. Imposing a need to use EASA certificated types to tow EASA certificated gliders would add cost for no justifiable reason, as the Permit to Fly types are equally as capable. Whilst there are alternative options available through the use of winches these have operating limitations.

Although identified as a recommendation in the drafting of the RA2 report, the CAA has already considered the issue of allowing the use of Permit amateur built aircraft for towing gliders in a club environment as an extension to the existing arrangements for the continued use of orphan aircraft that now operate

[81] The UK CAA had a policy whereby an aircraft that was demonstrably not supported by a type certificate holder, or through a type responsibility agreement (TRA), could not be eligible for a CofA. In 2011, the CAA revised this policy following industry lobbying so that, when a TRA is in place the owner now has the option of keeping a CofA or transferring to a Permit to Fly.

[82] The aircraft will be assessed from an airworthiness perspective as to whether it is capable of towing gliders.

on a Permit to Fly. A letter has been issued to the BGA to recognise this arrangement with the caveat that European operations rules may affect what may be permitted. This follows the pre-existing arrangement and provides a degree of flexibility that suits the nature of the operation.

Current UK practice, driven by the definitions laid out in the ANO, does not allow a Permit to Fly aircraft to undertake activities that are classed as Aerial Work, mainly because there is perceived to be some element of 'valuable consideration' that takes place. This is an issue for BGA clubs as they operate aircraft that are potentially affected by the transfer. Continued acceptance of ex-TC aircraft on National Permits to Fly for aerotow activities is considered an acceptable solution, particularly if it is possible to consider the nature of the operation of the BGA system of clubs as private, rather than aerial work.

The principle already exists as the CAA has already agreed that, since 2007, some Permit to Fly aircraft can continue to be employed on towing duties, providing it is operated within the BGA system and a genuine club environment. This arrangement has been extended to cover the potential growth in other aircraft types affected by the transfer to Permits.

The draft report suggested a recommendation that the CAA should seek to resolve any confusion about whether performing glider towing within a club environment, where there is no intention to make a commercial profit or income that is not available to the club, is aerial work or can be redefined as a private operation, which is recommended. In its discussion over the acceptance of using Eurofox Permit to Fly aircraft for towing gliders, the CAA looked at the issue of whether operation solely within a club environment constituted aerial work. The CAA arrangement for the Eurofox and ex-TC tug aircraft clearly establishes a policy that defines club use as being 'private' flights.

A major concern, however, is the current intention under the developing EASA operating Implementing Rules to designate glider towing as 'Commercial Operations'[83]. This would create a potential impediment to using both ex-TC aircraft and amateur built types. The recreational nature of the gliding activity is a clear candidate for lobbying EASA to adopt a more flexible approach given that the 'commercial' aspect of the activity, the payment to have an aerotow to altitude within a club environment is not strictly the commercial or business use

[83] The EASA requirements for Operations were consulted under Notice of Proposed Amendment 2009-02. EASA Opinion 04/2011 was published as a result in 2011 along with the various Comment Response Documents. At the time of this review the contents of that Opinion and CRD are still the subject of discussion and final rule has not yet been issued.

intended to be captured by the forthcoming rules.

Recommendation 5: The CAA should, in conjunction with its evaluation of the developing EASA rules on commercial operations, seek to influence EASA's view on GA and what 'recreational activities' should be deemed to fall outside of any definition of commercial operation, thereby allowing a more proportionate approach to regulation to be achieved. In essence this includes separation of recreational aviation related activity from pure commercially biased activity, which serves a 'transportation' need, towards the concept of 'adventurous aviation'.

Model Aircraft

It may seem strange to include model aircraft as a class under the RA2 programme. These are however a feature of recreational activity and, with increasing performance and size of some of these aircraft, it is felt that they cannot be ignored the aircraft, as an aerial vehicle, has the potential to impact third parties. In many respects the larger model aircraft, often up to 12 feet in wingspan and potentially larger, possess the same characteristics as their full size counterparts.

The ANO covers small unmanned aircraft (including model aircraft), under Article 166, and small unmanned surveillance aircraft (including model aircraft with onboard cameras), in Article 167.

With the high dependence upon radio control to operate and fly these aircraft there is a clear link to those aircraft classified as Unmanned Aerial Vehicles or Systems (UAV/UAS). However, with the potential to operate 'beyond line of sight' the complex policy associated with UAV or UAS are dealt with separately under a CAA business plan item.

The current arrangements do not regulate model aircraft to any great extent. Aircraft below a certain weight (20 Kg) are free to operate without CAA involvement. Aircraft above that weight require a CAA 'permission to test' in the first instance and thereafter a 'full exemption certificate'. This does not impose any airworthiness standards, as would be the case for a conventional aircraft, but the need for the permission recognises the increasing size of the aircraft and the higher potential risk to third parties in its operation. Such large aircraft are required to be inspected, with an evaluation of pilot capability and basic airworthiness testing (but not to a specific code).

The modelling activity and interface with the CAA is generally controlled through the British Model Flying Association (BMFA) with almost 800 clubs affiliated to it

and some 36000 members, both at club and individual level. The BMFA also has international recognition as the UK sporting body for that sector. Their handbook is quite comprehensive and links back to the legal provisions of the Air Navigation Order. To cover the activity and the interface with the legal requirements the CAA has published CAP658, Small (Model) Aircraft: A Guide to Safe Flying.

For the purposes of RA2, the situation is felt to be adequately but not over regulated. It is therefore recommended that the status quo be maintained.

Unmanned Aerial Systems and Vehicles

An unmanned aerial vehicle (UAV) is the actual aircraft, either fixed or rotary wing which is operated without a pilot on board. At the simplest level a UAV is no more than a radio controlled model aircraft.

The concept of an unmanned aerial system (UAS) includes the supporting infrastructure, including any ground based control systems that may be needed to operate the aircraft. The military and some security services make extensive use of UAS, primarily in a surveillance role although some military UAVs have an offensive capability. In the civil market there is growing scope for UAS, which have already seen some use in the UK with police forces and emergency services for surveillance purposes.

The smaller UAS are currently targeted at two markets, the recreational market for fun and personal use, and the commercial market such as aerial photography and surveillance (including fire and police use). The commercial use of UAS is outside this programme as they are clearly not being used for recreational purposes.

UAS aircraft range considerably in size from small (Parrot AR Drone) to a more conventional aircraft size (BAe Herti), which is about the size of a small light aeroplane. The Parrot AR Drone, which can be controlled using an iPhone or similar android communication device, has already shown that there is ignorance of the regulations. Many of these devices were sold as Christmas presents without bringing to the attention of the users the UK requirements for operation.

CAP722: Unmanned Aerial System Operations in UK Airspace covers both the airworthiness, where applicable, and operational requirements. Small UAS are treated in a similar manner to model aircraft. As the aircraft size grows further, airworthiness and operational requirements need to be met. This includes, where necessary, full airworthiness certification as for conventional aircraft and

the use of segregated airspace. UAS above 150 kg are deemed to fall under the provisions of the EASA regulations unless exempted under the EASA Basic Regulation due to their being used for 'State' purposes.[84]

A particular issue is the question of 'beyond line of sight' capability and this requires a more complex design and certification regime as we move into control systems that require the operator to use cameras and on-board sensors to 'fly' the aircraft from a fixed base. A UAS can be pre-programmed to perform a particular flight profile and as such it becomes an autonomous vehicle where the ground controller is there solely as a backup should a failure of the automation occur. This clearly demands some form of 'sense and avoid' technology and it is this aspect that is particularly challenging.

It is considered however that, with the exception of the small line of sight recreational 'toys' that fit within this category, such as the Parrot AR Drone, UAS are largely outside of the scope of RA2. The smaller vehicles are adequately provided for under CAP722. The private use of UAS, which have cameras on board questions whether the intended usage is really private. So, at this time recreational use appears to be somewhat limited. There are however other projects underway within CAA to look at future civil UAS oversight. Although these also fall outside of RA2 there will be ample scope to consider the recreational use of UAS where appropriate. The RA2 programme acknowledged the intent to appoint an Oversight programme Manager for UAS and it is accepted that, with this appointment, the future policy for such aircraft, whether used commercially or recreationally will be reviewed and addressed where necessary.

Single Seat Deregulated (SSDR) aeroplanes

The CAA responded to industry requests, primarily from the BMAA and aircraft owners, to consider the deregulation of certain single seat Microlights. These requests were considered by CAA in conjunction with the Department for Transport. It was agreed that single seat aircraft below 115 Kg could move away from the microlight airworthiness requirements, BCAR Section S, into a deregulated environment. ANO Article 16[85] was therefore amended to exempt microlight aeroplanes from the need to comply with prescribed airworthiness standards. This recognises the fact that the pilot, as the only occupant, was well aware of the risks. Microlight pilot licenses are still required.

[84] The EASA Basic Regulation is Regulation (EC) 216/2008 and the exemption for 'State' aircraft is contained in Article 1(2).

[85] ANO Article 16 refers to the need to hold a Certificate of Airworthiness.

Although this change in policy was welcomed there was some initial concern among owners about the CAA's withdrawal of the Permit to Fly for such aircraft. The Permit to Fly attests to a basic airworthiness standard being met and in the absence of a requirement to comply with a design code the CAA decided that a Permit cannot be issued. Owners believe that the Permit to Fly was giving assurance that the aircraft was fit to fly and without one the aircraft's airworthiness could be questioned.

Many owners also felt cautious about abandoning their links with the BMAA despite the fact that there was no longer any airworthiness oversight role for the BMAA to perform in respect of these aircraft. Many owners continue with BMAA membership in order to have some level of continued support. There are continued benefits that can accrue through membership of a sporting organisation such as the BMAA even if the BMAA no longer provides a technical service for airworthiness purposes.

The CAA would therefore encourage owners to retain their links with the BMAA and for the BMAA to continue to promote good practice in the operation of SSDR aircraft. The BMAA can of course continue to conduct flying training through its affiliated schools allowing prospective SSDR owners the opportunity to gain a licence and experience before flying their own single seat aircraft.

Since the SSDR category was established there has already been some growth in this sector with several new types available to prospective owners (such as the Reality Kid and Grass Strip Eindecker aircraft) with further examples under development. It is understood that, despite the absence of requirements to comply with a design code, many manufacturers are still using BCAR Section S as a baseline specification.

There has also been some informal discussion about whether the scope of this deregulation can be extended to a higher weight or even to two seat microlights. However, there are issues that need to be considered carefully since the basis upon which the original decision was taken does not automatically carry across. The presence of a second person, passenger, changes the basic assumptions about the acceptance of risk and it is felt that some form of continued airworthiness control is still required. It would also sit at odds with the situation in other European States where there is some form of regulation over standards.

This position is generally supported by the BMAA who do not want to see the sector go back to the days prior to 1984 where the absence of such controls led to growing concern over the accident rate. In many ways, the deregulation of

the sector has been beneficial. However, it is still early days. There has been no evidence to date of the change having had any impact on the accident rate for this class of aircraft following the shift in policy. However, the CAA will continue to monitor incidents.

It is not recommended therefore that the SSDR rules, e.g. the maximum weight of 115kgs, be changed at this time until further experience of operation has been built up on the new types being introduced.

An issue regarding the definition of what has to be included in the 115 kg weight has however come up with the development of some electric powered SSDR aircraft. With conventional combustion engines, the fuel is regarded as being separate. For electric power the 'fuel' is electricity stored in batteries but current policy and definition does not allow batteries to be regarded as an addition to the 115kg limit.

This subject is already under consideration as to whether the current Air Navigation Order definition needs to be reviewed to account for this propulsion system. If agreed that batteries can be additional to the 115kg limit then some provision will need to be written in, similar to that for ballistic parachutes. This will not however be identified as a separate project under the RA2 programme.

Microlights

A microlight is a small aircraft, defined as being below 450 Kg in weight. Microlight aircraft take many forms but the basic designs are separated into flex-wing (or weight shift), where simplistically the pilot uses the weight of his body as leverage to control the flexible formed wing above him, and three axis, which look and operate very much like a conventional aircraft.

Microlight flying is predominantly managed under the auspices of the British Microlight Aircraft Association (BMAA) in a manner similar to the BGA although for airworthiness in particular this is achieved through the CAA approval of the BMAA as a sporting organisation. There are two sporting organisations in the UK that continue under national requirements, the BMAA and the Light Aircraft Association. The approvals are not specifically defined due to the somewhat unique nature of the relationship to the level of devolved responsibility. This is however under review and a specific BCAR for sporting organisation approval is being drawn up.

Microlighting has been subject to greater regulation since 1984, particularly in relation to airworthiness issues, as a consequence of considerable concern about the accident rate. This was mainly seen as the consequences of poor

design. As noted above, microlights are therefore still subject to national rules rather than the new European framework. These rules have specific application regarding design and operation but there is no consistent approach to the setting of standards between the European States. As a result, there is considerable variation in how such aircraft are allowed to operate and even in what involvement the State authority may have in oversight. This is claimed to be problematic since it appears to set the UK standard at odds with that used elsewhere in Europe.

It is seen by BMAA as a desirable aim to simplify the requirements by looking to adopting a single European standard so as to remove any national variations that currently exist. This would help minimise the additional costs introduced by differing standards and allow greater freedoms to design, manufacture and sell such aircraft across Europe. In principle, this almost argues for the application of the EASA framework to microlights, given that many are now production built. The sector is however concerned that in doing so the issues of bureaucracy and proportionality identified 9in the sections above would come to the fore.

As an alternative approach, the CAA would argue that the adoption of BCAR Section 'S'[86] as an airworthiness standard has undoubtedly made a difference, improving the basic design and airworthiness of microlight aircraft. The CAA should therefore seek to continue to promote BCAR Section S as an airworthiness code in the UK and potentially across Europe for microlight design. It is understood that this is one of the areas that the European Federation of Light and Vintage Aircraft (EFLEVA) have been discussing the attractiveness of a single design code and this would be a worthy initiative to support.

On the other side of the regulatory equation, pilot licensing had also adopted a more flexible approach through the UK rules to microlight aircraft and had accommodated the different nature of microlight flying through the PPL (D). This eventually led to the setting up of NPLG Ltd and the BMAA Licensing office and their roles as effectively qualified entities to oversee and assess applications for the UK National Private Pilot Licence (NPPL) in 2002. NPLG Ltd deals with SSEA and SLMG[87] licences and ratings, the BMAA with microlight licences and ratings.

[86] BCAR Section S is an airworthiness code brought in to address concerns over the lack of consistent airworthiness standards which had led to an increasing number of accidents as the microlighting sport grew.

[87] Simple Single Engine Aircraft (SSEA) and Self launching Motor Gliders (SLMG)

It is difficult to see if this has had any real benefit in promoting new entrants to take up the sport given the significance of the financial climate on the marketplace. The results of the UK MOR analysis may also give some indication as to areas that may require to be re-evaluated, if it is possible to differentiate what licence the pilot held at the time of the incident.

However, the 'simpler' licensing approach does have some comparability with the sport licence that is now coming into being in other States worldwide. Perhaps the time is right to review the NPPL, in view of light sport licence development in other States, e.g. USA, New Zealand and Australia. There is also some form of provision in the EASA rules with the advent of the Light Aircraft Pilot Licence (LAPL) although it has yet to be seen whether this is really comparable with the sport licence in use elsewhere.

The UK's specific requirements for airworthiness and the application of CAA approval oversight are claimed by industry to be an impediment to growth. This is claimed to be evident in the relatively low number of UK microlight manufacturing organisations that operate in the UK sector against the scale of operations in some other European countries. The Czech aviation industry in particular has seen much of that growth although the CAA and BMAA have had cause in recent years to question some aspects of the design and quality of build on aircraft that have found their way into the UK system. In this respect, it has been necessary to embody some modifications to ensure the identified issues are addressed and that the aircraft fully complies with the UK Section S code.

A microlight designed to BCAR Section S and manufactured by a CAA approved organisation is designated as being 'type approved'. Type approved microlights may be used for flying training and, more recently the CAA has allowed them to be hired out from clubs by qualified private pilots who do not own their own aircraft. This replicates some of the aspects of CofA used for aircraft training and hire that is enjoyed by fully certificated aircraft and recognises the degree to which the CAA believes the type approved standards mimics these standards.

It would be possible to go all the way and certificate these type approved microlights to ICAO standards but this would add cost, due to the certification process, and would further separate the UK system from that for microlights elsewhere in Europe. As such, it is felt that the current UK system is about right but could benefit from a review of the current requirements for microlight manufacturing approval and the BCAR Section S standard to ensure that it is fit for purpose and not overly onerous without any safety benefit.

There has also been some development of the paramotor concept towards larger craft which are based around a ‘trike’, consisting of a powered three wheeled chassis, slung under a paraglider. For the purposes of RA2 this is classed as a para-trike. Single seat variants typically fall under the provisions of the Single Seat De-Regulation definition, providing the weight limit of 115kgs is observed, so such aircraft may be exempt from some requirements. Two seat para-trikes are classed as microlight aircraft and it is therefore appropriate to have included them in the RA2 discussion here.

With a fleet of some 2000 aircraft, the BMAA fulfils a significant role by carrying out a range of devolved activities under its CAA approval, the sporting organisation approval referred to previously. Some of these are performed on behalf of the CAA but not to the point where the BMAA is acting wholly independently.

The accident record for the sector, which was one of the key reasons for introducing greater controls in 1984, has improved significantly since the introduction of the current level of regulation, particularly in relation to airworthiness issues. This shows a growing level of competence and maturity in the approach to design and construction of these aircraft. There may therefore be an inherent reluctance to move away from the current regulatory model in case such a move has a detrimental effect on the accident rate.

However, an analysis of the most recent accident and serious incident events (covered in more detail in a later section) indicates that microlight pilot skill is an issue for consideration. This needs to be considered under RA2 in conjunction with the BMAA to identify if there is any safety intervention strategy, e.g. adjustments to the pilot licensing syllabus, which could improve the situation. This aligns nicely with the need to look at the current NPPL model and how that aligns with EASA’s LAPL and the Sport Pilot Licence concept used elsewhere.

In advance of the RA2 programme starting, the BMAA highlighted a number of issues to the CAA for their consideration. These were part of a BMAA paper on the ‘Future of Microlighting’. A key point they raised was the issue of further devolvement and a review of the regulatory restrictions on the use of microlights for commercial (aerial work) purposes. Since UK type approved microlights are designed to a suitable airworthiness code and manufactured under a BCAR production approval there is potential for such aircraft to be eligible for and hold a CofA.

This sits well with the concept of the RA2 programme and what it seeks to achieve. There is clearly scope to look for further devolvement of activity, given

the options, and potentially greater autonomy in some aspects of the BMAA operation. This would potentially permit commercial advantage to operators using microlights over conventional 'certificated' aircraft and this would need to be carefully considered as the move to use non-ICAO compliant aircraft for aerial work or commercial purposes sits at odds with the policies adopted in other countries. There are some aerial work activities that do not sit well with the potential capability of microlights.

Recommendation 6: It is recommended that the CAA consider whether it would be appropriate to allow certain aerial work activities to be undertaken by type approved microlights and potentially type approved gyroplanes, whether under a Permit to Fly or, alternatively, to give consideration of the additional requirements that would be necessary for such aircraft to hold a CofA.

There has also been considerable concern in recent years expressed about microlight manufacturing in the UK and, in particular, the CAA's approach to it. This centred on the development of a BCAR A8-21[88] design and production approval and a declared intent to require microlight manufacturers to comply with those requirements. There is no doubt that, at face value, the greater detail contained in the BCAR A8-21 requirements is seen as being overly prescriptive and onerous for microlight manufacturers to comply with. Notwithstanding this issue, industry has also been critical about the current depth of CAA oversight, suggesting that its approach is heavy handed and more suited to larger and more commercial organisations.

The CAA would argue that this is not the case, it is certainly not its intention to have a heavy handed approach, but does recognise that these organisations are often quite different in their make-up. The individuals involved are often short on experience and in their approach to regulation. The need for regulatory compliance, even against the expectation of establishing basic procedures and working practices, is therefore possibly misunderstood by some organisations. It is recognised however that the current UK requirements are more formal and demanding than those in some other States, allowing manufacturers in those States greater freedom to design and manufacture with less direct regulatory intervention.

In respect of these criticisms, the CAA has already acknowledged the potential

[88] BCAR A8-21 is intended to provide alignment of the design and production UK requirements with the JAR-21 requirements (now the Part 21 philosophy under EASA) and mirrors many of the European requirements.

impact of the EASA LSA[89] aircraft methodology, which if adopted as currently proposed would mean that the CAA, in moving to BCAR A8-21, would be imposing additional requirements on the lower weight microlight aircraft if our National system continued as it is. Accordingly the proposed introduction of BCAR A8-21 approvals for microlight manufacturers has been deferred until the impact of the EASA LSA system is better understood.

Recommendation 7: Review the continuing relevance of the BCAR A8-1 requirements for microlight manufacturers once the EASA regulatory methodology for LSA aircraft is properly defined. This review should account for the desire to have a more openly proportionate requirement and also take into account other microlight manufacturing systems in other European States.

In order to try and address these concerns over CAA oversight, the BMAA have also opened discussions on the concept of them assuming responsibility for the oversight of microlight manufacturers, on behalf of CAA. This was first proposed in 2002 but, for various reasons, was not progressed to a final conclusion. This is important as industry see it as a way of containing costs to the industry, by reducing that direct CAA involvement as far as possible. The high cost of CAA oversight is seen as an issue that is claimed to put the UK at a disadvantage to the rest of the European microlight industry. These issues will be considered under RA2. There is no reason why the BMAA could not perform such activity providing the process is agreed by CAA and any limitations on how to address findings is properly defined. The CAA, of course, retains ultimate responsibility for the approved organisation.

Recommendation 8: The CAA should consider and further explore the possibility of allowing the BMAA to take a greater role in the ongoing oversight of microlight manufacturers under BCARs, either as an extension to their sporting organisation approval or as a qualified entity.

Since the BMAA is not, at present, subject to EASA rules there is also scope to consider further the concept of a sporting organisation as noted above and what level of devolvement of activity across the whole spectrum it can embrace. This would also help focus our thinking on how we can influence EASA's future view on any potential expansion of their remit that affects aircraft that sit within Annex II. Crucial to that argument is whether there is justification for it to be regulated

[89] Light Sport Aircraft. Following the introduction of the LSA and Sport Licences in the USA EASA has announced its own LSA system. Whilst EASA's policy is still evolving, it does not exactly follow the US philosophy.

centrally through the EASA framework for any reason, one issue for the EASA Management Board review to consider.

Amateur built (Homebuilt) aircraft

The design and construction of an amateur built aircraft, often referred to as homebuilt, has been a feature of the UK general aviation sector since post WWII. Initially based around simple wood and fabric designs, built from plans, these aircraft evolved into the greater use of metals and more recently modern composite materials. A significant feature has also been the growth of the use of kits, containing many prefabricated assemblies and components, to satisfy demand and ease the process of homebuilding for potential owners.

This sector has been subject to the oversight and involvement of the Light Aircraft Association (LAA)[90] originally approved by the CAA in 1948. That approval, like that of the BMAA, is very much focused on the LAA as a sporting organisation with a range of devolved responsibilities and, similar to the BMAA, capable of carrying out certain activities on behalf of the CAA. This has similarity to, but is not the same as, a Qualified Entity would undertake under contract to the CAA[91].

The LAA oversee a large and diverse fleet of aircraft that now embraces most areas of design and technology. This includes amateur built microlight aircraft, aeroplanes and gyroplanes. These aircraft are still required to be airworthy, despite the apparent myth that there is a difference between PtF aircraft and their CofA counterparts. It is only the rules regarding what that airworthiness system is built upon that differs. In some instances, the LAA members and owners have built up a greater affinity for their aircraft, leading to many being in considerably better condition than the more marginal CofA aircraft that are operated on a tighter budgetary shoestring.

The use of modern materials, technologies and avionics has allowed considerable improvements to be achieved with faster aircraft performance, reduced noise and lower environmental impact. This challenges the historic view about what amateur built aircraft are. No longer small and slow, some of these aircraft are more capable in performance and navigational equipment fit

[90] The LAA was previously known as the Popular Flying Association.

[91] The term ‘qualified entity’ was introduced into BCAR A8-22 in August 2008, aligning with similar requirements in the EASA regulations. A qualified entity can be approved to undertake tasks on behalf of the CAA and to provide reports.

than many of the production aircraft from the 1960's, 70's and 80's that remain in service on a CofA.

Inevitably, owners are now investing considerable capital in building such aircraft, aided by the growing availability of attractive designs and build kits. For example, the Vans RV[92] models are very popular with a range of aircraft available to build and a proven track record. The finished cost of these aircraft ranges from £50,000 to over £100,000. The LAA also have considerable numbers of aircraft operating on a Permit to Fly that have previously held a CofA[93] but which, because of a lack of manufacture support, the CAA has agreed to allow to move to a PtF regime. This includes a number of aircraft that historically the CAA had agreed could operate on a PtF even though a type certificate was in place in another State, e.g. Cessna 140 and Piper J3 Cubs. By comparison, these exchange hands for sums ranging from £10,000 to £30,000.

The design capability the LAA possesses provides an engineering service to its members, avoiding the need for direct CAA involvement whilst maintaining an enviable reputation built up over the years. The continuing airworthiness support available to members is also evident, as with the BMAA, through a sizeable population of volunteer inspectors. Such volunteers are crucial to the success and viability of the organisation.

Recognising this but taking into account the need to be seen as being effective, the LAA has put in place several initiatives over recent years. These include actions to improve standards, a more focused programme of inspector training and attention to inspector competence being examples. This has generally resulted in a better airworthiness standard across the fleet. It is clear that the LAA is seeking to further improve its service to its members and to further establish and build on the standards it has achieved over recent years.

There are a number of issues that the LAA have raised with the CAA that can usefully be included in the RA2 review, some of which were already being considered and underway prior to commencement of the RA2 programme. This includes consideration of a provision to allow LAA aircraft to fly at night or in

[92] A very popular design, the Vans population embraces many single and two seat designs with good performance and comfort levels for cruising and touring. Prices range from around £50000 to over £100000.

[93] Where a manufacturer or type certificate holder provides support CAA policy is to require a CofA. Where the TC holder ceases to trade or is no longer providing active support the CAA will now consider the aircraft's eligibility to hold a Permit to Fly as an alternative approach.

Instrument Meteorological Conditions (IMC). Some other States, e.g. Sweden and France have allowed this on a few homebuilt aircraft although there seems to be greater provision under the US framework.

The CAA should therefore continue its work to consider the LAA request to allow ex-TC orphan aircraft and amateur built operating on a Permit to Fly to fly at night or in IMC, where necessary through the establishment of additional design requirements to be met and suitable continuing airworthiness provision and certification.

The CAA readily accepts that the loss of LAA and BMAA would jeopardise the viability of a considerable element of recreational aviation, totalling some 4500 - 5000 aircraft. It is therefore in the best interests of both the CAA and industry to ensure that these organisations continue to exist, within a regulatory framework that is proportionate whilst remaining effective at maintaining the current airworthiness standards and safety levels. It is acknowledged that the current approvals of the LAA and BMAA, which are presently issued against an internal CAA framework document, lack the clarity of definition against requirement that exists for all other approvals. This should be regularised.

In addition, the review of the LAA and BMAA as sporting organisations offers an opportunity to look at further devolution of activity to these important organisations including, where appropriate, tasks that could be considered to be relevant for assignment to qualified entities, but without the formality of having to control such activity through CAA awarded contracts for each task. This aligns with the recommendations in the GARR to facilitate such devolution where possible.

Recommendation 9: The CAA should develop a regulatory requirement that provides a suitable formal framework for approval of sporting organisations, such as LAA and BMAA, that embraces the role that the CAA wishes such organisations to play and defines, with greater clarity, the basis upon which the organisation is approved.

Beyond the airworthiness issues, the LAA has in place a coaching scheme to support pilots and owners converting onto LAA types and to help increase awareness of the issues associated with the types of aircraft under their control. A number of ‘Struts’ across the UK further this ideal along with creating a social network for owners to pool experience, expertise and ideas. It is difficult to quantify the benefit that can accrue from such system. There is certainly potential for improvement in awareness, pilot skills and a more conscientious approach to aviation issues that result from the sharing of experience.

To complete the review of the amateur built sector, a number of small helicopters, such as the Rotorway Executive, are available as kits. These currently fall outside of the LAA and are subject to direct CAA involvement. Given the complexity of helicopters in general terms it is felt that they cannot be dealt with simplistically. However, the RA2 programme ought to consider their position further with regard to looking at possible regulatory framework changes.

The LAA already have amateur built gyroplanes within their scope of approval and there is some similarity in terms of technology between these and helicopters. There are no other organisations that are currently positioned to take these on.

Recommendation 10: The CAA should consider the position of homebuilt helicopters and where they fit within the regulatory framework, given the specific needs of these aircraft and the desire for further devolution.

Gyroplanes

Whilst gyroplanes, or gyros, have been around for some time (1930's) it was the 1960's that saw the first signs of significant growth in this sector. Early gyros such as the Bensen and Air Command variants appear somewhat crude and there appeared to be minimal control over the airworthiness design standards of these aircraft. Many were accepted in the UK on the basis of the original design, most of these primarily originating in the USA. Accordingly the fatal accident rate was high, because of both airworthiness and low pilot skill issues, and of such significance that the CAA was forced to intervene.

Greater airworthiness scrutiny was applied, for example the Air Command gyro type was eventually grounded following a series of accidents. BCAR Section T[94] was introduced and additionally research conducted into gyro design issues and handling characteristics. As a consequence of this research the CAA required older gyroplane types to be modified in order to correct unacceptable handling characteristics linked to a thrust line to CG configuration dynamic. Whilst not a total solution it is hoped that the resulting improvement in handling under certain circumstances will realise an improvement in safety. Despite these improvements it is perhaps too early to decide what effect they will have on the accident record in the longer term due to the relatively few examples in use and

[94] BCAR Section T is a design and airworthiness code for gyroplanes. Similar to BCAR Section S for microlights it is managed through a joint CAA/industry working group which looks periodically at whether the requirements continue to be relevant and appropriate.

the low number of operating hours.

The application of Section T as a design code has undoubtedly seen considerable improvement in the more modern 'type approved[95]' gyros and there is resurgence in the market for these newer types. The CAA recently agreed that with the greater availability of 'type approved' gyros that all gyro training should be conducted on these types of aircraft. What is missing, however, is the same training environment, focus and support network that is seen with the BMAA microlight club system.

Gyroplanes have generally fallen under the auspices of the BRA but without any cohesive approach to BRA control of the sector's activities overall. Independent qualified instructors at present still conduct the majority of flying training and operations. With the advent of type approved gyros and modern production of these representations have been made to the CAA about gyroplanes possibly falling operationally under the auspices of the BMAA. It ought to be an aim in the gyro training industry to adopt the same model, possibly through the British Rotorcraft Association (BRA) or in conjunction with the BMAA. However, at present the BMAA does not have such expertise or capability.

Recommendation 11: It is recommended that industry seek to establish a gyroplane pilot training system that has parallels with that operated under the auspices of the BMAA using type approved gyroplanes.

This would not only allow improvements in gyro training to be achieved but also moves to allow qualified gyro pilots to hire aircraft from established clubs, as is the case for microlights.

Recommendation 12: It is recommended that the CAA consider the possibility of allowing established gyroplane flying clubs to hire 'type approved' gyroplanes to qualified pilots in the same manner as the system agreed for type approved microlights.

A further issue for consideration under RA2 is the level of direct CAA involvement in gyroplane matters, particularly Surveyor involvement in Permit issue and renewal. For various reasons, the CAA has been more involved in production gyroplane oversight than for other aircraft and sectors. This may be due to the perception that there is a continuing high accident rate with gyroplanes, a number of issues noted with new 'imported' gyroplanes and the perceived shortage of expertise within the industry.

[95] Type approved gyros designed to Section T and manufactured by a CAA approved organisation is similarly used for flying training.

With the growth in companies involved in type approved gyroplanes, the increasing interest among pilots in qualifying for a licence and the increasing ownership of these new machines, it is appropriate to look at the gyroplane industry overall and the possible scenarios and options for CAA oversight. The most recent review of gyroplane accident data suggests that there is no airworthiness related reason to differentiate gyroplanes with continued direct CAA involvement. However, it is recognised that the sector does not have a sporting body to represent its interests.

The LAA has supported some amateur built gyroplanes in respect of airworthiness issues, modifications etc. This latter aspect followed the premise that the older gyros were amateur built and therefore fell fully within the LAA's capability. The inclusion of type approved gyroplane airworthiness support and capability within the LAA is therefore also under consideration as part of RA2 as a natural extension to their capability.

Gyroplane pilots with the LAA have complained that they do not get the same representation or benefits as their fixed wing colleagues, particularly on non-airworthiness matters. That is primarily an issue for the LAA to resolve. However, it does build on the perception that gyroplanes are different.

Recommendation 13: The CAA should consider further devolution of gyroplane oversight, including the airworthiness support, airworthiness review functions and the associated CofV process, to industry, through the LAA, BMAA (if appropriate) and possibly, with suitable approvals, directly to gyroplane manufacturers for airworthiness support.

However, the acceptance of non-UK modern gyroplane designs, upon which many of the models sold in the UK are based, has often required modification action for them to be issued UK certificates. For example, the UK appears to be unique in requiring a fire detection system to be fitted to some production gyroplanes, notwithstanding the satisfactory operation of the type without such systems fitted elsewhere in Europe. This is perhaps an indication, as with microlights, that there is a variation in standards across Europe.

In the longer term, industry has stated that it would be good to see a harmonisation of standards across Europe and, in some States, a reluctance to allow gyroplane operations, but without necessarily invoking any desire to see the sector embedded within EASA’s remit. Perhaps CAA should promote BCAR Section T as an appropriate airworthiness code. However, it should be recognised that, if we adopt the concept of adventurous aviation and the shift in approach to third parties and the associated risks then Section T may have

some requirements which are no longer proportionate when viewed against similar European standards. Although not a recommendation this is something that CAA ought to look at.

A more recent analysis of the accidents that have occurred highlights pilot training and skills among qualified pilots as a significant causal factor. A lack of available performance data, awareness of gyro handling characteristics and gyro specific safety promotion is noted. This suggests that scrutiny be also given to the pilot licence syllabus and training standards. Work has already been undertaken jointly with CAA and industry to develop enhanced guidance for gyroplane pilots on handling, performance and related matters to try and address the underlying issues identified in the analysis of the gyroplane accidents. At the time of writing this report, the work on that Safety Sense Leaflet is almost complete. It is not therefore a recommendation.

Ballooning

Prior to the introduction of EU legislation, ballooning in the UK was conducted under a framework of both regulated and unregulated activity. The British Balloon and Airship Club (BBAC) were very much involved in the sector as the governing body. Although some activities were conducted outside of that body's oversight the BBAC acted as a UK sporting organisation with CAA approvals for certain activities.

For commercial activities, e.g. balloon pleasure flights or experiences, a National balloon AOC (Air Operator's Certificate) is required. This satisfies the ANO public transport requirements as they currently stand because payment is being made for carriage. All balloons must be registered. In addition, AOC balloons were required to hold a CofA, which was issued against compliance with UK airworthiness codes, whilst those used privately were not although some did voluntarily, particularly if operating outside of the UK.

Balloons are required to comply with certain design standards, both for the envelope and the basket. This applies even where the shape of the balloon is unconventional, e.g. in the shape of a house or motor bike for a specific customer requirement. Balloon AOC operations are also covered by requirements and these are contained in CAP611 Air Operator’s Certificates: Operation of Balloons. However, standards vary from State to State and therefore there is no harmonised European position.

The EASA Regulations now require conformity with the relevant rules[96] and, whilst some of these have yet to be developed or others seen to mature, the BBAC have had to face the imposition of EU regulation in a manner similar to that faced by the BGA. Obviously, moving from a largely unregulated environment, as applied to private flying, the European rules have resulted in considerable concern among balloon owners, in terms of what is seen as unnecessary bureaucracy and cost. This is particularly true of balloons where the same rules apply even though the technology is much simpler and there are fewer component parts.

Once again, the BBAC has a significant role to play, particularly as a Part M subpart F and G approved organisation. The BBAC is also supported by a number of volunteer inspectors. The CAA's experience of the BBAC's control of ballooning shows that, despite being a fairly small organisation, the standards achieved within the sector and the corresponding safety record are good. Obviously, whilst the BBAC could be considered as a sporting organisation, the need to comply with European regulations places them in a position similar to the BGA. They have not therefore been included in the development of the sporting organisation approvals under BCARs.

It is noted that some Balloons are able to take advantage of the shift in EASA's position on continuing airworthiness requirements for European Light Aircraft. Further changes could well be seen in due course once the Part M Regulatory Impact Assessment[97] (RIA) work has been completed. The projects arising from this RA2 programme should look at the issues with a view to developing a strategy to influence EASA's thinking on the potential Part M RIA changes, and wider reviews of GA in Europe, particularly for balloons where the use can be defined as recreational. These should be embedded in the work assisted with CAA involvement in the EASA Management Board review of GA issues.

Obviously the forthcoming Operations and Licensing Implementing Rules could further impose regulatory requirements on this sector so this programme will have to consider these elements as well. The current NPPL system, which is also used for balloons, is obviously affected by the EASA pilot licensing rules, particularly as there are relatively few Annex II balloons. This could potentially

[96] The design codes under Certification Specification CS-31 apply to both Hot Air and Gas Balloons and the production requirements of Part 21 and maintenance requirements of Part 145 or M apply.

[97] This was announced by EASA during 2011 as a response to industry's continued criticism that EASA was not putting in place requirements that properly accounted for GA activity and operations and that were disproportionate.

exclude some pilots who cannot meet the European standards.

Recommendation 13: The CAA should push for the appropriate recognition of UK balloon NPPL licences with suitable grandfather rights on EASA Balloons.

The commercial use of balloons is also affected by the proposed European legislation, which is currently under review. Commercial balloons, i.e. those used under balloon AOCs, can range from small two or three person balloons to larger balloons, some capable of carrying 24 persons. There is scope to look at the pleasure flights in balloons as aviation activities that fulfil a recreational desire for the customer. However, the size and potential third party risks of the balloons, particularly those with a larger capacity (24 persons), could potentially limit any change in regulatory approach if the change in approach to risk could not be applied.

Recommendation 14: The CAA should seek, where appropriate to influence EASA's thinking on the use of balloons for pleasure flights as an adventurous aviation activity with proportionate regulation and oversight.

A further issue is the actual geographic area of operation. Whilst not a particularly significant issue, many UK registered balloons are based in foreign countries such as Italy. This allows the pilots to take advantage of the often better weather that prevails. However, there is a question of residency and whether the continuing airworthiness support for such aircraft is adequate. It is not necessarily seen appropriate to prohibit such operation but the issue of adequacy of oversight has to be considered, even if under the devolved system of Part M CAMO review.

This issue has not been included in the RA2 programme but is the subject of further review within the CAA Airworthiness team.

Ex -military Aircraft

For many years, the UK has accepted the operation of ex-military aircraft under a civil regime. These range from simple piston engine training aircraft to the Avro Vulcan, a 1950/60's bomber. In the early days military designs were often the only option for those wishing to establish a civil operation, aircraft being converted to provide basic passenger accommodation and allow civil use but not against civil design standards. In later years such ex-military aircraft were operated on Special Category CofAs, often for specific research purposes such as the British European Airways gust research De Havilland Mosquito aircraft.

With the advent of a growing interest in the purchase of surplus military aircraft, both for personal use and for display purposes at air shows, it was felt that the Special category CofA was no longer the best solution. Accordingly in 1975, a Military Aircraft Permit regime was established, which was felt to be more appropriate as there was greater scope to certify the aircraft outside of defined civil airworthiness codes. This eventually evolved into one aspect of the current CAA Permit to Fly system

Over the years, a range of other regulatory controls have been developed and put in place, from both an airworthiness[98] and operational perspective[99], in response to a number of accidents to such aircraft. These often occurred during air displays and as a consequence certain minimum controls over airworthiness, operations and air displays were established. These resulted in greater scrutiny of operating practices and the associated requirements were published in CAP632: Operation of 'Permit to Fly' Ex-Military Aircraft on the UK Register. This provides for certain controls over aircraft operations, including air display and air show activity which many of these aircraft participate in. Air displays are however regulated separately over and above CAP632 and will also be looked at under the operational review elements of the RA2 programme.

In one notable case, the fatal accident[100] to a Vickers Varsity, a number of aircraft enthusiasts were killed when the aircraft they were travelling on lost power and the pilots subsequently lost control. In response to the Air Accident Investigation Branch (AAIB) report the CAA placed restriction on the occupancy of ex-military aircraft. This restricted the number of persons on board to those that are necessary for the flight.

In recent years, a growing number of light helicopters[101] have been decommissioned from military service and have now found their way into continued use under a civil Permit to Fly. The CAA's occupancy policy originally allowed for the carriage of ground handling personnel, for the purposes of manoeuvring the aircraft, but there was growing evidence of the abuse of this

[98] BCAR A8-20 was established to look at improving the continuing airworthiness support for ex-military types.

[99] CAP632 was introduced to provide guidance on how ex-military aircraft ought to be supported operationally.

[100] Varsity T.Mk.1, G-BDFT, operated by the Leicester Aircraft Preservation Group crashed in 1984 following engine problems whilst flying on route with the tragic death of 11 of the 14 occupants.

[101] Such helicopters include the Wasp, Scout and Gazelle, the latter of which is looked upon as a cost effective private alternative to turbine engined helicopters holding a CofA.

provision. It is claimed that in one case, such a helicopter was seen transporting a bride and her father, in full wedding attire, to the wedding venue.

The issue of occupancy was again most recently raised by the AAIB during their investigation into an accident involving a foreign registered Gazelle helicopter[102]. As a consequence, a recent review was carried out on the occupancy of these ex-military types, with the aim of providing clarity over who can be carried and under what circumstances as many of these aircraft, particularly as light helicopters such as the Gazelle, are now being increasingly used for private purposes and not solely for air displays.

This resulted in clarification of the occupancy rules where a civil variant of the type existed. This was consistent with a change in regulatory approach, such as that being considered under RA2. However, the possibility of further types with a capacity similar to that of the Varsity coming into the Permit to Fly regime will require this aspect of maximum occupancy to be considered again. The question is whether there should be a maximum occupancy, particularly for those ex-military types holding a civil equivalent. This will continue to be kept under review.

On the airworthiness side, BCAR A8-20 established a set of approval requirements to further improve the airworthiness control and management of these aircraft, many of which no longer enjoy manufacturer support[103]. Some issues regarding the airworthiness management of ex-military aircraft came to light a few years ago and some aircraft were effectively grounded until corrective actions were taken. The subsequent investigations suggested that there were a number of areas where the requirements had been abused, not necessarily in ignorance. However, the investigation also highlighted a number of areas where additional guidance or clarification on the rules would be beneficial.

Therefore, as a result of recent discussions with the Historic Aircraft Association (HAA) the A8-20 requirements are currently being redrafted with a view to consultation and re-issue in 2012 providing a revised framework with additional capability and freedoms to use the approval more effectively. These changes again are in line with the principles of the RA2 review. The opportunity is also being taken to align the proposed changes with developing philosophy to

[102] Accident to YU-HEW, a Serbian registered Gazelle.

[103] Many military types were subject to manufacturer controls over the aircraft's flying spectrum and fatigue life. Without manufacturer support, it becomes more difficult to maintain a comprehensive continuing airworthiness regime.

simplify the maintenance processes and introduce greater flexibility in how companies can be approved to cover both aircraft holding a CofA and those with Permits to Fly. This aligns with the future thrust of the ESP initiative.

Recommendation 16: The CAA should complete its work, in conjunction with the HAA, on the review and re-issue of BCAR A8-20 to address HAA concerns about flexibility of use and CAA concerns over minimum standards, in particular through the introduction of a maintenance management function. The work should also account for developing policy regarding a more flexible approval system for organisations.

A further issue to be considered is the issue of exemptions to foreign registered ex-military aircraft and their participation on the UK airshow circuit. The CAA has a policy that requires foreign aircraft to transfer onto the UK register if they are to be resident for a lengthy period of time. In addition, the CAA has a policy that requires additional evidence for foreign ex-military aircraft or examples that are classified by the CAA as complex or which are subject to fatigue life monitoring and limitations to show that there is no airworthiness issue with the issue of an exemption. Should this continue?

Consideration of the issue under RA2 took the view that the current system ensures that third party risk of an aircraft structural failure was reduced by maintaining the restriction on fatigue management. To do away with the system would put UK operator's at a disadvantage. It would also ignore the basis upon which military aircraft had fatigue limits specified and the accumulation of fatigue was monitored in service. It is therefore intended to retain the current system of monitoring foreign aircraft when they apply for exemptions.

There are also issues regarding the onset of 'ageing' issues with the engines installed in such aircraft. The engines in many of these aircraft types are, by and large, no longer supported by the manufacturer. Spares are available, but often in limited numbers, and this affects the ability of operators and maintenance organisations to strictly follow the engine overhaul recommendations or requirements that may have applied during military service.

The CAA has been looking at developing 'ageing engine' requirements, considering the alternative strategies to overhaul of such engines but taking into account the relatively low utilisation and limited maintenance and type support that is available. Some guidance documents have been developed and circulated with industry and, following some minor changes to accommodate feedback from industry, will be formally issued as guidance. For this reason, the activity has not been raised as a recommendation.

The HAA have also approached the CAA with regard to the possibility of removing the current restrictions on flight in IMC. The rationale for this is relatively straightforward but had previously been rejected by the CAA. Ex-military aircraft, particularly jets, are currently forced to operate at low levels of airspace where the majority of GA aircraft are operating. This increases the potential for airborne conflict and mid air collisions.

The HAA wish the CAA to once again consider allowing ex-military aircraft to operate in IMC to allow these aircraft to fly above the lower levels and thereby reduce the potential for airborne conflict with GA aircraft.

Recommendation 17: The CAA should consider the HAA request for clearance of ex-military aircraft to operate at night and under IMC subject to being satisfied that suitable equipment fit, modifications and continuing airworthiness arrangements are in place.

Ex-military aircraft are also presently excluded from flight over congested areas. This means that such aircraft have to manoeuvre around congested areas when the HAA believe that the risk of such overflight is minimal. The HAA have asked the CAA to consider the removal of the restriction since the exposure time over most congested areas is minimal and there is statistical data that they believe supports their argument. However, key to any such review will be the question of what constitutes a congested area.

Recommendation 18: The CAA should consider the HAA request for the removal of the restriction for ex-military aircraft on the overflight of congested areas, subject to a review of the accident data, risks and potential mitigation to keep any risk to a minimum through pre-flight planning. This is linked to the potential grant of clearance for ex-military aircraft to operate in IMC.

Projects have been identified within the RA2 programme to consider these.

Ex-Type Certificated Aircraft

There are a growing number of aircraft types that are ageing and find themselves unsupported by the original manufacturers, the type certificate (TC) holder. It is an ICAO requirement that, to facilitate the freedoms of aircraft to operate on International Flights under the Convention on Civil Aviation, the aircraft must remain under some form of continuing airworthiness programme and regime. In the absence of a type certificate holder the UK CAA has put in place a system whereby an organisation or individual can apply to hold the type responsibility. It is however not the CAA's responsibility to arrange and provide

continuing support for such aircraft. This is something that is best achieved by 'owner's clubs' who can use a collective demand to source support and manufacture of new spares.

A basic level of airworthiness monitoring is provided by the TRA holder, where any significant airworthiness issue that arises can be brought to the attention of the CAA and safety actions, such as an Airworthiness Directive can be put in place. A type responsibility agreement also allows the aircraft to continue to be eligible for a CofA and, of course, the potential to be used for public transport etc. There is a significant difference between what an owner could expect from a TC holder and what may be possible under the more limited TRA regime. However, there are certain obligations expected of an ICAO Contracting State as the 'State of Design' and the removal of all support has implications for operations of the aircraft wherever they may be registered.

The CAA recognises that there are relatively few aircraft owners of these older aircraft who wish to undertake flights involving public transport and that the imposition of a single policy that required the continued holding of a CofA, for the one owner that wanted to fly commercially, was causing disquiet.

The CAA carried out a review of its policy for type responsibility agreements and decided that it would be possible to allow a split fleet to exist. This means that owners who wish to hold a CofA and conduct public transport activities are able to do so whilst other owners, wishing only to operate their aircraft privately can transfer onto a UK National Permit to Fly. This has been welcomed by industry and by private owners.

Owners wishing to continue with a CofA may do so and the issue affecting them are addressed in the next section. The policy continues to evolve, particularly in the light of the developments with DHSL support of De Havilland aircraft. The cancellation of a type certificate has implications for the CAA and the other ICAO Contracting States as the CAA has to advise them that the type certificate is no longer in place. It is then the responsibility of each State to decide what action it needs to take for any examples of the aircraft type in its register that are affected by the decision. For this reason, it will be reviewed outside of this project but in line with the principles behind the RA2 programme.

Certificated Aircraft (EASA and Annex II)

This class of aircraft includes those aircraft, fixed wing and rotorcraft, which are type certificated and eligible to hold an ICAO compliant CofA. This includes aircraft that fit under the EASA umbrella and those remaining types that sit

under Annex II to the basic regulation where the CAA issues a CofA. Annex II CofA aircraft are very much the older (vintage) types and actually now represent a small proportion of the UK fleet and those of other NAAs.

There is no question that, in order to enjoy the freedom of movement privileges under the ICAO Convention, some form of regulation in terms of airworthiness and licensing must still be enacted. In either case, the aircraft must meet minimum airworthiness and equipment standards, in line with the intended operation. EASA has set up a series of Regulation with the associated Implementing Rules that provide requirements for operations, licensing and both initial and continuing airworthiness. These meet the ICAO requirements and therefore continue to provide a suitable structure that underpins International flight. There are some provisions, e.g. the Light Sport Aircraft and the Light Aircraft Pilot's Licence in the EASA Framework that are not strictly ICAO complaint however their existence within the EU States allows considerable freedoms across the whole of the EU rather than being more restrictively limited to one particular State.

There are advantages under the EASA system with a centralised certification system such as that introduced under EASA. It allowed a common certification standard to be achieved so that the transfer of aircraft between the registers or the EU Member States could be achieved seamlessly. This means that there should be no impediment for an airworthy aircraft with valid documentation in one State to transfer to the register of another EU State.

Prior to EASA's inception in 2003, ICAO Contracting States were also able to determine their own certification standards. This meant that, within the EU member States there were potentially 27 different standards for CofA issue that could apply to an aircraft type. In 2003, the adoption of a common code eliminated many of the additional requirements[104] for the EASA aircraft types within the individual States and put in place a common certification standard. In some instances, operators wishing to introduce additional aircraft saw a reduction in certification costs as a number of expensive modification requirements were withdrawn.

The disadvantage is the need to liaise with EASA over the approval of modification, even simple ones, rather than the local NAA and industry has

[104] With the move to EASA requirements the UK CAA carried out a review of its additional requirements such as Additional Airworthiness Directives, UK Special Conditions and Special Requirements for Import. Some 3000 plus requirements were withdrawn with the remaining being put forward to EASA for consideration of adoption across the EU.

claimed that the resulting process is slow, more bureaucratic and very much more costly. A basic modification is claimed to cost a minimum of 600 Euros.

All is not bad however as there is an added advantage in that previously approved modifications that existed in any of the EU Member States were 'grandfathered' under the EASA system. This means that industry and owners have access to modifications that had been approved in another State but not necessarily, in the case of the UK, previously approved by the CAA. Unfortunately, there is no common database of what has been previously approved so determining the status of many modifications can be problematic.

If such a central repository of approved modification information could be established it would serve three functions. The first is to provide the Authorities, e.g. CAA, and CAMOs with information on modifications that had been previously approved by other EU authorities but which may now be found on UK registered aircraft. The second point clearly focuses on identifying whether FAA modifications and STC's, which often offer alternative products and performance improvements, have already been approved. The third issue is that such a list would avoid the need to have a 'previously approved' modification re-approved and the associated cost.

For example, as was noted following the GARR, there were many 'environmentally friendly' modifications, such as additional exhaust silencers and different propellers that could be used by UK owners without having to seek separate CAA approval. This has obviously reduced the cost of having to get additional CAA approvals but does require some evidence of the original basis upon which the modification was approved, and thereby grandfathered.

As part of the European legal package, EASA introduced continuing airworthiness rules that were developed by EASA and made law by the European Commission and the European Parliament[105], in accordance within the normal EU legislative process. Part M was not a pre-existing code under the pre-EASA JAA system. Common agreement of what such a requirement should include or what level of regulation was required could not be agreed between the JAA Member States. EASA was therefore proposing something from scratch without any proven pedigree in implementation.

Feedback from UK stakeholders suggests that the European legislation under

[105] The European legislative system works at both a Parliamentary and Commission level, with essential requirements and implementing rules. This is comparable with the UK's primary and secondary legislation.

Part M introduces a far more prescriptive and arguably restrictive regime than was the situation under national rules prior to EASA. This was pointed out to EASA before the rule came into effect but the rule was not deferred for GA whilst it was sorted out to minimise the unnecessary impact. EASA's failure to address the industry's and owner's concerns over the apparent heavy handed nature of the requirements means that, some 8 years after the rules were introduced, little has been done to achieve a proper proportionate position for general aviation, and in particular recreational flying.

Recommendation 19: The CAA should continue to lobby EASA and contribute to both the Part M RIA and the general EASA MB review of GA in respect of a more proportionate set of regulatory requirements for GA and in particular private or recreational activities.

With regard to Annex II aircraft, the various national rules still apply. This means, in the case of the UK, that the ANO and its supporting requirements, such as BCARs, need to be observed. Whilst these are still considered to be relevant, the GARR report contained a recommendation that saw industry wanting the remaining UK requirements be aligned wherever possible with the EASA philosophy. In practice, given the concern about the EASA standards any alignment must be looked at pragmatically to avoid falling into the same situation where any new rule is seen as inflexible and disproportionate. This, to an extent is one of the primary purposes of this RA2 review.

Since the 1970's the UK CAA has gradually pursued a strategy of devolving certain responsibilities to industry. The cessation of CAA surveyor involvement in every CofA renewal was facilitated by the approval of organisation to conduct periodic reviews. This provided the organisations and operators with greater flexibility in managing the reviews. That system has some parallels with philosophy adopted by EASA, although the need to have strict controls for recreational aircraft where the owner does not want to enter into a costly contract in order to get the benefits of a 'controlled environment' is arguably unnecessary for private aircraft.

Most recently, with the EASA Part M requirements in place, the CAA has embarked on a programme of work on BCARs[106] to align the remaining requirements with the European system. This introduces the concept of a non-expiring CofA with a national Airworthiness Review Certificate and similarly a non-expiring Permit to Fly with a certificate of validity. This should further

[106] This resulted in the development and issue of a revised BCAR A8-15 and new BCAR A8-23, A8-24 and A8-25 requirements.

minimise the need to apply to the CAA for renewals, using approved organisations to manage the continuing airworthiness of the aircraft.

Recommendation 20: The CAA should continue and complete the revision of BCARs to embrace the intent of the GARR recommendation to look at further devolution of activity to industry and the alignment of BCARs to EASA regulatory philosophy where appropriate.

The BCAR review has also sought to rationalise the underlying requirements that aircraft with a CofA have to comply with. The requirements have been refreshed and consolidated with outdated requirements being withdrawn. The language used in the BCARs has also been revised so that the 'olde English legalese' format is replaced with more modern text. A further phase of BCAR changes are planned which will complete the exercise. One key imitative of that phase is the further rationalisation of the maintenance approval requirements. This will allow organisations to be approved to carry out maintenance and certify that work on either Annex II CofA aircraft or national Permit to Fly aircraft. This avoids the need to hold multiple approvals.

It can be seen from the above that there are many issues associated with UK recreational aviation that make the RA2 review a complex, yet important, activity to be undertaken. It is very much an opportunity for industry and regulator alike to reach a common understanding about what the important issues are and put in place a regulatory approach that is appropriate, effective in managing standards and most importantly affordable.

CHAPTER 7

The operational considerations

Recreational Aviation and Operational Sectors

As noted in earlier sections the actual type of aircraft is only one consideration as an aircraft can be used for many different operational purposes. For example, a Cessna 172 Skyhawk can be used privately for recreational purposes, privately for business purposes, privately or commercially as a flying training aircraft, commercially for pleasure flying, commercially as an air taxi and also for banner towing under aerial work rules. The ability to apply a different regulatory approach differs therefore according to the purpose that the aircraft is used for.

It is not intended to go through any of the Commercial Air Transport sectors as these are clearly not recreational. However, drawing on the headline topic list that was presented in Section 1 of the report this section explores the operational areas of commercial, aerial work and private flying in order to determine what are the issues associated with the various operational sectors and whether any, given a different approach to risk and payment, could be considered recreational aviation activities with a different regulatory approach being possible.

Company Business Operations

Aircraft of many sizes are used for business purposes, both by individuals and by companies as executive jet transport. It is quite clear that, for almost all of these flights the purpose of the flight is very much to transport the individual from one place to another in the course of the company's business. The use of such aircraft for business purposes has been proven to be an effective business tool. In such circumstances, company use of aircraft is not considered a recreational activity.

At an individual level, an aircraft owner can pilot himself or herself to another airfield in order to carry out work associated with their business. This can involve small aircraft such as the Cessna 172 through to single pilot operation business jets. In such cases, it is possible to class this as not being recreational in intent, even though there is a case to argue that the pilot may still enjoy the flying itself. The use of aircraft in this manner often requires the pilot to hold an

Instrument Rating so that they are not constrained unnecessarily by the weather.

The recovery of direct costs from the business essentially makes the flight aerial work so this also impact on the way in which this can be regarded as a recreational flight. The UK CAA has issued an exemption that allows such use of an aircraft by a private individual and accommodates some measure of cost recovery. However, there remains an argument as to whether this constitutes recreational activity due to the predisposition towards a need to use the aircraft for a specific business purpose.

A company business operation does not normally require an AOC under UK rules. It is acknowledged however that EASA is presently working on Implementing Rules that will potentially impact on this sort of operation, the philosophy appearing to require some form of self-declaration and management of the operation. This is very much focused upon providing some form of protection for the interest of the third parties that may be carried, i.e. company executives or employees other than the pilots.

For these reasons these aircraft overall have not been considered within the scope of the RA2 project. The CAA will, however, continue to watch the development of the EASA requirements and, where necessary, review existing UK legislation.

Air Taxi

The use of aircraft for air taxi purposes quite clearly is a commercial activity, filling an important gap for many users that do not have access to their own aircraft but who cannot, for one reason or another, use scheduled flights for their intended journey. This allows users to ‘charter’ an aircraft to take them from one place to another where the timing or accessibility to smaller airfields is better suited to their needs. The aircraft that are typically used for air taxi operations are twin piston engine aircraft with up to five passenger seats. Some of these aircraft may in fact be available for flying training and private hire when not on air taxi work. This facilitates better aircraft utilisation.

An air taxi operation is not viewed in the same vein as a Commercial Air Transport operation under the EASA or EU rules but it is a commercial operation and therefore subject to some European regulation. It is however very much regarded as a public transport operation under the ANO and therefore an AOC is still required under the ANO. There is some concern that there are a number of ‘private’ flights, on various registers, where there is known carriage of

passengers. In some cases it is suspected that a fare has been paid but establishing this with certainty, and thereby proving that illegal public transport has taken place is often difficult.

Again, due to the nature of the flying and use of the aircraft for pure commercial purposes this is clearly not considered recreational and is excluded from RA2.

Pleasure Flying

As mentioned before, activity under the pleasure flying banner is conducted under the auspices of a UK AOC issued under the ANO, similar to that issued for an air taxi operation. This reflects the current definition of such flying falling under the definition of a public transport operation. The types of aircraft used are generally smaller aircraft, not those typically used on commercial flights. The flights themselves are also usually short duration in nature, taking off and landing at the same place and lasting often a half-hour for fixed wing, or fifteen minutes for a helicopter ride. They are very much focused upon the air experience elements of the flight rather than any form of ‘transportation’.

Some pleasure flying organisations are set up so as to be independent of flying clubs or other operational arrangements. Pleasure flying can however also provide useful additional income for some organisations using four seat aircraft such as the Cessna 172 or Piper Cherokee, particularly if they are collocated with and conducted through a flying training organisation.

There is a question as to whether ‘trial lesson’ is anything different from a ‘pleasure flight’ in such a small aircraft. Such flights often have the added advantage, if conducted through a flying school, that they can provide a useful stream of students if individuals get hooked on flying as a result of their pleasure flight. However, the cost of getting the required AOC, with the bureaucracy that inevitably can follow the application of the requirements if applied disproportionately, can be enough to cause small organisation to baulk at the application.

Many pleasure flying organisations using larger, vintage, aircraft such as the DH89 Dragon Rapide or DH 104 Dove are operating solely as a business for pleasure flying rather than as an extension to a flying training activity. It is also clear that the use of larger aircraft, e.g. a DC-3 or Being 737, in taking air enthusiasts to an airshow, perhaps in another country generally fall into the definition of a charter flight due to the number of passengers, different destination and the duration of the flight. They therefore need to be considered as charter flights and separately outside of RA2.

In the context of the RA2 programme, pleasure flying can readily be argued to be very much a form of air experience and thereby creates the potential to consider a slightly different regulatory approach than applying the full rigour of an AOC. This is certainly true of the typical A to A pleasure flying that seems to form the backbone of this sector. Obviously the trips across to France for lunch and return are not quite in the same vein and could almost be regarded as a charter or air taxi operation rather than a pleasure flight. However, the subject of such flights is open to further discussion.

Pleasure flying is also a major source of income for many balloon operators. As noted previously under the discussion for the balloon category these are currently controlled via a Balloon AOC. These arrangements differ from both fixed wing and helicopter flying and have been reviewed as part of the RA2 programme and it is felt that the less prescriptive requirements for a balloon AOC remain appropriate for the level of activity and to provide the required duty of care for the third parties, passengers and general public.

Whilst the CAA could reinvent the rules for pleasure flights, it will inevitably be impacted upon what comes out of Europe. Once again, the issue of pleasure flying as a commercial operation is under discussion as the EASA implementing rules for operations evolve. It will therefore be further monitored under that workstream through the CAA's Flight Operation Division. However, with the EASA Management Board review of GA underway, there is an opportunity to throw the concept of doing something different into the mix.

Flying Training

In general terms, it is foolish for an individual to simply jump into any type of aircraft without any prior training and take to the air. A safe outcome, in terms of a safe return to earth, is likely to be achieved more by luck than skill and judgement. This has been seen in the USA where there have been a number of accidents to individuals with no piloting experience who just climbed in and took off. Fortunately, this irrational approach to flying does not seem to feature in the UK accident statistics.

Pilot training and, where it is felt appropriate, pilot licensing are a means of ensuring that an individual is able to handle an aircraft with the necessary competence and avoid the risk of an accident due to inexperience.

ICAO rules require pilots to be licensed, and to certain minimum standards. Although these apply to international flights, there is nothing that stops a particular country from adopting a non-ICAO compliant licensing standard. It will

however carry restrictions and may preclude flight in other countries. The UK NPPL is one such system although, as it is not ICAO complaint, it is not openly accepted by other States, even if the pilot is flying an ICAO compliant aircraft.

The UK gliding community has also worked for many years without a formal licence being required. Licences were available through organisations such as the Federation Aeronautique Internationale (FAI), founded in 1905.

Flying Training in the UK has largely been regarded as an aerial work activity. Flying clubs or schools were required to be registered and the training itself was carried out to a syllabus that developed the individual's competence through a series of theory and practical exercises. The syllabus currently in use was developed under the Joint Aviation Authority rules, JAR-FCL. This is now in the process of being transitioned to the EASA framework. One aspect that has been introduced through the transition is the need for flying training organisations to be formally approved as an organisation.

Whilst this may appear at face value to be a sensible approach, ensuring that the organisation has sufficient governance and procedures to achieve the desired standards in training, industry are fearful of the additional costs and the bureaucracy that direct regulation may involve. For many flying clubs and schools, the vagaries of the British weather, the cost of fuel and the impact of any hint at a financial upset, such as the present crisis are serious issues for them to juggle with.

Is there evidence to suggest that the current 'registered' system is not working adequately? It is clear that this is the sort of decision that can be taken quite lightly by the regulators without the proper feel for the implication of the imposition of a more rigid rulemaking structure. There has to be a real value, in terms of safety of quality of output such as the competence of pilots on test, in putting in place requirements for stricter organisational management that incurs a real cost.

The risk is that industry will wither as the financial margins necessary to support the cost would make flying training for pleasure prohibitively expensive. Alternatively, it would simply drive flying training across into an Annex II based system, using a National licence and Annex II aircraft types, where the cost base retains some sense of proportion. That of course assumes that the National system remains as it is.

Recommendation 21: The CAA should consider the potential impact of the imposition of the EASA regulations for approved training

organisations on the financial and operational viability of small and medium sized enterprises. Where appropriate the CAA should seek, as part of the EASA MB review on GA to influence their thinking on the negative impact of such regulation on small organisations that cannot embrace the financial or bureaucratic cost of the new requirements when there is no statistical evidence to suggest that it offers any safety benefit over the previous JAA registered facility.

There is no doubt that learning to fly is expensive, particularly for recreational purposes where money just goes out in payments to the clubs without then being recovered over the course of a commercial flying career. As part of the GASR and GARR the flying training industry lobbied for reductions in tax on fuel for training and other similar provisions for VAT, intended to create an environment where the changes result in lower costs and make it more attractive to would be learners. Industry have also raised the issue of airport access for GA and the increasing tendency for many airfields to adopt policies that discourage their use by GA aircraft, to the benefit of commercial air transport operations. These issues are not, however, a subject for consideration under RA2 or within the CAA as the topics sit wholly under the remit of HM Treasury and Government policy. They will continue to be monitored by GASF and have been included in the GASF industry Strategy paper that has been submitted to DfT.

The current PPL standards used by recreational pilots, both at national CAA PPL and European JAR-PPL level, are generally consistent with the ICAO standards for pilot licensing and therefore afford certain recognition across countries. However, a study of the licensing systems for private pilots in many countries reveals a wide variation in the training syllabus and requirements. This is also extending into a growth of National and sport pilot licences as authorities respond to industry pressures to encourage growth by simplifying licensing requirements.

Whilst the adoption of harmonised requirements which are part of European legislation will introduce a common approach to training and licensing, this does not suggest that the licence syllabus and training requirements are wholly appropriate. This is particularly so in respect of some of the knowledge requirements for additional ratings such as the Instrument Rating (IR) where it is important that the knowledge is tailored to suit GA aircraft where that is where the licence rating will be used. It is acknowledged that EASA discussions on the topic of the licensing requirements continue.

Recommendation 22: The CAA should, where possible ensure that it

seeks to influence EASA's view on the proportionality of any intended syllabus for pilot or engineer licensing such that the syllabus is wholly appropriate to the technology and scope of aircraft the qualification is intended to cover. Such review should incorporate consideration of any issues arising from the safety analysis in the RA2 review.

In respect of the licensing initiatives to encourage individual to take up recreational flying, it should be noted that the USA has, for example, created a recreational licence. This will be issued following at least 30 hours of flight time that allows the holder to act as pilot in command of a two seat aircraft operating within 50 miles of a particular airport. The licence can be extended to allow wider privileges. The US also has a sport pilot licence, which is aimed at pilots wishing only to fly Light Sport Aircraft (LSA). Both of these licences are sub-ICAO and therefore not valid for the recognition afforded under the Convention. These recreational licences are also under consideration or in use by other countries, e.g. Australia and New Zealand. They have however generated a considerable following and growth in those aviation sectors.

The UK has its own sub-ICAO licence. In fact the CAA, like the USA has a mix of systems. The UK PPL, non-expiring, will in future only be able to be used for Annex II aircraft, not EASA. The JAR-PPL will have to be converted to an EASA-PPL and, whilst intended to be used for flying EASA aircraft, it will be able to be used for UK registered non-EASA aircraft as well. There is also a National Private Pilot Licence (NPPL) which has been in place since 2002. This licence is issued by the CAA but runs under the auspices of NPLG but is supported by the LAA, AOPA, BMAA and BGA[107]. This reflects a proportionate approach but it is not clear as to the success of the current model and whether for the NPPL there are other options to consider.

Flying training also takes place for ratings and the more commercially oriented licences. These licences very much fall into the EASA rule set and so the UK can only air its opinions as part of the process of developing the rules. EASA is also looking at developing a simpler Light Aircraft Pilot Licence (LAPL) which will be easier to obtain than the PPL but will not afford the same privileges. This may well be suitable as an alternative to the UK NPPL.

Within the scope of RA2 there are obviously areas around pilot licensing to explore. Some of these will reflect the desire for proportionality in the approach to training for recreational licences. Others will, as is highlighted in later

[107] Simple Single Engine Aircraft (SSEA) enquiries are dealt with by AOPA, Self Launching Motor Gliders (SLMG) through the BGA and for Microlight and Powered parachutes through BMAA.

sections, be oriented around safety interventions arising from the analysis of incident data.

Banner Towing

Towing of a banner by an aircraft for advertising purposes is usually considered an aerial work activity as there is often a commercial arrangement associated with charges for the use of the aircraft. It is therefore not likely to fit within the definition of recreational use. As for parachuting, the aircraft must have the appropriate towing gear installed, be approved for the purpose with the appropriate revision to operating procedures and limitations covered by Flight Manual Supplements.

The actual activity is also subject to compliance with the requirements for approval under the provisions of The Civil Aviation (Aerial Advertising) Regulations 1995. This does not mean that there will be a requirement to hold an AOC in every case as it is largely dependent upon whether or not there is valuable consideration.

At present, banner towing takes place using EASA or Annex II aircraft with a CofA. In future this could be performed by LSA aircraft with a towing capability, even where EASA has issued a restricted type certificate, if EASA allow such use. Current UK policy is that aircraft operating on a Permit to Fly are not permitted to carry out banner towing, even where the aircraft is an ex-TC aircraft that had the capability when it was operated on a CofA. It is also possible, from an airworthiness perspective, to design a towing installation for a microlight that would take the loads involved.

Some microlights are approved for towing hang gliders from operating fields where there are few, if any, hills to provide a suitable launch site. There have been previous requests from industry to allow microlights to go further and perform aerial work such as banner towing. This, they argue, would allow lower operating costs due to lower fuel consumption whilst providing a similar operating capability as the more conventional types used.

This was based on the belief that similar microlight aircraft were conducting towing in France. The CAA made enquiries of the French DGAC[108] where it was established that aerial work by microlights is not permitted and would be illegal. However, anecdotal evidence suggests that the activity does take place with

[108] The CAA recently concluded discussions resulting in a mutual agreement to allow greater freedoms for non-ICAO compliant aircraft to visit their respective countries. This allowed CAA to explore the issue of aerial work with such aircraft.

relative impunity, particularly in the South of France. This needs to be taken account of in any UK consideration of a change of regulatory approach.

The lower fuel consumption of the LSA aircraft[109] provides a suitable solution in the near term if EASA allow such aircraft to be used in this way. However, light sport aircraft in other countries are excluded from commercial activities. It is likely that EASA will impose restrictions similarly. Due to the often commercial nature of these operations it is not intended to review the situation regarding microlights being used for towing under the RA2 programme until such time as EASA has clearly announced the boundaries of its policy and rules on commercial operations. A project line has however been established to look at the issue once this is known.

There is no reason why a microlight could not qualify for and hold a CofA since the BCAR Section S code would likely meet the ICAO requirements[110] for eligibility as an appropriate design code. However, this code, and the Section T requirements for gyroplanes has not been put forward to ICAO as a compliant code. The potential for such aircraft to hold a CofA, restricted CofA or to remain on a Permit to Fly and qualify for limited aerial work activity should be considered. This was covered under Recommendation 6 highlighted earlier in the report.

The move to a CofA basis would however likely introduce additional costs for owners/operators as compliance would be required with the relevant airworthiness requirements. This would negate the benefits that are attractive in the use of such aircraft however that would be an issue for industry to decide.

Parachuting

Parachutists use aircraft solely to get to an appropriate target area and altitude to commence a parachute descent by jumping out of the aircraft. Many different types and size of aircraft are used for this purpose, allowing operation to various altitudes. This helps both novice parachutists and the more experienced freefall parachutists to enjoy varying levels and styles of parachute jump.

It should be noted that whilst the equipment looks similar to the aerodynamic wings used by paragliders the actual operational capability is quite different. A

[109] Many LSA aircraft use Rotax engines that are typically around 50% of the fuel consumption. This combined with modern propeller technology to reduce the noise footprint of the aircraft offer clear advantages over older technology types.

[110] A code such as Section S must satisfy the minimum requirements of ICAO Annex 8 to support the issue of ICAO compliant CofAs.

parachute will usually only provide a means of slowing the rate of descent and allow some degree of manoeuvring on the way down. Due to its size and design, a paraglider is more capable of producing lift, mainly due to the size and design of the wing, therefore extending the time in flight almost indefinitely if the conditions are right.

Parachuting in the UK generally falls under the remit of the British Parachute Association (BPA), established in 1961 and is a not for profit organisation where the executive is elected by the members. The BPA works through a number of affiliated clubs[111] with some 5000 full members and up to 50000 members of any category. Although the BPA does not hold any formal organisational approval as such, the BPA is overseen by the General Aviation Section of the CAA's Flight Operations Division which monitors and audits the sector activity. There is no indication that the current level of oversight is too much or inadequate.

The CAA issues parachuting Permissions[112] and any related Exemptions[113] that may be required. Further guidance on the conduct of parachuting in the UK and the requirements to be met are provided in CAP660: Parachuting [114], which lays out the regulatory framework associated with parachuting activities. CAP660 clearly references the BPA Operations Manual as representing the standard for sport parachuting in the UK so there are few, if any, parachuting operations that sit independently of the BPA. The BPA oversees compliance with CAP660 within its network of affiliated clubs so, although the BPA is itself subject to CAA oversight, UK parachuting is to a large extent self-regulated. In this sense, the BPA employs some form of safety management system across the sector.

The ANO makes it quite clear that when valuable consideration has been given or promised for the carriage of persons and the flight is for the purpose of dropping of persons, it is deemed to be aerial work. In order to conduct parachute dropping operations, each operator must therefore first obtain Permission from the CAA under the provisions of Article 130. Under certain conditions, the CAA may also agree to the issue of Exemptions from other

[111] The BPA web-site shows there are 27 affiliated clubs at present.

[112] A Permission is issued under the ANO to carry out an activity when the CAA is satisfied that the requirements relating to that activity have been met.

[113] An exemption will waive compliance with a requirement of the ANO to allow the activity to take place although the requirements are not fully met. Exemptions are an example of the use of discretionary power.

[114] CAP660 provides a broad spectrum of information and touches upon the regulations, operations, displays, monitoring and safety management systems.

provisions of the ANO.

The operator is responsible for the overall control of all aspects of their parachuting activities and their related aircraft operation. The aircraft used are typically EASA types which have a good load capacity and will normally operate with the seats removed. Some aircraft are fitted with roller door configurations or are approved for operation without the doors installed. The actual configuration requires certification and continued airworthiness in accordance with the EASA requirements of Part M. The aircraft, once approved, will usually have a Flight Manual Supplement associated with the role configuration and any change in operating limitations. Balloons may occasionally be used for the dropping of parachutists.

According to the BPA web-site, the BPA currently co-ordinates a varied programme of competitions, promotes skills development and oversees the safe conduct of parachuting in the UK. There are around 25 parachute clubs/centres approved by and affiliated to the BPA that conduct training and that provide aircraft.

Parachutists are obviously well aware of the risks associated with the pursuit of their sporting activity, particularly as a parachutist progresses with experience onto more adventurous jump techniques. This extends to situations where tandem jumps are carried out to provide a parachuting experience to those that are not qualified to jump solo.

There does not appear to be any justification to increase CAA regulatory involvement as there appears to be general consensus that currently parachuting operations are well organised. The BPA obviously acts as a focal point so there may be scope to look at the BPA taking a greater role in supporting the CAA review of applications for issue or renewal of permissions. This may be something to consider but has not been highlighted as a recommendation.

Glider Towing

Some aircraft types can be used for glider towing providing they are appropriately modified and equipped or the purpose. As for banner towing, the aircraft that are presently used are predominantly operating on a CofA, either EASA or Annex II although the CAA has more recently allowed the BGA to use ex-TC aircraft on a Permit to Fly[115] to continue to tow within a club

[115] This recognises the previous capability and their continued use avoids the costly modification

environment.[116]

Glider towing is generally classified at present as aerial work as there is an historic perception that the activity involves 'valuable consideration'. However it is possible for an interpretation to be made for operations being conducted strictly within the club environment such that the activities are considered to be private providing the aircraft are owned and operated by the club and only direct costs are recovered. This establishes a clear non-commercial aspect to the activity and is the basis upon which agreement was given to the Permit to Fly Eurofox aircraft and ex-TC types to do 'private' towing in clubs as outlined in section 6.4 of this report. However, this may not work in all cases.

Conventional aircraft are expensive to operate due largely to the higher fuel consumption of the older technology engines that are installed. Glider tugs typically are Piper Pawnee, Piper Cubs or Robin aircraft although there are several other types that can have towing equipment fitted. Tug aircraft are also often modified with different propeller configurations to help reduce the noise footprint of the tugs during operation. In principle, there is nothing that prevents the continued use of these aircraft except that the higher cost of fuel significantly increases the operating costs, particularly as the aircraft, when towing, is operating at fairly high engine power settings most of the time, thereby increasing the fuel used. It is therefore cost effective and environmentally friendly to look at alternative aircraft, if possible.

Recent developments in the lower weight aircraft categories have led to the production of aircraft such as the Eurofox. This is currently only available as a kit, not a production built aircraft, and therefore is classed as an amateur built aircraft and only eligible for a Permit to Fly. As noted in section 6.4, the CAA was requested by the LAA and BGA to consider allowing aircraft such as the Eurofox to carry out glider towing whilst on a Permit to Fly. Glider towing trials were carried out during 2011 and demonstrated that the Eurofox, already used for glider towing in some European countries is perfectly capable of performing towing for gliders up to 600 Kg. This covers a large proportion of the UK glider fleet.

The request to use the Eurofox was considered in relation to the pre-existing 2007 agreement, the context of the RA2 project and was agreed subject to the

of other aircraft that are still eligible to hold a CofA.

[116] The CAA has allowed continued use of Auster aircraft for glider towing following their transfer, as orphan aircraft, t the PtF regime. Originally agreed in 2007, this has recently been extended to include De Havilland Chipmunk types.

same, private operation, considerations that were applied to the ex-TC aircraft used in this role. Obviously the Eurofox may eventually progress to a production basis and qualify as an LSA aircraft under the EASA system. This may regularise the situation but this is not guaranteed. In the meantime it was felt there was no impediment to agreeing to the private use of the aircraft in this role.

As mentioned before, EASA are continuing to look at commercial operations and glider towing may be affected should EASA take a particular policy line. It is known that the subject of what fits into the definition of commercial operations may affect the potential for certain types to undertake glider towing or other aerial work activities. The agreements referred to above, which allow the use of ex-TC aircraft and the Eurofox, are therefore subject to a caveat that will recognise and accommodate the final EASA proposals.

The potential avenues to explore in relation to glider towing have already been the subject of recommendations in previous paragraphs and no additional points are made here.

Air Displays

A variety of aircraft are used for air displays in the UK airshow circuit and similar events, both private and public. In fact almost any aircraft can at some time be a potential air display participant. These include airliners, ex-military and ex-TC aircraft operating on a Permit to Fly and aircraft with national and EASA CofAs. The UK public have a fascination with seeing aircraft displayed in their natural environment, in flight, and in many ways the sector is big business. Article 160 of the ANO makes provision for the regulation of air displays.

The actual air displays are managed through a series of CAA permissions and, in respect of the participating pilots, air display authorisations. The requirements associated with these have been developed in the light of experience over the years. The UK suffered a series of accidents during several air displays and as a result the CAA carried out a review of the requirements associated with air displays, looking at the various elements of operation and control that were commented upon in the UK AAIB[117]. With the exception of a couple of airworthiness issues, such as engine failures or the structural failure of a ‘Spirit

[117] Air Accident Investigation Branch reports often contain recommendations following establishment of the causal factors. These recommendations can be focused upon the aircraft operator, the industry sector or the regulator and can target operating procedures of the regulations themselves.

of St Louis' replica[118] many of the accidents are attributable to the pilot's handling of the aircraft or simply an element of misjudgement.

An aircraft with a CofA can readily partake in air displays as it is not normally precluded from any type of activity. Aerobatics are also allowed if the aircraft flight manual approves them. Where the aircraft is on a Permit to Fly the permit normally carries a condition that allows the use of the aircraft for display purposes, particularly if the aircraft is ex-military. There are requirements regarding the potential payment that can be made for taking part and these have to be observed in order to avoid issues about valuable consideration. However, they are generally felt to be adequate to allow participation in air displays at an appropriate cost recovery level.

The present level of regulation for air displays appears to be adequate despite the occasional continued accident. However, there is no room for complacency, particularly as many of the displays involve aircraft manoeuvring close to the ground. It is important that the CAA continues its involvement in managing the standards and safety however there may still be scope for devolvement through a designated industry body that acts on behalf of the CAA.

The RA2 programme therefore proposes no change at this time although there is a possibility that air display authorisations and permissions could be devolved to a suitably approved and structured industry body if the CAA was to consider that option. Whilst that has not been the subject of a recommendation at this time, it is perhaps something that will be considered as part of the CAA ESP strategy.

Trial Lessons

The concept of a trial lesson is an important element of encouraging individuals to take up flying as a recreational pursuit. There has long been an argument that some flying clubs have used this as a technique to get round the requirements that regulate pleasure flying. There are other clubs that use trial lessons as a genuine tool to attract new students.

It is clear that the delineation as to whether a flight is a trial lesson or not depends upon the actual way the flight is conducted. A trial lesson should involve some pre-briefing of the participant as to what the basic elements of flight are and what the flight will cover. Actual hands-on experience, as well as

[118] This replica was foreign registered and suffered a failure of a weld repair which led to the wing becoming detached during an air display.

demonstration of the various points in this first lesson by the instructor, is an important element.

These are very much part of promoting recreational aviation but the current requirements and regulatory environment is believed to be appropriate, given the premise that the trial lesson is the initial foray into learning to fly. Further work is not therefore envisaged on trial lessons under the RA2 programme as they clearly fall within the provisions of flying training. The issue as to whether pleasure flights are being conducted as a trial lesson was dealt with earlier in sections 7.4 and 7.5

Charity flights

Charity flights are those flights that are associated with the winnings or rewards for participation in lotteries or in respect of contributions to charity. Although payment has not been made directly the monies given to charity are still regarded as 'valuable consideration'. As such, there are restrictions as to how charity flights may be conducted under the present regulations.

UK Aeronautical Information Circular (AIC) 70/2008 provides guidance on Charity Flights. This supports the provisions of Article 266 of the ANO. If valuable consideration is given, in other words if any part of the payment does not go to charity, the flight is regarded as public transport, particularly if passengers are carried. The AIC also makes it clear that only aircraft with a CofA can carry passengers on a charity flight, even where no valuable consideration takes place.

There are other restrictions placed on charity flights such as the carriage of passengers in powered aeroplanes from unlicensed aerodromes. With the recent decision to remove the restriction on flying training to be conducted from licensed aerodromes, many smaller airfields are allowing their licences to lapse creating a reduction in the number of airfields that could be used for charity flights.

In the course of the RA2 discussions with stakeholders the issue about visiting the subject of charity flights in aircraft with a Permit to Fly was raised. Clearly many aircraft operating on a Permit to Fly previously held a CofA. It is therefore difficult to argue that the aircraft are no longer suitable just because they are no longer on that CofA. There is a wider issue, however, in that the attractiveness of many charity flights is the possibility of being able to fly in a historic aircraft and, according to the AIC, the individual is deprived of the ability to decide if this is something they wish to participate in or not, simply because such aircraft may

be excluded as they only hold a Permit to Fly.

In line with the principles of the RA2 programme this topic has been included as a potential workstream for review. This would also allow the basic principles of charity flights to be reviewed in line with the potential for a more proportionate acceptance of the risks associated with the flights.

Recommendation 23: It is recommended that the CAA consider the purpose and operation of charity flights and, where possible, expand the provisions to allow greater freedoms to conduct charity flights, including the use of aircraft operating on Permits to Fly, e.g. Spitfire, and with less restriction on the payment or contribution to such flights, over and above any payment to a charitable cause.

Adventurous Aviation

When the internal CAA RA2 working group first came together one element of the discussion was an industry request to consider allowing air experience flights to be undertaken in ex-military aircraft.

The CAA had recently agreed to qualified pilots being able to pay for flights since they could use the flight as a learning experience on the basis that they were already licensed. This has opened up the way to at least one organisation offering training to qualify on a Spitfire, via other types along the way. Whilst expensive it may well attract some individuals who aspire to fly a Spitfire and would not otherwise get the opportunity.

However, the ability to fly as a passenger in such aircraft has always been dependent upon there being no ‘valuable consideration’ as the absence of such payment would allow the flight to be regarded as a private flight. Any cost recovery or substantive contribution breaches the ANO conditions and the flight becomes public transport, which of course Permit aircraft are precluded from.

There is, and will likely continue to be, a high level of interest in being able to fly in ex-military and vintage aircraft and the absence of a CofA precludes individuals from participating in the experience. The RA2 group discussed whether the change in the approach to risk that was an underlying element of the group’s review would offer potential to revisit this and allow paid flights for flight experience in these older aircraft.

Industry pointed out that the New Zealand (NZ) CAA had recently issued their Part 115: Adventurous Aviation requirements. This was issued in November 2011 and lays out the basis for an operator to be certificated for carrying out

Adventurous Aviation. This appears to have a mix of requirements covering many of the operating requirements for ex-military aircraft found in the UK CAA's CAP632 document. The NZ rule however covers many different classes of aircraft and operational activity, including microlights, balloons, hang-gliders and parachuting. It therefore is a much broader document than CAP632.

It is interesting to note that the NZ rules capture an A to A flight in an aeroplane or helicopter that is issued with a standard category airworthiness certificate (CofA) if it is conducting formation flight, aerobatic manoeuvres and similar non-standard manoeuvres. However, adventure aviation operations also include, as examples, A to A flights in a class 2 microlight, a flight in a hot air balloon, a flight in a glider and a parachute drop aircraft operation. This clearly goes across the discussion on pleasure flights and parachuting that were addressed earlier.

As such, the NZ Part 115 crosses activity that would be conducted under both EASA requirements and UK National requirements and so does not easily transpose into something that the UK could easily adopt. EASA is already talking about additional requirements being established under their framework for aerobatics, special operations and of course, as already discussed to a limited extent, commercial operations. Do these activities require such additional regulation?

There is however guidance on what sort of management control and organisational competence that the NZ authority would wish to see out in place to allow adventure aviation operations to be conducted. That guidance would be worth reviewing in the context of creating an adventurous aviation strategy for the UK.

Recommendation 24: It is recommended that the CAA give consideration to defining and establishing an adventurous aviation regime, including pleasure flights, air experience flights in ex-military aircraft, aerobatic, simulated military flights, tail chasing and similar activity, where valuable consideration is permitted in recognition that the activity is recreational in its nature. As part of this review the CAA should consider NZCAA Part 115 and other regulatory authority provisions for adventurous aviation.

The key area to look at in terms of adventurous aviation in the UK model is that of allowing air experience flights in ex-military and Permit aircraft and allowing a charge to be levied. This requires that not only the activity is looked at but the implications of the current provisions in the ANO for valuable consideration reviewed in the context of what would be required should a change in approach

be adopted. Once again, the acceptance of the higher level of risk in the activity is crucial in determining a future strategy for dealing with this form of recreational aviation.

CHAPTER 8

Safety analysis

Introduction

A key element to any review of recreational aviation has to be the safety level of the various activities that fall within the scope of the review. This is important, particularly where there is any intention to consider changing the regulatory approach to a specific sector or activity. No change of approach should be made if there are contra-indicators, e.g. an adverse accident rate, until such time as a strategy for safety improvement is identified.

This follows the rationale that if the current regulatory regime is not adequately managing safety then potentially moving towards greater freedoms is unlikely to improve things. In order to analyse where we are this section looks at the historic data to identify if there are specific sector trends that would prevent or suggest a cautious approach be taken to any change in the regulatory approach. It also helps identify the current safety related issues that may have a relevance to general aviation in general and recreational aviation specifically.

The whole purpose of looking at accident data is to identify general safety threats based on past experience. In other words we use the past data to try and predict the future. Whilst this will not guarantee any future indication on safety events, human nature is such that, in the absence of any social or cultural change it is likely that the behaviour of individuals and organisations will continue as they are. This would suggest that future threats will indeed be driven by the same issues seen through past behaviours unless something changes.

Analysing individual occurrences to identify the underlying causal factors and trends is also important as using that information helps us formulate a safety strategy for the future. If we know what is going wrong perhaps we can specifically target efforts to address it.

The CAA has done considerable work in relation to the safety threats for Commercial Air Transport[119] (CAT) and as a consequence has identified the

[119] Commercial Air Transport (CAT) is the European term for airline and certain business operations, including scheduled and charter operations. These were previously designated as Public Transport operations under the UK Air Navigation Order.

'Significant Seven' themes that represent the key safety risks to that sector. These are:

- Airborne Conflict
- Loss of Control
- Runway Incursion
- Runway Excursion
- Controlled Flight Into Terrain (CFIT)
- Fire
- Ground Handling

These were derived from an analysis of world accident data as well as information from the CAAs own MOR system. In addition, the UK data set was used to try and identify safety threats by looking at the high risk events[120]. Due to the need to look at CAT data as a priority, the results do not necessarily include GA related data and may not be wholly representative of, or applicable to, the RA2 scenario.

The Significant Seven feature strongly within the CAA Safety Plan and are the subject of a number of projects and further work on possible safety interventions through task forces allocated to each theme. These task forces have both CAA and industry representatives to work collaboratively through the issues and help the CAA identify safety interventions to address the threats.

Industry has welcomed the initiative and, interestingly, helped identify additional contributory factors that can lead to an event. The task force work also includes collaboration with other aviation authorities such as the US FAA. These safety interventions are identified and built into the CAA Safety Plan and Business Plan.

In the absence of a GA focus on data in the original reviews that led to the significant seven, this section also looks to analyse the available MOR data relating to general aviation and determine if there is a comparable set of safety themes for GA. In considering GA safety, the starting point for the RA2 review had to be the work conducted as part of the General Aviation Strategic Review (GASR) and the General Aviation Regulatory Review (GARR).

[120] The CAA set up The High Risk Events Analysis Team (THREAT) group to look at trends and key threats that were evident from the UK MOR data.

Those reviews, conducted in 2006, looked at the general aviation safety data and information that was available. This was compiled from the CAA's own statistics, using MOR and accident data, but the contribution from the General Aviation Safety Council (GASCo) during those reviews was invaluable in setting the context for the analysis of the data and drawing some conclusions.

It gave a wealth of information on accidents which could be broken down into categories, class of aircraft and type of event. This sort of analysis is crucial if any truly representative picture of the threats is to be compiled. It is also important to have that detail in the analysis so that interventions can be properly targeted rather than take a wider effect shotgun approach. For example, there is no point in mandating better brakes on an aircraft to prevent runway overruns if the issue lies with the pilot landing over halfway down the runway.

The GARR Safety Analysis

The results of the GARR analysis was entitled an 'Analysis of Fatal General Aviation Accidents' and were published in the final report[121]. Under the GARR, General Aviation (GA) was taken to be non-public transport operations involving UK registered aircraft with a maximum take-off weight below 5700 Kg.

This is perhaps slightly different to the definition of recreational aviation that we are looking at in this RA2 review however it still provides some useful data in respect of the aircraft types and categories that are involved in recreational aviation. The analysis covered the ten year period from 1995 to 2004, essentially the ten year period prior to the commencement of the GARR. During that period there were 235 fatal accidents involving UK registered[122] and unregistered[123] aircraft resulting in 340 fatalities. These are further broken down by aircraft class in Table 1. This covers most of the classes of aircraft that were described earlier. There is a separation of the statistics for aeroplanes and helicopters which is helpful.

However, the aeroplane category includes both CofA and Permit to Fly aircraft. It therefore covers amateur built aircraft through to certified aircraft sitting around the 5700 kg mark. Whilst this is not ideal to analyse technical issues with the aircraft, which may well differ due to the certification basis, it does not matter on the piloting side as the same PPL is required for either category of aeroplane.

[121] Annex 'L' to the General Aviation Regulatory review report.

[122] Registered aircraft are those registered by the CAA under Article 3 of the ANO 2009.

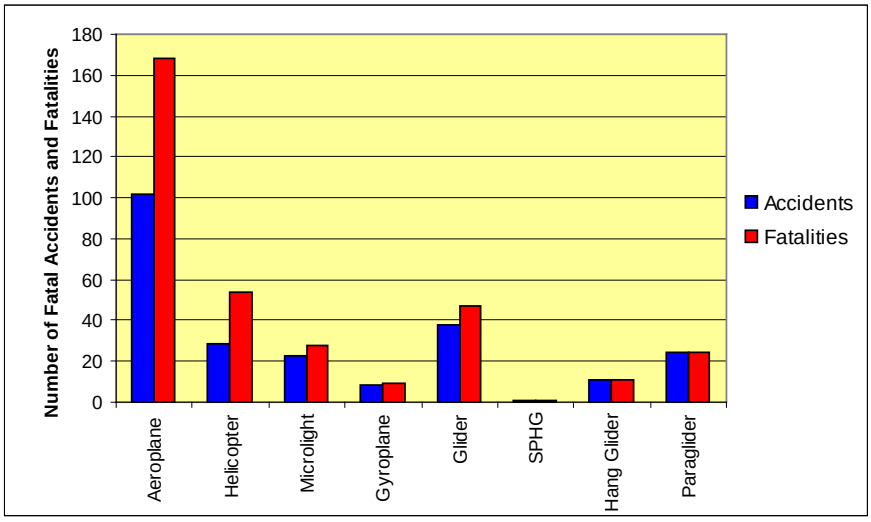
[123] The unregistered aircraft include Annex II gliders, hang gliders, paragliders and parachutists.

Table 1 Breakdown of the Number of Fatal Accidents and Fatalities by Aircraft Class – ten years from 1995 to 2004

	1995-99		2000-04		Total	
	Ac	Fat	Ac	Fat	Ac	Fat
Aeroplane	60	99	42	69	102	168
Helicopter	13	22	16	32	29	54
Microlight	13	14	10	14	23	28
Gyroplane	2	2	6	7	8	9
Glider	17	22	21	25	38	47
Self-Propelled Hang Glider	0	0	1	1	1	1
Hang Glider	7	7	4	4	11	11
Paraglider	9	9	15	15	24	24
Airship and Balloon	0	0	0	0	0	0
					235	**340**

The data presented shows the Accident figures in one column and the fatalities involved in the second. It can be seen that the relationship between accidents and fatalities varies according to the type of aircraft. Obviously single seat aircraft show a direct relationship.

Figure 1 Breakdown of the Number of Fatal Accidents and Fatalities by Aircraft Class for the 10-Year Period 1995 to 2004



This data can be further demonstrated graphically as shown in Figure 1 where the comparison between class data and the relationship between accidents and fatalities can be seen more easily.

While this is older information, it does provide a useful breakdown by aircraft class and so sets a benchmark for comparing the data from this review. The breakdown in data between two five-year data sets also provides a backdrop against which to compare the data for the next five years to 2010. The data also provides some indication about the number of fatalities in relation to fatal accidents. This clearly shows that in many accidents third parties (passengers) are also involved.

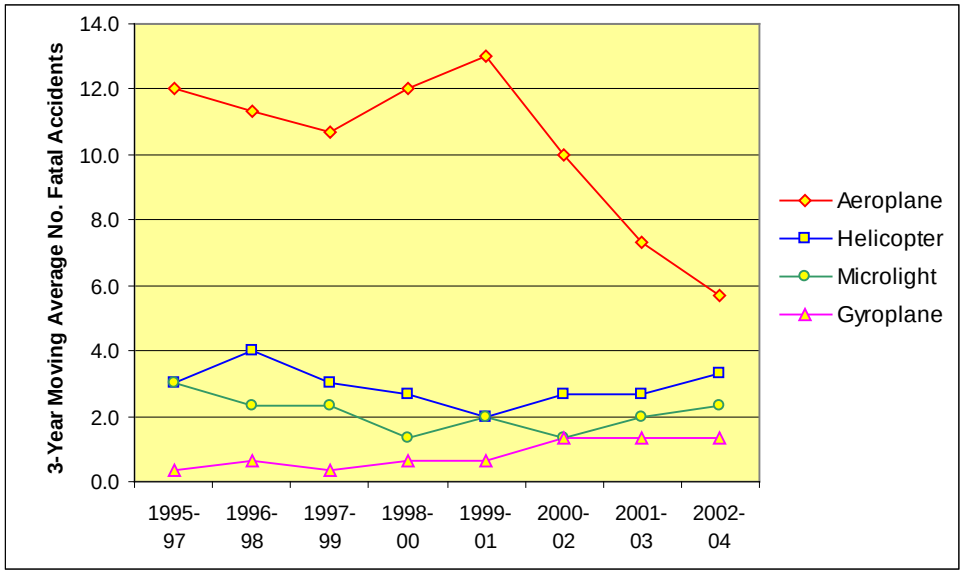
The data used in the GARR was prepared under the auspices of the General Aviation Safety Review Working Group (GASRWG), a mix of CAA and industry representatives. The group was able to provide statistically significant information using an established taxonomy for analysing the data. This allowed the data to be refined and classified such that it included the class of aircraft involved, the underlying cause for the accident and the causal and contributory factors. Whilst it was intended that GASWRG would continue post-GARR there have in fact been no recent meetings.

The GARR data was also presented as a three year moving average. This helps eliminate some of the peaks and troughs that may appear using raw data. This showed an improvement over the ten year period to 2004 in the number of aeroplane fatal accidents whilst the figures for helicopters, gyroplanes and microlights remain fairly constant. It is not known whether there was s single factor or combination of things that led to the improvement in the aeroplane class data.

The analysis is shown in figure 2a. Again, this is useful data since it gives a feel for the overall safety trends over that ten year period. It should be possible to look at whether the situation has further improved or deteriorated when a later data set, from 2000 - 2010 is analysed and presented.

Figure 2a Three-Year Moving Average Number of Fatal Accidents for

Aeroplanes, Helicopters, Microlights and Gyroplanes 1995 to 2004



These statistics do not identify or lend themselves to a comparison between aircraft classes due to the different population sizes. It does however still give some indication of the overall number of fatal accidents. The raw data can be compared with the data in the same class year on year giving useful trend information for that class.

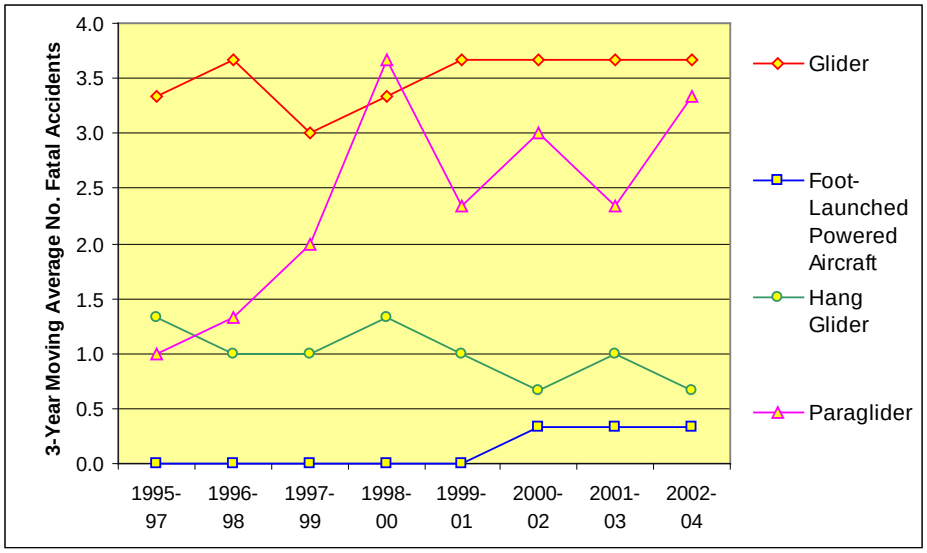
Figure 2b shows similar three year moving average data for the remaining aircraft classes, glider, hang glider etc. It can be seen from the GARR analysis that these average figures are also fairly steady, although paragliders did see an initial rise.

The adverse trend in the paraglider data appears to be attributable to several factors. A significant issue could well have been the split between the development of paraglider with increased performance and the way in which such aircraft were certified. Those developments also appear to have taken place at the same time as there was considerable growth in interest. However, an analysis of additional data available for this review shows that the vast majority were attributable to human error for one reason or another.

There is a balance to be struck between developing a faster, higher performance machine and the effect that may have on the handling. Essentially, you could put a high performance wing into the market where you need considerable expertise to fly it. This leads to the possibility that relatively inexperienced pilots were not matched to a paraglider with suitably benign performance for them. Likewise the rapid increase in students and novice pilots places considerable demands on club systems to provide what is almost after care (post licence) advice and guidance. This is possibly evident in the fact that

10 of the 15 accidents in the period from 2000 – 2004 took place outside the UK but there is insufficient information available to reach a definitive conclusion.

Figure 2b Three-Year Moving Average Number of Fatal Accidents for FLPA, Gliders, Hang Gliders and Paragliders 1995 to 2004



It has to be acknowledged that a more useful analysis is comparative data between the classes which helps identify whether one class is safer, comparatively, against another. There was some difficulty in carrying out a precise analysis due to the difficulty in getting good data, e.g. there was some doubt as to the total hours flown for each sector etc[124]. The GARR report acknowledged that further work on safety levels would be required.[125]

Table 2 shows a breakdown of the fatal accident rate per 100,000 hours flown by aircraft class based upon the estimated data that could be obtained. Accurate values for non-public transport aircraft utilisation were not available. In order to generate fatal accident rates, utilisation had to be estimated and, as such, the fatal accident rate values should be treated with an element of caution. Table 2 also shows the equivalent fatal accident rates in brackets

[124] The CAA does not capture such data for all classes. Some information is available through the data received for CofA and Permit renewals.

[125] The GARR considered what would be an acceptable level of safety for each sector but did not reach a conclusion. Whilst establishing a safety level has some advantages the raw data in terms of number of accidents and fatalities is equally as important.

based on a 95% level of confidence.[126]

Table 2 Breakdown of the Fatal Accident Rate (FAR) per 100,000 hours Flown by Aircraft Class Together with the 95% Confidence Value (in Brackets) 1995 to 2004

	1995-99		2000-04		Total	
	FAR	95%	FAR	95%	FAR	95%
Aeroplane	1.5	1.9	1.1	1.4	1.3	1.5
Helicopter	2.6	4.1	2.4	3.6	2.4	3.3
Microlight	3.4	5.4	2.0	3.3	2.6	3.6
Gyroplane	26.1	82.3	61.1	120.6	45.8	82.6
Glider	2.1	3.1	3.0	4.3	2.5	3.3
Self-Propelled Hang Glider	0	44.4	5.3	25.4	3.9	18.6
Hang Glider	3.5	6.7	2.6	5.9	3.1	5.2
Paraglider	1.9	3.5	3.3	5.2	2.6	3.8

Notes:

2. The rates for self-propelled hang gliders, hang gliders and paragliders were based on fatal accidents involving UK BHPA members only, as utilisation was only available for this group. However, statistics on the number of fatal accidents were for all UK pilots.

3.

4. The equivalent fatal accident rates for UK registered and/or operated public transport aircraft over the period 1995 to 2004 were:

   - Large (above 5,700 kg) aeroplanes: 0.02 fatal accidents per 100,000 hours flown.
   - Small (below 5,700 kg) aeroplanes: 1.19 fatal accidents per 100,000 hours flown.

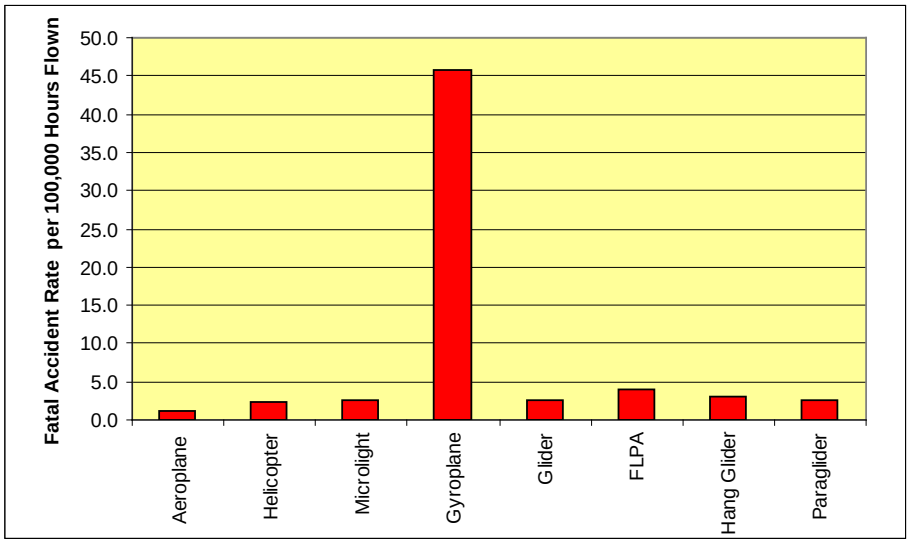
[126] There is a 95% level of confidence (using the Poisson distribution) that the rate will not exceed the given value.

- Helicopters (all): 0.31 fatal accidents per 100,000 hours flown [offshore operations: 0.13 and police support operations: 0.26].

It is clear from a simple evaluation of this data that there is scope to be worried about what the figures tell us about gyroplanes in particular. The number of accidents to gyroplanes, as shown in table 1, was not significant in itself, being lower than many other classes of aircraft. However, the small overall population and the low number of hours being flown means that the fatal accident rate becomes significant. On this basis it creates a situation that the regulator cannot ignore.

Figure 3 shows a graphical representation of this information, clearly reinforcing the concern about the rate for gyroplanes. Despite the use of estimated data, the fatal accident rate per 100,000 hours flown can be seen to range from 1.3 for aeroplanes to 45.8 for gyroplanes. The rates for all other classes of aircraft were below 4 fatal accidents per 100,000 hours flown. One point to consider is whether these rates are acceptable and this is something that will be discussed later as the issue of what is acceptable level of risk and how does this compare with adventurous activities, e.g. abseiling, potholing and even horse riding.

Figure 3 Breakdown of the Fatal Accident Rate per 100,000 Hours Flown by Aircraft Class for the 10-Year Period 1995 to 2004



The CAA investigated the reasons behind gyroplane accidents and identified some specific actions in the 2006/2007 Safety Plan to help improve the safety record of these aircraft.

These actions included:

- An assessment of the handling qualities of a two-seat gyroplane types.
- The validation of the gyroplane computer model in the light of the results of the work on teeter behaviour, modify the model and revise the earlier studies as appropriate, and consider any necessary changes to British Civil Airworthiness Requirements (BCAR) Section T (Light Gyroplanes).
- A review of gyroplane pilot licensing, in consultation with Industry, with a view to revising gyroplane pilot licensing to meet the needs of the wider gyroplane community, and to meet potential future licensing requirements.
- A review of the training arrangements for gyroplane pilots, instructors and examiners, in consultation with Industry, with a view to revising training syllabus and materials.

These actions were concluded and revised requirements put in place. As will be seen in the later data analysis (2005 – 2010) the situation appears to have improved but the nature of the few, more recent accidents has changed.

However, recognising the specific work that was to be undertaken in respect of gyroplanes, the GARR report otherwise noted that:

- 'There was no statistical evidence, based on fatal accident rates, to suggest that a fundamental change in the UK GA regulatory model was required.'

Recommendation 25: It is recommended that the CAA review its needs for reporting of incidents and the detail in required information to permit a realistic and meaningful analysis. This should ensure that the reporting requirements of the European ECCAIRS programme are met and replicated within the UK for non-EASA aircraft. Any review should include provision for improved reporting from GA, identification of a better taxonomy for categorising MORs and greater attention to rends in incident data. The use of IT in submitting reports in an easier and more user-friendly manner should be encouraged.

The Changing Environment

The GARR statistics for the first five years (1990 – 1995) were very much still focused on the national regulatory system. The latter five years of data presented in tables 1 and 2 potentially capture the effects of the implementation of the Joint Aviation Requirements (JARs) under the JAA from 1998 and therefore reflect a combination of some form of European requirements mixed

with continuing national rules. Since 2003, however, the EASA rules have undoubtedly changed the regulatory environment in the UK for many industry sectors. Whether there is any evidence that shows any improvement or deterioration in the safety statistics is obviously open to discussion.

The GARR recommended, in view of the then forthcoming changes in the legislative framework, that statistics should continue to be collected in order to monitor the effect of EASA-related issues and the impact of other regulatory changes on UK GA safety. This has been done so far as is possible and the results and corresponding analysis are shown in this report.

In addition, as mentioned already, the recent and continuing downturn in the financial climate since 2009 has inevitably had a significant impact on the disposable income available for recreational flying. Due to the lack of detailed data of pilot experience and recency, it is difficult to determine statistically whether there is any effect from the reduction in the hours flown and the potential increasing risk of an incident due to the lack of recency of experience for some pilots. It is logical to suggest that the lack of recency may be an important element of accidents and significant events in the latter part of the data analysed under this review.

With respect to the impact of European regulations on GA in particular, the devolved regulation of balloons through the BBAC[127] that was present in the UK prior to 2003 has stopped, balloons now fall firmly within the European aviation regulations. More significantly, the self-regulated activities of gliding through the BGA[128] have now also found themselves within the European regulatory framework. This caused considerable uncertainty, concern and inevitably cost as industry has come to terms with the transition to the new rules.

The same is true of aeroplanes and helicopters where the requirements of Part M have been imposed greatly increasing the administrative burden for owners of these sorts of aircraft. As has already been mentioned this is associated with a need to comply with the manufacturer's recommendations or an alternative means of compliance. This increase in the cost base further exacerbates the impact on owners and pilots and perhaps further restricts the available money to spend on flying.

The period has also seen the introduction of the European Directive on Occurrence Reporting and the setting up an occurrence database under the

[127] BBAC – British Balloon and Airship Club.

[128] BGA – British Gliding Association.

European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS). The Directive requires that the UK embed this into UK legislation and this has been done by revising the provisions in the Air Navigation Order in respect of Mandatory Occurrence Reports (MOR).

ECCAIRS requires the CAA to provide accident and incident data reported to it under the MOR scheme into the central database. The ECCAIRS initiative is well intended as it will gather information from across the EU and the resulting analysis will help focus EASA's future safety strategies. It will also help identify the experience in other EU States where the GARR research showed an often piecemeal approach to gathering data and doing anything with it.

European legislation for accident investigation has also come into force which impacts upon the role of the UK Air Accident Investigation Branch and the way that they operate, investigate and report.

The RA2 Accident Data Analysis

As part of this RA2 programme a review of the accident data for the ten years from 2001 – 2009 was performed[129]. The intention behind this was to update the GARR data set so far as possible and see if there were any changes in trends or safety issues that could be identified.

Additional data was also available for 2010 and 2011 and the data relating to the analysis of these two years is also shown. This is summarised in tables 3 and 4, which have been structured similarly to table 1 to allow a comparison to be made in terms of the raw statistics relating to fatal accidents.

It can be seen that, for the ten year periods, 2000-2009 against 1995-2004, the overall number of fatal accidents has generally remained of the same order or reduced and the total number of overall fatalities is also lower. Arguably, this suggests that we have seen an overall improvement in the gross number of accidents.

In some areas, such as gyroplanes and gliders this may be the result of safety interventions. In respect of gliding, the BGA has put in considerable effort in

[129] The accident data was derived from CAA MOR database and accident reports available through the UK Air Accident Investigation Branch web-site. The detail associated with some fatal accidents to UK aircraft overseas was not able to be determined during the period of the RA2 programme. The RA2 review did not analyse the data to the same extent as GASCo or GASWRG did under the GARR, the aim this time being to look for high level detail in the data as a snapshot.

safety initiatives such as their winch safety programme to reduced the prevalence of accidents arising from winch events, e.g. cable breaks etc. The BGA are to be commended on their approach to safe operations and the way their use of available data supports their SMS. Perhaps other similar sector specific bodies should follow suit.

Table 3 Breakdown of the Number of Fatal Accidents and Fatalities by Aircraft Class - ten years from 2005 - 2009

	2000-04		**2005-09**		**Total (2000-2009)**	**Total (1995-2004)**
	Acc	Fat	Acc	Fat		
Aeroplane	42	69	47	76	89(145)	102 (168)
Helicopter	16	32	10	28	26(60)	29 (54)
Microlight	10	14	11	14	21(28)	23 (28)
Gyroplane	6	7	4	4	10(11)	8 (9)
Glider	21	25	10	10	31(35)	38 (47)
Self-Propelled Hang Glider	1	1	0	0	1(1)	1 (1)
Hang Glider	4	4	1	1	5(5)	11 (11)
Paraglider	15	15	0	0	0(0)	24 (24)
Airship and Balloon	0	0	0	0	0(0)	0 (0)
					183(285)	235 (340)

Note: Mid-air collisions between different classes of aircraft was counted against each class of aircraft (both for the number of accidents and fatalities).

In this sense, the CAA has much to learn from the BGA's focus on data analysis and key safety threats. It is clear that BGA have used the available data sensibly to identify trends, drill down into the supporting data against visible significant tends and, using the analysis target the threat by adopting a different approach to the risk and addressing it through improved awareness, training and a shift in user behaviour.

By comparison, the number of fatalities has gone up in some aircraft classes largely due to an increase in accidents involving multiple occupants. For

example, the helicopter accident data set is such an example, often due to the growing use of four seat helicopters such as the Robinson R44, and includes several events where a several passengers were involved. The potential occupancy of an aircraft does therefore have a significant bearing upon the number of potential fatalities in any incident and the associated risk.

With regard to the comments regarding gyroplanes made earlier, it can be seen that the overall number of accidents in each of the ten year periods are similar. However, the figures in the latter five year period against those in the first five years shows a decrease, which is further demonstrated by the 2010 and 2011 figures. This may be the results of the safety interventions on gyroplanes that have been accomplished during the intervening period. It is also known that with type approved gyroplanes now in service and more flying being done the rate has come down, although it could not be established during the review with any degree of confidence as to how much.

If this is reflective of the efforts put into the initiatives highlighted in the GARR report then it clearly shows the potential safety benefits of appropriate safety interventions.

In table 4, the data for the two years 2010 – 2014 has been extrapolated to try and provide some estimate of the possible five year periods statistics that we would see if the accident rate for the respective classes continued at the same level. The five year period would see decreases in the overall rate for most of the aircraft classes.

The data for hang gliders and airship and balloons has been adjusted as the accidents that were recorded are seen as relatively rare by comparison with other classes.

Table 4 Breakdown of the Number of Fatal Accidents and Fatalities by Aircraft Class - ten years from 2005 – 2009 and the two years from 2010 - 2011

	2005-09		**2010-11**		**2010-2014 (extrapolated)**
Aeroplane	47	76	13	19	33(48)
Helicopter	10	28	3	5	8(13)
Microlight	11	14	2	2	5(5)
Gyroplane	4	4	1	1	3(3)

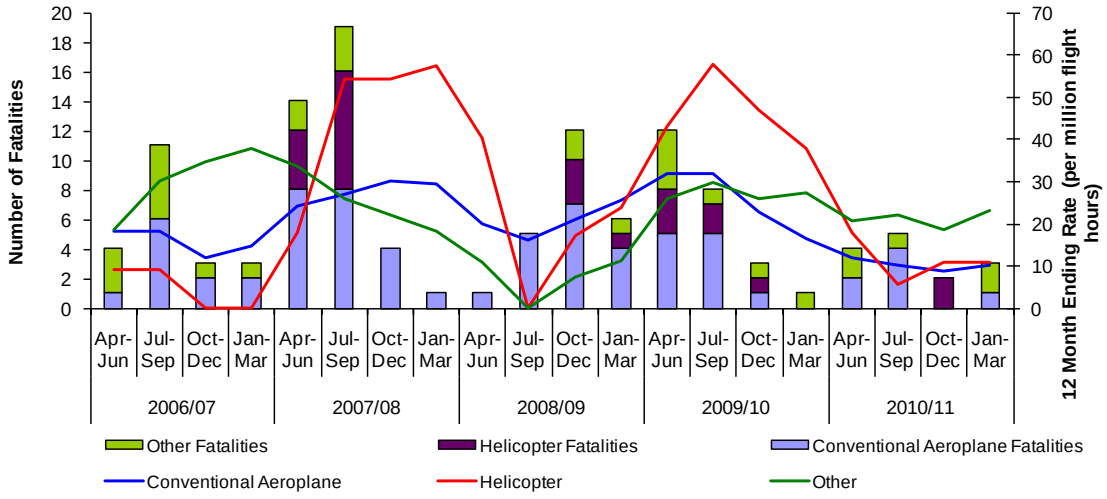
Glider	10	10	1	1	3(3)
Self-Propelled Hang Glider	0	0	0	0	0(0)
Hang Glider	1	1	1	1	1(1)
Paraglider	0	0	0	0	0(0)
Airship and Balloon	0	0	2	3	2(3)

It is recognised that whilst this is wholly speculative it does provide a useful comparison if we could hold the rate at the current level.

UK general aviation fatal accident data is available for the period from April 2006 to the end of March 2011. These statistics are presented as part of the safety data information that goes to the CAA Board and are reproduced below. Whilst this is not in the same form as that presented under the GARR it is still included as it provides a useful reference set.

This shows the data for fatalities involving UK registered or operated aircraft with a maximum take-off weight not exceeding 5,700 kg, engaged in non-public transport flights. Data excludes paragliders and hang-gliders, as these are not regulated by the CAA. The graphical data for the UK general aviation sectors is shown in Figure 4.

Figure 4 UK general aviation fatal accident data



This shows that there is a relatively stable level of accidents for aeroplanes. The same is not true for helicopters which show some form of cyclical trend,

although this does not appear to be calendar based. Further analysis of this would be required. It is noted that, with respect to helicopter data the EHEST[130] team has carried out considerable analysis of available European data on helicopter related incidents. As a result EHEST has triggered several safety initiatives, including the publication of safety leaflets and guidance to helicopter pilots and users.

EHEST is supported by the European Helicopter Safety Analysis Team (EHSAT) who have produced an analysis of European wide helicopter accident data. The latest report features 311 helicopter accidents up to 31 March 2010. The top 3 identified areas for consideration are:

- Pilot judgement and actions
- Safety Culture and management
- Ground duties

It is interesting to note that there were different patterns between commercial, aerial work and private operations. Under private operations it is more difficult to establish the presence of a safety culture due to the diverse inputs of the individuals involved.

The background data from which the information in figure 4 is derived is shown in table 5.

Table 5 UK general aviation fatal accident - Background Data: Number of fatalities per quarter

Year	**2006/07**				**2007/08**				**2008/09**			
Qtr	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar
Aero	1	6	2	2	8	8	4	1	1	5	7	4
Heli	0	0	7	1	4	8	0	0	2	0	3	1
Other	3	5	1	1	2	3	0	0	0	0	2	1

Year	**2009/10**				**2010/11**			
Qtr	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar

[130] The European Helicopter Safety Team, launched in November 2006, brings together manufacturers, operators, research organisations, regulators and accident investigators.

Aero	7	5	1	0	2	4	0	1
Heli	3	2	1	0	0	0	2	0
Other	6	1	1	1	2	1	0	2

Likewise there is considerable interest in analysing the data for commercial aircraft incidents and fatal accidents. The UK CAA has an accident analysis group (AAG) that looks at worldwide accidents and, using a standard taxonomy, use the available accident information to determine global risks. The results are published periodically in CAA documents summarising what was found.

In addition, the CAA puts considerable resource into The High Risk Event Analysis Team (THREAT) that analyses CAA MOR data on significant events to identify potential underlying causes and trends. The AAG and THREAT work has been a key element in the identification of the 'Significant 7' safety risks for CAT. It is not however something that can easily be transposed to the GA sector as the data is less robust.

This can be compared with the GARR accident rate data shown in table 2 and figure 3 and which fundamentally forms the starting point for the graphs in figure 4. The aeroplane data suggests that accidents will occur during the months of April to September. This is not surprising as that is when the majority of flying takes place. The other classes do not have any correlation that allows similar conclusions to be drawn.

It should be noted however that much of the events that occur to GA are only reportable on a voluntary basis. This means that the available data set for analysis is incomplete and the utilisation data that is available from CAA records is not necessarily limited only to the events covered by the MORs being analysed. This means that the rate is artificially low as the lower number of MORs is divided by the higher utilisation.

All safety data statistics needs therefore to be used with a degree of caution due to the differing interpretations that can be placed on the data.

RA2 Analysis of MORs - Aeroplanes

As noted above, the original GARR work focused primarily on fatal accidents. Whilst a similar review was conducted for this RA2 programme review, as shown above, it was felt that fatal accidents alone did not provide sufficient indicators upon which to base any proposal for regulatory change or to put in place further safety interventions. It is often suggested that the bigger threat lies with the non-fatal incidents that make up the greater proportion of the

occurrence iceberg that is less visible.

A review of the MORs relating to aircraft below 5700 Kg was conducted to see if there were any significant issues that came to the fore. This MOR list included all aircraft below 5700 Kg, including commercial operations, business flights and helicopters and therefore it was not wholly representative of recreational aviation. In the period between 2000 and 2011 there were approximately 25800 reports in the CAA database and these were obtained in an Excel spreadsheet. It should be noted that these were not individually reviewed but the spreadsheet subjected to various 'sorts' of data so as to identify possible trends. It therefore represents a rough cut of the data.

The CAA receives around 16000 MORs across all aviation sectors each year. Within the timescales available for the project it was not possible to look at the detail of these occurrences. It should also be noted that it is not mandatory to report some types of GA related incidents so the data set is not necessarily complete. This was considered to be a limiting factor in the analysis.

Key themes were evident from a simple sorting in the table of the available MOR data at a high level. The principal themes that emerged from this exercise, although not a wholly exhaustive list, were as follows:

- 3rd party injury/death (2)
- Aircraft equipment[131] (1932)
- Aircraft Loading (54)
- Aircraft maintenance issues[132] (448)
- Aircraft Structure[133] (443)
- Aircraft technical occurrence (751)
- Adverse weather (144)
- Aircraft occupant injury (37)
- Airspace Infringement[134] (5406)

[131] This includes warnings and system/equipment failures.

[132] Many of these were suggestive of poor maintenance, often a lack of lubrication leading to stiff operation of moving parts, e.g. retractable undercarriage.

[133] Most of the reports featured incorrectly secured doors or panels rather than structural failures.

[134] By far the most significant event category.

- Altitude deviation (616)
- Bird Strike (551)
- Collision on ground (317)
- Crew Illness (10)
- D&D cell reports (146)
- Detached undercarriage part (117)
- Diversion/return (53)
- Emergency call (83)
- Engine Fire (146)
- Engine shutdown (223)
- Engine Malfunction (710)
- Falling Object (34)
- Flight Control issues (300)
- Flight Crew Occurrences[135] (2098)
- Fuel (196)
- Ground Occurrences (452)
- Hard landing (175)
- Landing gear problems and collapse[136] (593)
- Loss of Control [137](405)
- Low on fuel (53)
- Mid Air (11)

[135] These figures included all crew initiated reports, not covered by the other categories. Nuisance warnings, minor events and peripheral issues all featured to the extent that a summary review of the data could identify no key safety threat or trend.

[136] There is a mix of gear failure due to previously unreported damage, e.g., heavy landing or bounce, and poor maintenance, e.g. lack of lubrication or maladjusted microswitches.

[137] Loss of control appears to be insignificant on its own but it features more prominently in the significant incident and fatal accident data.

- Navigation Error (371)
- Runway Excursion (60)
- Runway Incursion (446)
- Runway Overrun (40)
- Runway undershoot (18)
- Windshear/Gusts (160)

Whilst it was of interest to note these themes, and the correlation to some of the CAT ‘significant seven’, the data could not easily be drilled down further to identify themes specific to the recreational aviation environment. It is clear however that aircraft equipment, airspace infringement, flight crew occurrences and ‘aircraft equipment’ are issues to be considered further.

A quick look at some of the reports on aircraft equipment showed that some reports featured simple system warnings which led to the cancellation of the planned flight rather than system failures. The same was true of aircraft technical occurrences. In both these cases, the issue was not specifically a safety threat as the flight did not take place or, if in flight, could continue safely to its destination. These therefore range from nuisance events to a need to take precautionary action to shut that system down. In many cases the flight continued without any risk due to the availability of other systems or the non-critical nature of the warning or failure. For the purposes of the RA2 review it was felt that there was nothing that could be readily identified as a particular safety thread to explore. However, there was further analysis on related matters carried out as part of the review on serious incidents and accidents.

The 443 events relating to aircraft structure appears at first sight to be significant however the vast majority relate to panels (e.g. engine oil access panels) being adrift or doors (cargo locker and main door) not being locked properly prior to take-off resulting in undemanded opening or warning indications. In almost all cases the event was fairly benign as the event did not affect the handling of the aircraft. However, in one event involving a gyroplane the aircraft was lost due to the apparent distraction of the pilot during the attempted recovery to the airfield after the enclosed cockpit canopy came unlocked and opened in flight.

There were a number of adverse weather events, some of which clearly indicated that the pilots proceeded to conduct some flights despite the weather forecast being marginal leading to difficulties when it deteriorated further. In a

few cases the flight continued to develop into a ‘loss of control’ or ‘controlled flight into terrain’ accident. There were also a number of D&D related MORs that captured the same deteriorating weather scenario albeit with different events and thankfully a safe outcome. The D&D reports also featured a number of low time pilots who had become lost during a flight, calling into question the adequacy of their navigational skills.

The number of airspace infringements, at 5604 events, clearly demonstrates the GA related aspect to this safety threat, one of the significant seven as GA aircraft are a major contributor. There is continuing work underway as part of the Airspace Safety Initiative (ASI) that looks at reducing the risks associated with infringements.

Altitude deviations are also of concern in the data, since they are predominantly in relation to aircraft under Air Traffic Control. In the majority of cases the erosion of separation between aircraft is a clear risk as the airborne conflict theme in the significant seven demonstrates. With respect to the events that were briefly analysed almost all involved GA aircraft that were under ATC control.

There were a large number of landing gear failures but when the data was analysed, albeit superficially, the majority were attributable to a failure following overload after a heavy landing or an uncontrolled ‘bounce’ event during landing. Likewise many of the events noted as ‘loss of control’ were usually the result of pilot inattention during a cross wind landing, in some cases leading to runway excursion.

There were also a few events relating to loss of control where the pilot, in making a manoeuvre, let the airspeed decay to the point where a stall/spin situation was encountered. The attention to the aircraft’s status is essential in avoiding such events and therefore there is a need to better understand the Human factors issues associated with distraction of information processing.

Recommendation 26: It is recommended that the GA Safety Partnership (GASP) review the data from the RA2 MOR analysis to determine what safety interventions may be appropriate. In doing so the GASP should:

- **Consider the data analysis carried out as part of the RA2 programme.**
- **Take account of the Airspace Safety Initiative’s (ASI) continued focus on addressing the underlying reasons for airspace infringements in conjunction with the Airspace Infringement Working Group (AIWG).**

- **Consider a campaign to promote awareness of the need to report heavy landings or bounce events such that aircraft can be properly inspected to prevent pre-existing damage leading to failure on subsequent flights.**
- **Consider the human factor and performance element of the GA pilot in the events.**

Although the data recorded in the MOR database had primary and subsidiary designators to three or more levels it was noted that there was often inconsistency in the way that the information was recorded on the CAA system. This impeded any exercise that sought to easily sift the data and identify specific threats. It would be a major exercise requiring a complete review of each MOR and some element of re-classification. This was felt to be outside of the RA2 project.

RA2 Review of Accidents/Serious Incidents

In view of this, it was decided to limit the review to the most recent data set (2000 – 2009) of accidents and serious incidents recorded on the CAA MOR system for GA aircraft. This could be achieved by selecting some of the MORs from the data set where they had been tagged as being reportable accidents / serious incidents. This resulted in some 1600 MORs relating to small General Aviation aircraft. It was felt that, with the ability to review each MOR to some degree, there was sufficient confidence about this data set and that this would give us much better data to carry out an analysis more appropriate to the RA2 programme.

The aim was to determine what key safety threats lay behind the events and the statistics, not just those limited to fatal accidents. It also considered whether there was some commonality with the CAA's 'significant seven' or if there were GA specific factors within the data that needed to be drawn out and taken into account when looking at any potential change in approach to the regulation of recreational aviation. If GA specific factors or themes could be identified then it would be possible to identify more appropriate safety interventions

Notwithstanding the original classification of these MORs by the CAA's Safety Data Department, since the data set was more manageable in terms of overall numbers, each occurrence was reviewed individually against the content of the report to classify the nature of the event and the key causal factors. In some instances the classification was changed before the analysis was performed to ensure that the data was dealt with in a consistent manner. The intent was not to reanalyse all MORs and some were excluded on the basis of existing

programmes to look at specific issues.

The MORs analysed did not include airspace infringement events as these rarely led to an accident or serious incident. It was felt however that these were already being addressed under the CAA's ASI initiative. Statistics are readily available for infringement of controlled airspace and very much the basis upon which the CAA's safety interventions are established. It is clear that errors by GA or recreational aviation pilots are the main cause of many airspace infringements. Considerable work has been done and will continue as it still remains a key risk area. Likewise, airborne conflict was not specifically included in the data analysed.

A number of mid-air collisions were picked up from the MORs and ought to be further considered. These are investigated by the UK AAIB and reports with an analysis of the occurrence, the causal factors and any recommendations are made publically available. The CAA will always consider any such recommendations and if appropriate instigate change to address the issue. Mid-air collisions do however show where a complete failure of the regulatory safeguards has occurred.

Recommendation 27: It is recommended that, given the threat to life in mid air collision events and the potential implications for third party death, injury or damage that, in conjunction with any detail in AAIB reports into these incidents, the CAA specifically analyse the data for the last ten years to identify any underlying root cause or underlying factors that may benefit from a safety intervention being raised to target the issue.

Other airborne conflict issues are addressed through ATC reports for route, incorrect speed or altitude deviation. There is also the role and function of the AIRPROX Board and their analysis of near miss events.

The MORs overall were categorised and then looked at individually to identify the underlying cause, if possible, and any significant contributing factors. This allowed an informed decision to be made as to what type of event it was as well as making a judgement as to its significance. It is recognised that this process is partly subjective but in the absence of objective criteria against which to classify the data, the analysis of the MOR data by one individual provided some degree of standardisation. For the purposes of the RA2 project, and the available time line, this was felt to be adequate.

By looking briefly at the available data it was also possible to get a feel for what

safety interventions may be worth considering adopting in addressing the issue.

Year	Number of occurrences
2000	130
2001	150
2002	147
2003	150
2004	121
2005	138
2006	143
2007	122
2008	131
2009	140
2010	105
2011	105
Total	**1582**

Table 6: Number of serious incidents and accidents by year

It can be seen that the number of accident/serious incidents is relatively constant over the period at around 120 or 10 events per month. There is however a detectable downward trend in the data.

It is not possible to understand if this is an acceptable level or not until a more detailed analysis of the significance of the event is considered. This would highlight the significance of the risk to the individual and the potential impact, benign, minor or serious injury or fatal. These figures do include accidents, both fatal and non-fatal.

As can be seen in the data from table 4, and in alternative from via figure 5, the fatal accident rate is quite variable so it would appear that there are a few serious incidents or non-fatal accidents that, by sheer luck, do not result in fatalities. However, relying upon luck is not an adequate response to controlling the risk of the activity as shown by the data.

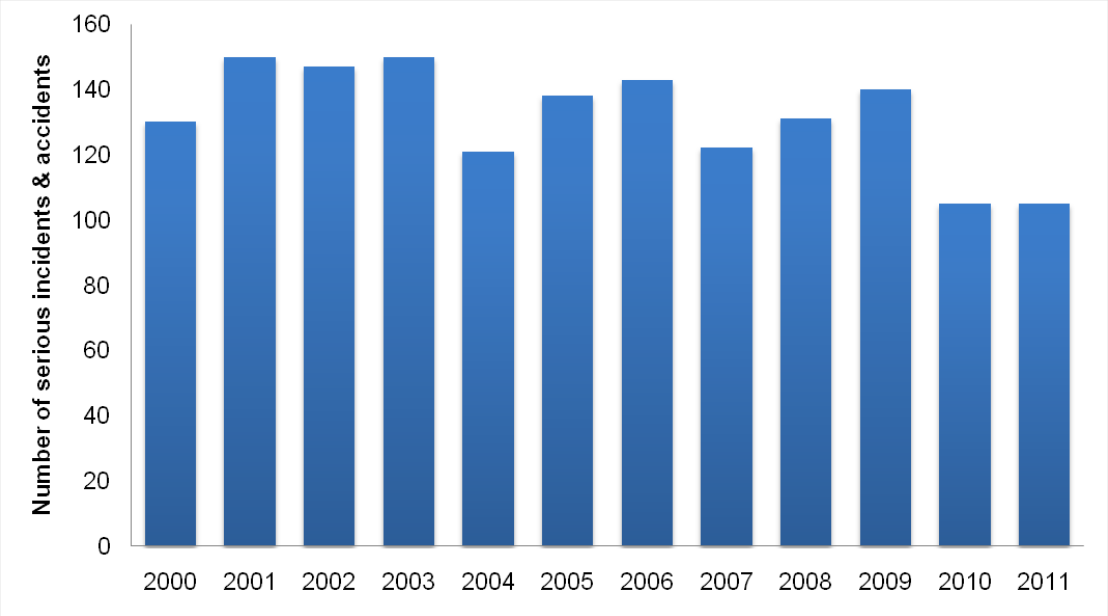


Figure 5: Number of serious incidents and accidents by year

The analysis of MORs provided information such that it was possible to determine the top ten types of serious incidents and accidents. These are shown in Figure 7 below.

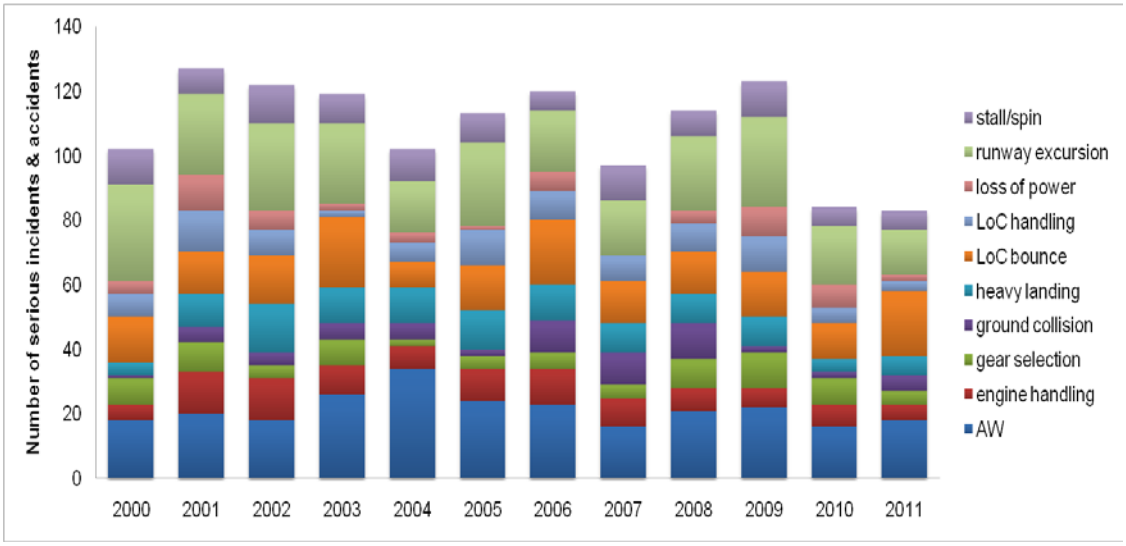


Figure 7: Number of serious incidents and accidents by year and by category (Top 10 Categories)

The numbers in this figure obviously differ slightly from those in figure 6 as they are for the top ten categories only. It can be seen that there are some key categories of event that can be drawn out of this more serious data set. These are:

- Stall/spin
- Runway excursion
- Loss of power
- Loss of Control (handling)
- Loss of Control (bounce on landing)
- Heavy Landing
- Ground Collision
- Gear Selection
- Engine Handling
- Airworthiness (maintenance and component failure)

It is interesting to look more closely at why these events occurred. This was done and led effectively to a secondary breakdown of the data into a form of basic root cause. However, the limited information available did not give sufficient information to be categorical about exactly why the event occurred. The available analysis is therefore presented with some degree of caution.

For example, take a runway excursion event. The MOR could state that the aircraft left the side of the runway. The secondary analysis could show that the pilot landed in a cross wind but failed to exercise adequate control. In some instances the MOR simply stated that the incident was a loss of control and did not report any the existence of any cross wind component.

However, in a few instances the actual cause could be determined to be an undercarriage failure or binding brake that led to the loss of control and excursion. In the analysis, where evidence was available, the MOR was re-categorised. This led to less cross contamination of the data and the numbers of events in figure 7 were derived after this re-categorisation.

Year	AW	EH	GS	GC	HL	LoC bounce	LoC handling	loss of power	RE	SS
2000	18	5	8	1	4	14	7	4	30	11
2001	20	13	9	5	10	13	13	11	25	8
2002	18	13	4	4	15	15	8	6	27	12
2003	26	9	8	5	11	22	2	2	25	9
2004	34	7	2	5	11	8	6	3	16	10
2005	24	10	4	2	12	14	11	1	26	9
2006	23	11	5	10	11	20	9	6	19	6
2007	16	9	4	10	9	13	8		17	11
2008	21	7	9	11	9	13	9	4	23	8
2009	22	6	11	2	9	14	11	9	28	11
2010	16	7	8	2	4	11	5	7	18	6
2011	18	5	4	5	6	20	3	2	14	6
Total	**256**	**102**	**76**	**62**	**111**	**177**	**92**	**55**	**268**	**107**

Table 8: Number of serious incidents and accidents by year and by category[138]

It can be observed that, with a few exceptions, the distribution of occurrence category per year shows a consistent trend. It is also to be noted that, again with the exception of the occasional year, the data in each category is fairly level. From the data it appears that runway excursion is the most significant category, notable in that it is one of the significant 7 for CAT. However, the relatively low inertia of these GA aircraft means that the resulting runway departure is not likely to result in major damage or threat to life in most events, unlike their commercial or large aircraft counterparts.

The second highest figure relates to airworthiness events which is attributable mainly to failures of one type or another. Some data on failure types is available and considered later but there is little data on corrective actions taken or follow up information after the events. Poor maintenance is however another aspect that cannot be ignored, although it is recognised that it is difficult to pin this

[138] Table code: AW = Airworthiness. EH = Engine Handling. GS = Gear Selection. GC = Ground Collision. HL = Heavy Landing. RE = Runway Excursion. SS = Stall/Spin.

down to a particular cause based on the available data. The changes in the MOR scheme should help gather more data in the future. The CAA should do what it can to ensure that the data submitted is better suited to data mining and analysis.

Loss of control is also significant although the analysis has tried to differentiate between a loss of control due to mishandling and those that result in a loss of control due to a bounce, or several, on landing[139].

Figure 8 shows the top ten graphically showing the relative scale of significance.

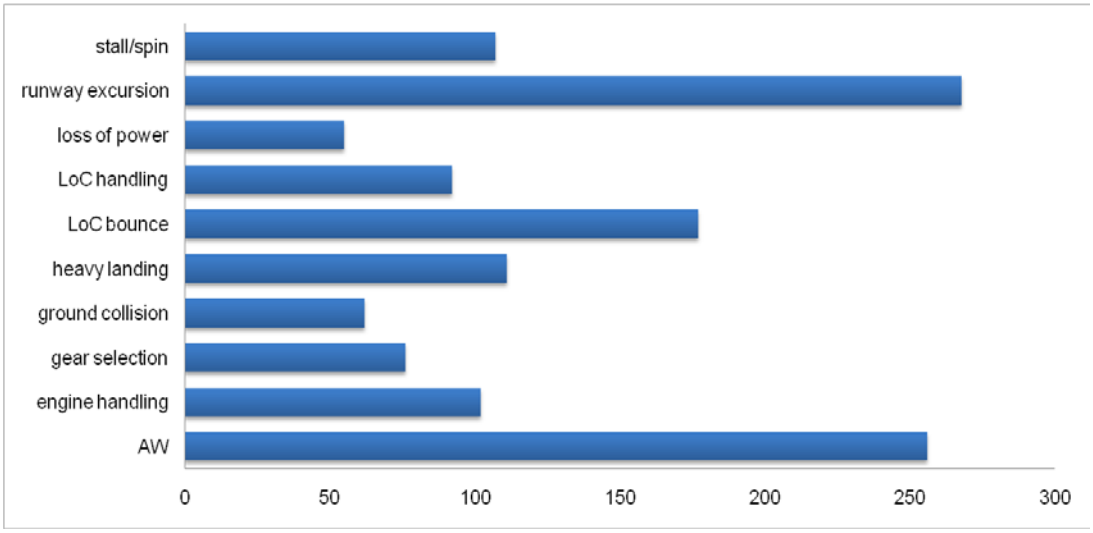


Figure 8: Number of serious incidents and accidents by category (Top 10) for the period: 2000 – 2011

It is worth noting the following comments in respect of the other event categories. Stall/spin incidents continue to feature, notwithstanding various attempts to highlight the need for attention to speed control and the focus of instructors in checking such knowledge and awareness among pilots during the 1 hour check flight required as part of the licence revalidation process. Of note when the events are further analysed is the mix of loss of airspeed and awareness of approaching stall during turns onto final (lack of attention to speed), on approach (focus on touchdown area rather than speed), on go-around (in correct trim and inattention to speed) and through a high pitch up rate and angle of attack after takeoff (resulting loss of speed and wing drop).

[139] A bounce normally results from a high rate of descent where the aircraft rises into the air again. However, in doing so the aircraft attitude, power selection and pilot action is critical to avoid a further heavier landing, possible overloading of the nose leg or leading to a stall.

On the heavy landing statistic it was clear that some events were reported as caused by windshear during the flare. However, most were due to mishandling and a high flare, too much aft stick leading to a balloon (increase in height over the runway) and perhaps too much focus on the touchdown area rather than using the perspective of the runway to judge correct height above the runway whilst flaring. Of course, as for stall/spin loss of airspeed awareness often led to the aircraft simply running out of airspeed too high. In the worst events, the heavy landing led to undercarriage failure and loss of control with perhaps runway excursion.

Category	No of occurrences
airfield condition	8
Airworthiness	256
bird strike	4
CFIT	23
Door not latched	14
electrical handling	3
engine handling	102
engine start	25
Fire	1
forced landing - not engine	7
gear selection	76
ground collision	62
ground incident	5
ground loop	39
heavy landing	111
hit object - approach	30
hit object - t/o g/a	30
LoC airborne	1
LoC bounce	177
LoC handling	92
LoC medical	1
LoC nose over	48
loss of power	55
Mid air	11

pre-flight	3
runway excursion	268
runway incursion	1
stall/spin	107
undershoot	22
Total	**1582**

Table 9: Number of serious incidents and accidents by category for the period: 2000 – 2011

Table 9 provides the full data from the analysis of the serious incident and accident related MORs for the period 2000 – 2011.

There is the potential to categorise an event in different ways according to the way the event is looked at and the point at which it is decide the incident was beyond saving. This indicates the reason why careful categorisation of the data is important and why a more detailed analysis of any identifiable trends is essential to determine the root cause.

For example, it should be noted that stall/spin events are an obvious loss of control whilst airborne. The 1 loss of control - airborne event in the table was not able to be attributed to a particular cause.

Looking at the secondary analysis of the top ten events allows us to subcategorise the data. This helps identify the potential underlying cause. From this more complete table of data it can be seen that there are other types of event which are not statistically significant but which have the potential to result in fatalities or significant damage to the aircraft.

Mid Air collisions obviously represent the biggest threat to those on board the aircraft. In the majority, if not all, of case these events have been investigated by the AAIB so there is considerably more detail on the circumstances available for consideration. It is important that these events are looked at first and foremost as the issue that has the greatest potential to save lives and make the biggest difference. This was discussed at a recent meeting of the GA Safety Partnership.

The additional analysis figures include a number of controlled flight into terrain (CFIT) events. In almost all cases, the event was associated with the pilot continuing into deteriorating weather. It is also evident that most pilots were not

qualified, in terms of holding IMC or Instrument ratings, and did not in any event follow the basis adoption of determining an instrument safe altitude as the weather got worse. This tends to underwrite the lack of appreciation as to the trouble that the pilot was getting into. As these events also tend to result in fatalities further review is envisaged.

Recommendation 28: It is recommended that a further review of GA related CFIT events be carried out to identify any root cause or underlying causal factors that may be of benefit in addressing through a safety intervention.

There were also a few cases where the aircraft hit objects, such as fences, hedges or trees, either on takeoff or during approach. This suggests a lack of preparation, perhaps marginal airfields and adoption of go-no go criteria. On the approach, is it simply a case of getting too low and losing sight of the obstacle as the nose is raised with power to make the runway? This latter aspect appears to be emphasised by the fact that there were some 22 incidences of undershoot or landing short. Is this a question of pilot judgement or poor attention to what the aircraft is doing?

It was noted earlier that runway excursion was a significant feature in the data. The data relating to the further analysis for runway excursions is shown in figure 9. Runway excursions accounted for almost 17% of the total events.

This shows that the biggest contribution to runway excursion, some 40%, was poor handling. Most of these were down to the aircraft landing in a cross wind but the pilot then not handling the aircraft effectively with a consequent swing and departure off the side. It was interesting to note that these occurrences involved both tailwheel and tricycle undercarriage aircraft.

It was noted that about half of these events involved low time pilots or students under training, both on solo flights and with instructors. In some instances, the pilot simply appeared to relax after landing and was caught out by a sudden swing. In some of these the aircraft ground looped as well with consequent damage to the aircraft being incurred.

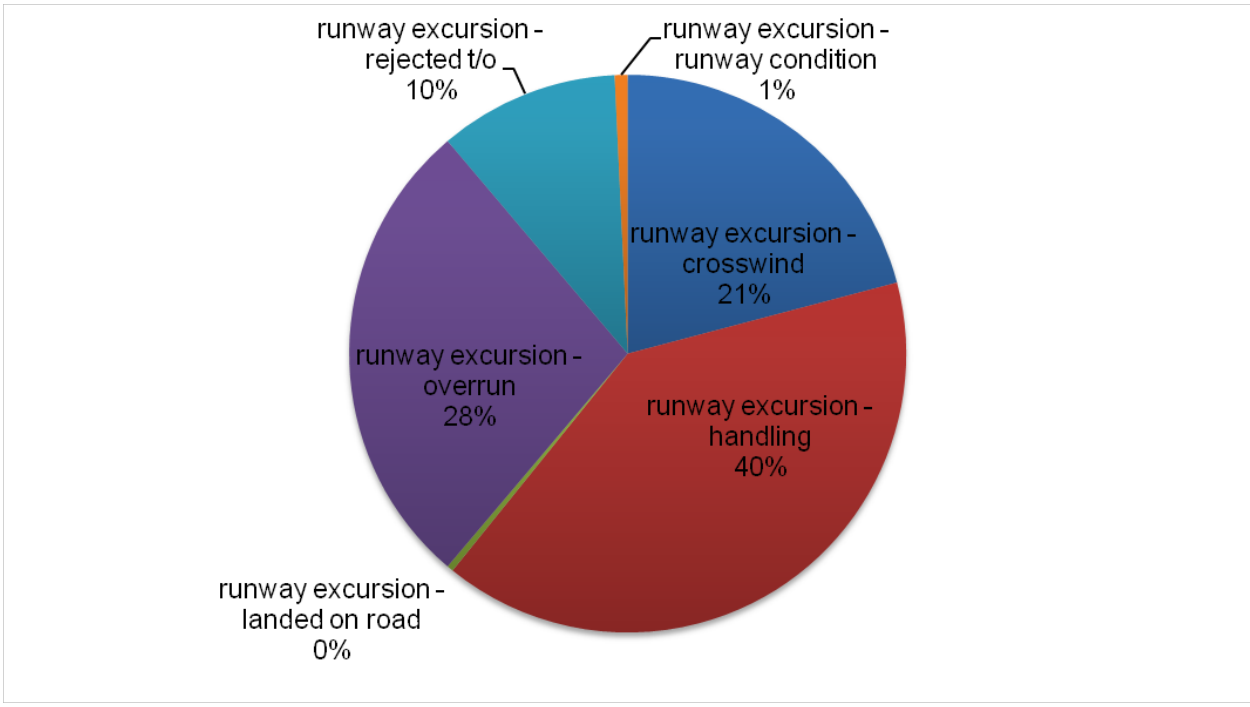


Figure 9: Runway excursions by additional factor for the period 2000-2011

28% of runway excursions were overruns of the runway. The reasons for this include landing on wet grass, the runway length being insufficient, floating too far down the runway before touchdown and landing with a tailwind. Many of these resulted in some damage to the aircraft and, in some events, injuries but no fatalities.

Some 21% related to runway excursions in a cross wind. This was not a loss of control due to poor handling. In the information provided following some incidents it was clear that the pilot did not allow sufficient correction for wind drift with the result that the aircraft was landing with a sideways component of movement. This meant that the pilot was landing well off the centreline of the runway and could not correct the aircraft before it departed the runway. This was determined to be more an indication or poor judgement rather than a loss of control through poor handling. Again, aircraft damage was often incurred.

Rejected take-offs led to some 10% of the total incidents of runway excursion. The reasons were usually a late decision to abort in the case of slow acceleration. In other cases, the aircraft became airborne but landed again due to obstacles beyond the airfield boundary and the pilot deciding to land rather than proceed with the potential to hit the obstacle. A few were caused by a swing on takeoff due to a cross wind leading to departure off the side of the

runway and a subsequent abort decision. The latter events were separated out from the landing events as the initial circumstances differ.

Once again there is the question as to whether this is a training issue, requiring re-evaluation of the PPL syllabus, or whether it too can be attributed to poor judgement. It appears from a casual review of the data that many of the events are caused by poor decision making during the more dynamic phases of flight. Is this an indicator of an underlying human factors issue?

A few events involved a runway surface that was in exceptionally poor condition. This is more down to an aerodrome issue than piloting however these are not considered significant enough to warrant further action, particularly as the aerodromes involved were unlicensed.

Finally, in one event the pilot inadvertently landed on a road running parallel to the runway. (The 0% shown in the table is actually representative of 1/268 = 0.003%)

Airworthiness issues were also statistically significant in terms of the numbers of events totalling 256. The main causes of these were analysed and gave rise to the data set presented in Figure 10.

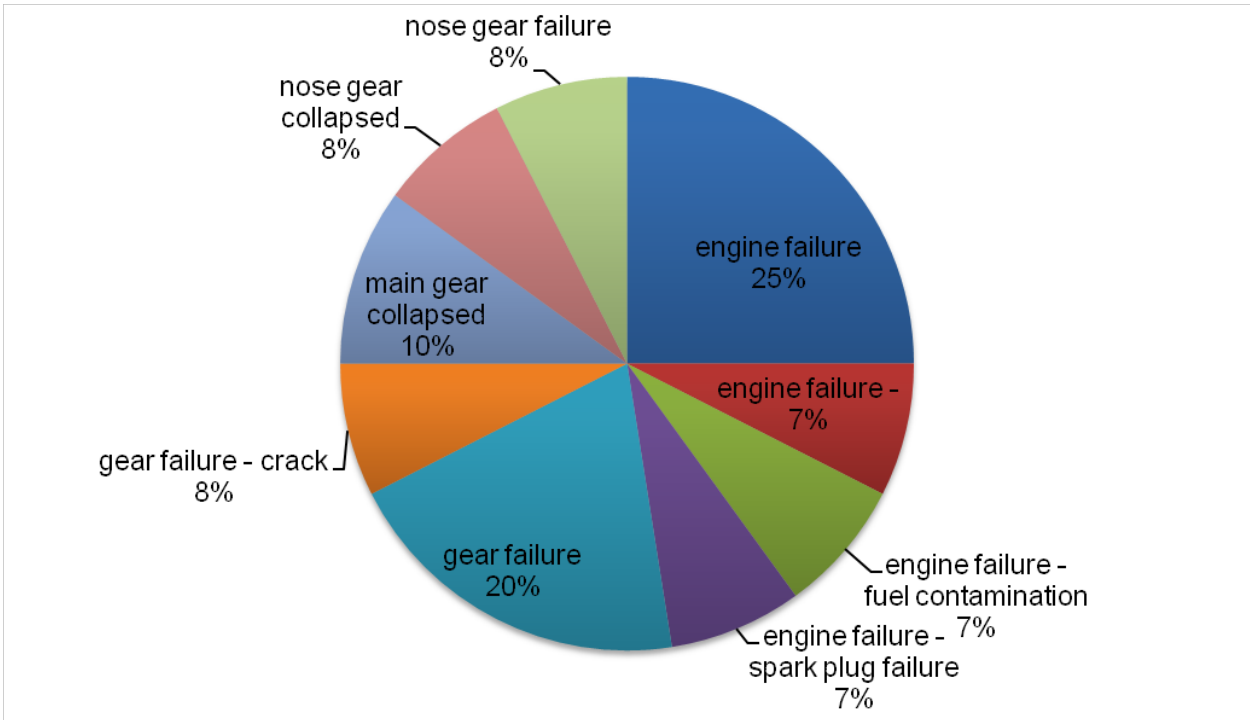


Figure 10: AW by additional factor for the period: 2000 – 2011

Undercarriage failures were a significant feature, affecting types with both fixed and retractable gear. The data shows gear failure where a component in the undercarriage failed due to an overload condition, cracks or fatigue. Some cracks or fatigue events were caused by pre-existing damage, questioning the effectiveness of the pilot's pre-flight inspection. Gear collapse is more attributable to a failure to lock down in the case of retractable gear or the failure to effectively deal with a bounce on landing led to a failure of the nose gear (wheel barrowing).

A few of these events were found to be attributable to poor maintenance, e.g. lack of lubrication or incorrect rigging, however there were a large number of events where the gear appears to have collapsed because of damage incurred earlier. This could have been the result of a heavy landing, a bounce on landing or excessive sideways movement on landing leading to an overload condition.

Engine failure also features highly in the data. It can be seen that spark plug failure, in the main due to the core of the plug being ejected, led to several events, around 7%. The reasons for these failures could not be established although the inspection and re-use, or re-use without inspection, of spark plugs may be a contributing factor. This may be something to highlight to GA maintenance engineers.

It was interesting to note that the majority of GA engineers want to be more aware of the safety issues being found on GA aircraft so that they could appropriately target their inspections. There was also an expression of concern that the CAA's surveyors were not actively involved enough in the survey or inspection of aircraft, spending most time on the paperwork for the aircraft rather than the physical aspects.

This highlights the issue of industry's understanding of what the CAA's regulatory role involves and what oversight may be involved. As noted earlier, the CAA employs a range of licences, certificates and approvals as a means of empowering industry to carry out certain functions and therefore the CAA's role is not that of direct inspection. That role, and the way that the CAA oversight in conducted is under review as part of the CAA's ESP review and adoption of risk based oversight.

A useful observation offered by some GA engineers during the review was the absence of MOR feedback on engineering events and the recent removal of engineering information from GASIL. It is recommended that, in any review of the MOR scheme, consideration be given to looking at means of providing feedback to GA engineers on issues being reported under the MOR scheme, by

means of information in GASIL or some other form of publication.

Fuel contamination also contributed to 7% of the airworthiness events. This was due to the presence of water as well as solid contaminants. This is largely a failure to carry out the proper precautions when refuelling. Since it may not be done by the pilot himself the events were listed under the airworthiness data even though the pilot has an obligation to perform water drain checks.

Some 7% of engine failures resulted from a loss of power and it is suspected that in the majority of cases this was due to carburettor icing. This has been the subject of concern in previous reviews and featured as a safety research project in the CAA's safety plan. This was evaluating a heated butterfly valve in the carburettor with the hope that this would prevent the onset of icing. This was thought to be more effective than the current heat exchanger systems presently used by a considerable number of carburetted engines. That project was not completed.

It was possible to analyse the data as well according to whether it was an event that was in the pilot's control at the time of the incident of if they were simply an innocent bystander to the event. The results are shown in Figure 11. Pilot events account for 81% of the serious incidents and accidents in the period 2000-2011.

It can be seen that the airworthiness events are broken down into whether they occurred in the air or when the aircraft was on the ground. Several incidents involved mechanical failure during start up or during taxi. However, the vast majority of airworthiness events occurred during flight or landing. These were failures due to a varied range of events.

It can also be seen that there are a number of mid air collisions, making up 1% of the statistics. As noted before it is recommended that further work be done on this.

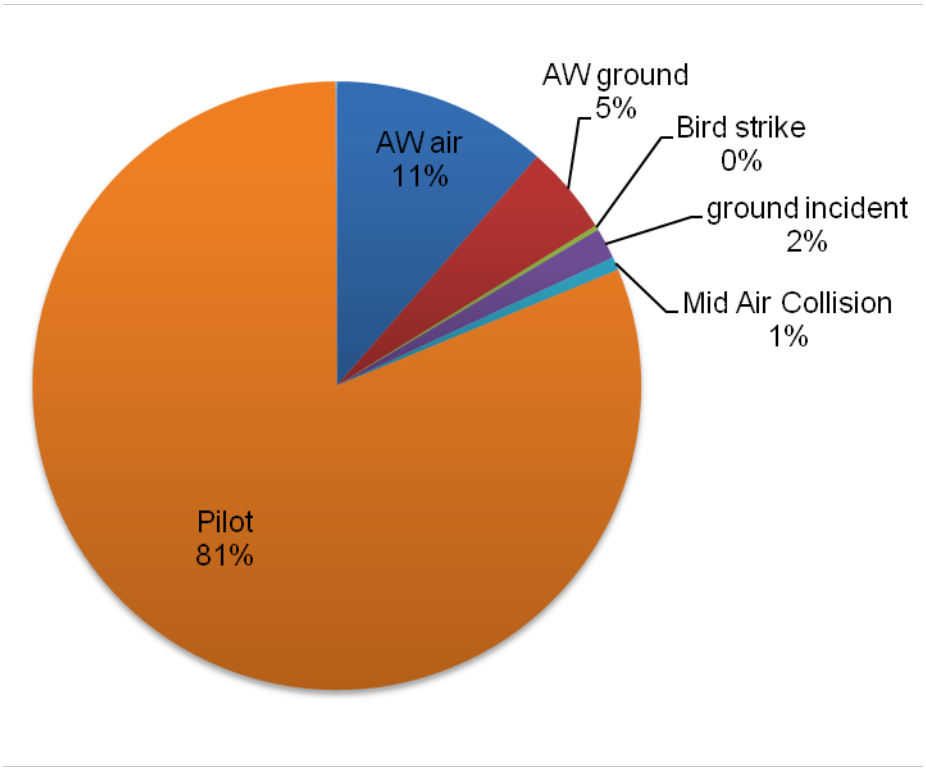


Figure 11: Serious incidents and accidents by event for the period 2000-2011

There were also a number of ground incidents making up 2% of the events. These included ground collisions, fire on start and personnel being injured during start or ground operations. The vast majority of these are attributable to poor judgement or lack or care on the part of the pilot.

The personal injuries incurred on start included a number where, despite the checklists, advice and guidance on the reasons for previous events, engines were hand swung with the throttle, and in some instances the brakes, not properly set.

It is clear from the data that the biggest difference to safety could be achieved if we could address the underlying causal factors behind the pilot oriented events. The 81% overall figure of pilot related events can be broken down further and this analysis is shown in Figure 12.

This provides some insight as to what areas, e.g. training, safety promotion or other initiative may be used to help promote awareness of why these events are occurring.

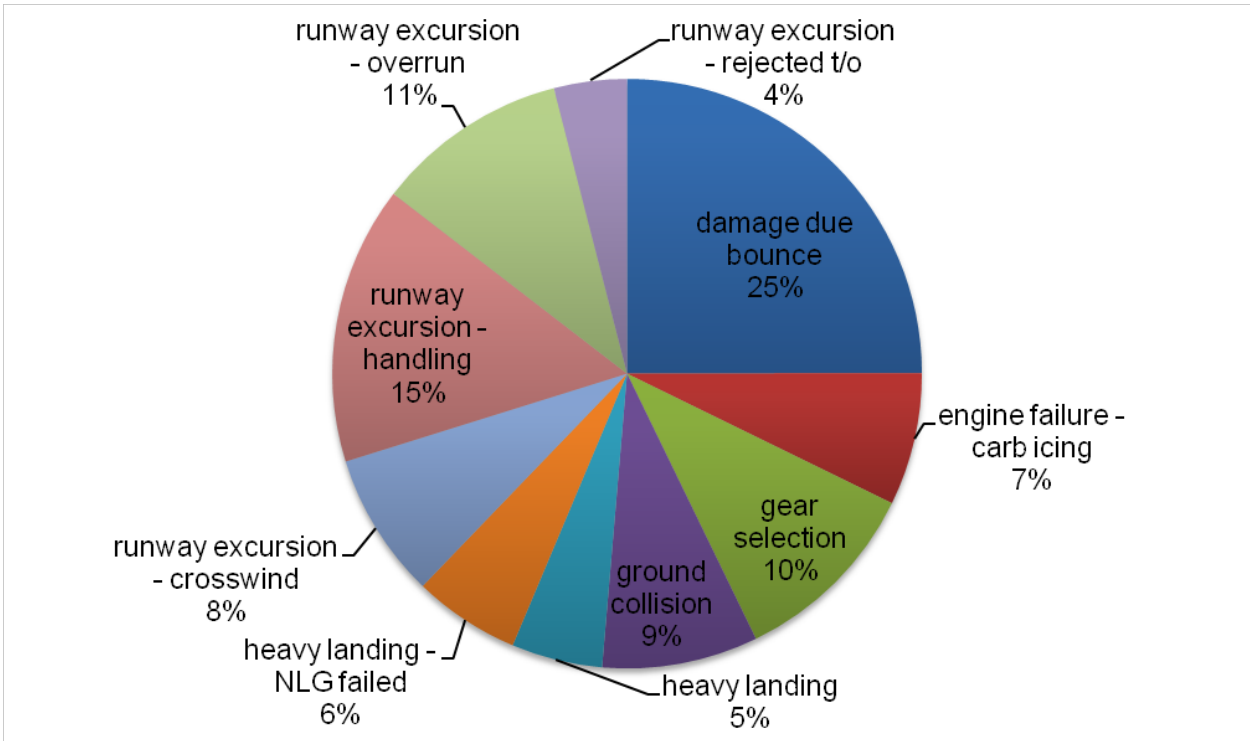


Figure 12: Pilot events by additional factor

RA2 Analysis of MORS - Helicopters

A similar analysis was conducted on helicopter related MORs. Out of the 25800 MORs a total of around 6400 related to helicopters. Once again, a simple data sort within an Excel spreadsheet revealed the key themes that underpinned the MORs that had been recorded. Obviously the increased complexity of the helicopter design, with the associated systems, indications and warnings give greater scope for mechanical or technical issues and this is borne out by the data. It is therefore no surprise to see a greater preponderance of technical issues within the themes identified.

The key themes, along similar lines to the previous listing, are:

- Aircraft equipment (1007)
- Aircraft maintenance (213)
- Aircraft structure (193)
- Aircraft technical (586)
- Ai4rspace infringements (351)

- Engine malfunction (623)
- Flight crew occurrences (723)
- Ground collision (67)
- Loss of control (44)
- Smoke/fumes (61)
- UK Airprox (82)
- Undiagnosed vibration (56)

The aircraft equipment data includes a variety of different events, some of which is not a safety threat to the aircraft, being primarily a nuisance warning. The data includes inadvertent release of underslung load, warning lights and main drive belt failure. Other examples cover airspace infringement events, rear position light broken (suggestive of an unreported tail strike) and a float bursting on test at 2.6 psi. Considerable effort would be required to analyse each of the 6800 MORs to re-categorise the information in order to obtain better clarity on what the key issues are. The scope of the RA2 project did not allow for this.

However, as for the primary analysis of the MORs in previous sections it is something to take into account in any future work on reviewing how MOR data is recorded and how such data is used within the proposed Enhanced Safety Programme work to drive CAA targeted oversight and safety interventions.

RA2 Analysis of Serious Incident/Accident data - Helicopters

The data set this time for MORs classified as serious incidents or accidents was smaller, amounting to 260 GA helicopter events and reports. Airspace infringements and AIRPROX data was analysed separately from this data set.

Once again this data set was evaluated and individually tagged so that there was consistency in the identification of the event type, causal factors and any contributing data. Table 10 shows the nature of the flight that was taking place when the incident occurred.

Class of work	No. of incidents	Percentage of total

Commercial[140]	20	7.7
Private	157	60.4
Training	81	31.15
Flight Test[141]	2	<0.5
Total	**260**	

Table 10: Helicopters – Incidents, Class of work

This shows that there are a significant number of the accidents and serious incidents occur to non-commercial flights, the biggest proportion being private flights (60%) rather than training (31%).

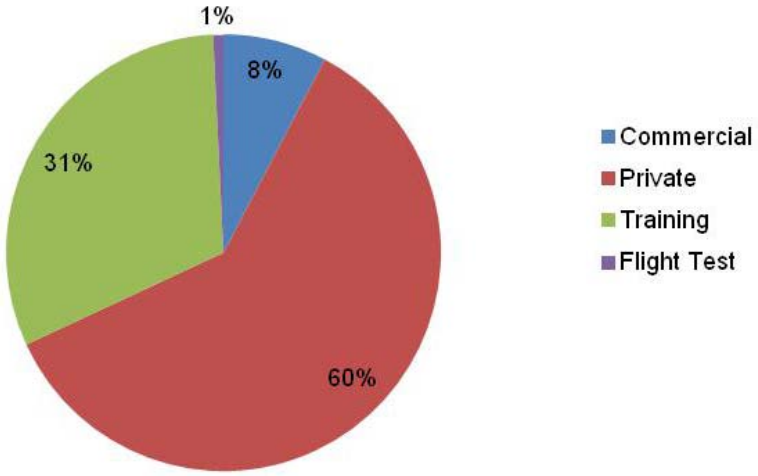


Figure 13: Helicopters – Incidents, Class of work

The 260 events were further broken down into a number of themes and this resulted in the breakdown shown in Table 11. This breakdown provides a comparable event list to that for aeroplanes allowing a comparison to be made if required.

No. of events

[140] This includes aerial work, air taxi, ambulance and police flights.

[141] These two events occurred during post maintenance test flights but have been kept ion the data set.

Event Type	
3rd party injury[142]	1
AW Air	37
CFIT	22
Engine Failure	12
Fire	3
Heavy Landing	28
Hit Object	7
Loss of Control	132
Loss of Power	12
Ground Incident	3
Mid Air Collision	3
Total	260

Table 11: Helicopters – Event Analysis Themes

It can be seen that there is a slightly different flavour to the type of event compared with the data for aeroplanes; however a number of key themes are still present. The results indicate that loss of control features heavily in the analysis. This is followed by airworthiness issues that occur in flight.

There is a significant difference here with fixed wing, where there is a mix of ground and flight based events, as the helicopter spends most of its time in flight so the majority of airworthiness issues occur in flight rather than on the ground.

A number of heavy landings are also reported, around one third of these events occurring during training or practice for engine off landings. The remainder appear to be largely due to poor collective control on landing, too much or too little, or misjudgement in the high rate of descent. However, there were several

[142] This 3rd party fatality involved a parachutist who fell from the helicopter, from a height of around 60 feet.

instances where windshear or suspect vortex ring effect may have been a contributing factor. Such causes to incidents are more difficult to identify conclusively.

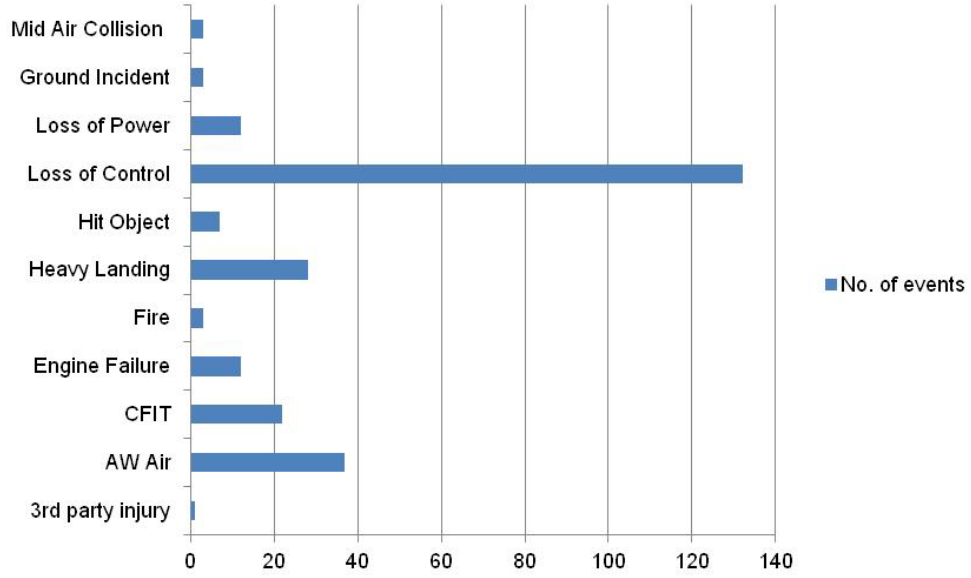


Figure 14: Helicopters – Event Analysis Themes

The airworthiness related events have been separately analysed and presented in table 12.

Airworthiness Event Type	No. of events
Vibration	10
MGB/TGB failure	3
Drive Failure	4
Maintenance	3
Structure	8
System	6
Engine	3
Total	37

Table 12: Helicopters - Airworthiness Events

These are presented also in graphical form below. Vibration, which arises from many sources, including blade damage, structural panels coming loose or impending bearing failure, is numerically the highest theme. The next highest is structure. Within this group there were there instances of exhaust system failure, one of which led to a tail rotor strike, vibration, detachment of the tail rotor gearbox and damage to the vertical stabiliser although a forced landing was then successfully accomplished. In another instance a part of the engine cowling detached on approach, struck the main rotor blades although the helicopter continued to a safe landing.

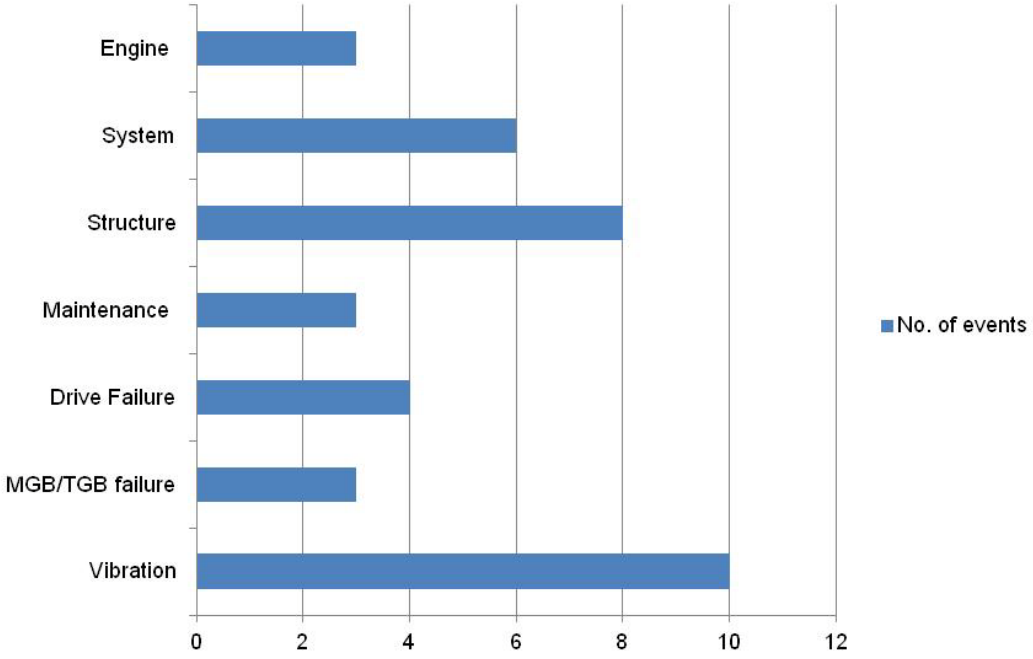


Figure 15: Helicopters - Airworthiness Events

In the airworthiness event table, there are a number of engine failures or loss of power events. Some of these occurred simply due to low fuel state. This suggests a lack of pre-planning on the part of the pilot. There were also several engine failures due to mechanical reasons but from consideration of the report detail there appears to be no correlation between these or commonality in the nature of the failure. These included a piston engine ‘big end’ failure, FCU failure and an indication problem. As a consequence these are not considered statistically significant.

There were 22 CFIT events, almost all of which were weather related. The majority of these however suggest deliberate flight into conditions of poor

visibility or IMC without any consideration of a safe height. Three of these involved a possible loss of control in IMC prior to impact as a turn was apparently initiated, with the possible intention to regain visual conditions.

There was one accident involving flight at low level (in good weather) and two further incidents that involved hitting objects (typically trees or power lines) on approach during a precautionary landing. One fatal accident involved a passenger collapsing across the controls with the consequent result that the aircraft collided with a hillside.

The largest proportion of events fell within the 'loss of control' theme and 130 of these have been separately analysed and presented in tabular form below. Two events were excluded due to the lack of information as the accident occurred overseas.

A large number of the loss of control events were due to poor handling, most of which resulted in damage to the helicopter, including tail rotor and main rotor strikes. However, a specific detailed analysis of all of the causal factors could not be conducted due to the time constraints for this project. This may warrant consideration for further review.

Loss of Control event	**No. of Events**	**Training**
Handling	51	17
Heavy Landing	3	1
Hit Object	3	0
Loss of Tail Rotor Effectiveness	3	0
Main Rotor Strike	5	1
Roll over	59	36
Weather	3	0
Total	**130**	**55**

Table 13: Helicopters - Loss of Control Events

It is interesting to note that around 42% of the loss of control events occurred during training flights. In the events attributable to handling many incidents was

the result of inadequate yaw control during hover, taxying or turns. Poor control of pitch also led to a number of tail or main rotor blade strikes during hover, some of which then led to a rollover event. It is difficult to know exactly what the underlying cause is but it is possible that it is simply a matter of under or over controlling of the helicopter on the part of the inexperienced pilot.

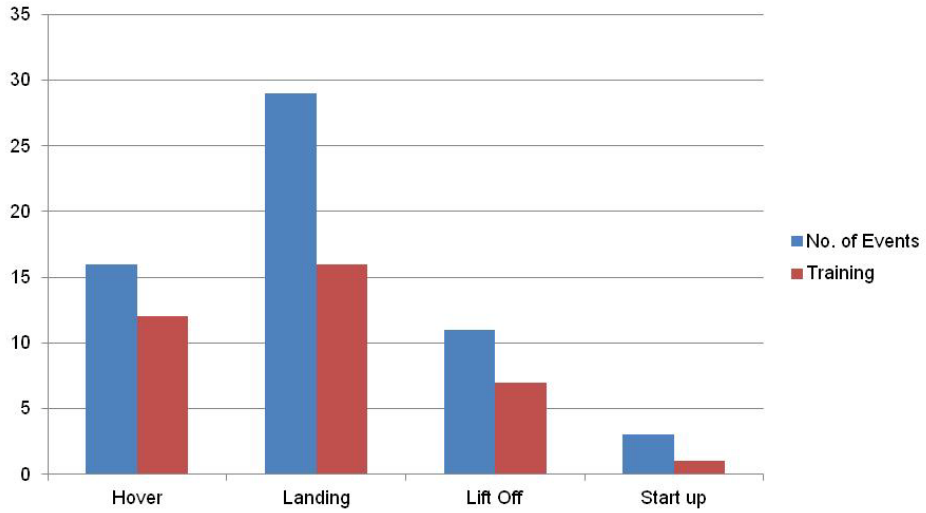


Figure 16: Helicopters - Loss of Control Events

On two occasions the pilot reported a loss of tail rotor effectiveness (LTE), both on Gazelle aircraft which have a fenestron rather than a conventional tail rotor. The third suspected LTE event was on a Robinson R44 which is reported to have experienced an uncontrollable right yaw before impacting the ground.

It appears from the detail of the reports that many of the loss of control incidents involving yaw problems could be attributed to loss of tail rotor effectiveness. However, some incidents were clearly the result of yaw control input in the wrong direction, leading to the helicopter developing an unexpected turn to the pilot's intention. Other events appear to involve too little yaw input, resulting in a failure to control the helicopter and an increasingly dynamic rotational condition.

Due to the dynamic nature of helicopter operations many loss of control events did eventually result in the helicopter rolling over. These have been separately evaluated to identify the stage of flight where the event occurred.

Rollover Event – Phase	No. of Events	Training (%)
Hover	16	12 (75%)
Landing	29	16 (55%)

Lift Off	11	7 (64%)
Start up	3	1 (33%)
Total	59	36 (61%)

Table 14: Helicopters – Roll Events, Flight Phase

This suggests that the potential for a loss of control event which then leads to a rollover is not confined to training flights alone. This is visibly demonstrated in figure 17. It does appear however, particularly where an instructor is on board during the incident flight, that the rapidity with which the event unfolds precludes any corrective action being effective in regaining control before a loss of control situation develops.

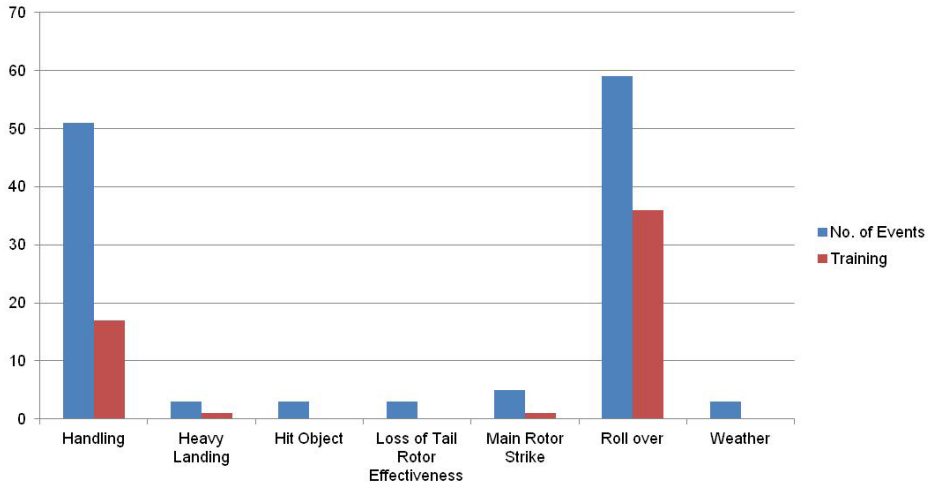


Figure 17: Helicopters – Roll Events, Flight Phase

As noted at the beginning of this section, airspace events involving helicopters were not included in the overall analysis. A sort of the MOR data suggests that there were 78 such airspace, aerodrome or AIRPROX events.

Helicopter Airspace events	No. of Events
Infringements	5
Separation	21
Runway Incursion	8
AIRPROX	35

Mid Air	3
Other	6
Total	76

Table 15: Helicopters – Airspace Events

There were five actual infringements into controlled airspace by civil helicopters. This compares very well against the same infringement data for fixed wing aircraft, possibly as a reflection of their more limited operation. However, there were 21 events where military helicopters or military aircraft infringed airspace or other areas of civil operation (such as CANP airspace) such that separation between the civil helicopter and the military aircraft was compromised. In one case, two military jets were witnessed releasing flares/decoys over an active helicopter route. This lack of co-ordination with the military is a concern and should continue to be the focus of scrutiny under FAS or the 21st Century Class G initiatives.

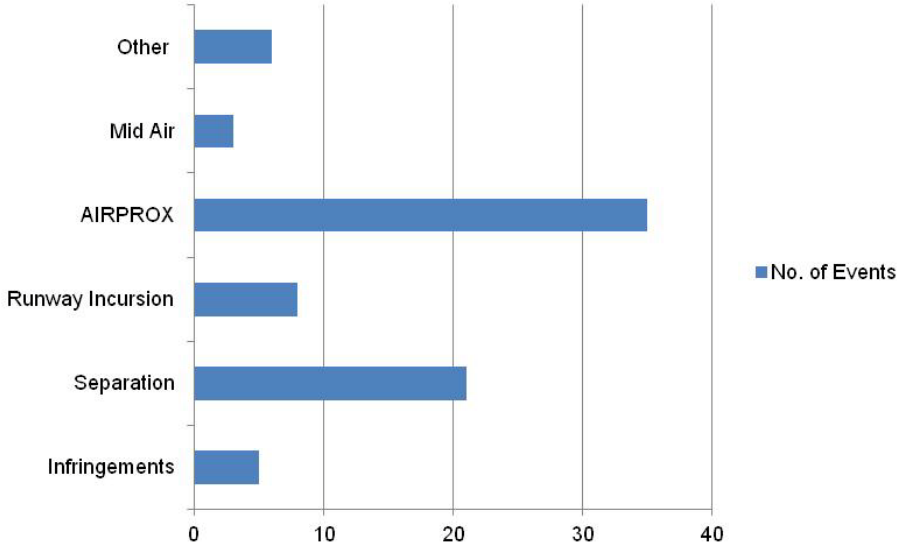


Figure 18: Helicopters – Airspace Events

There were also 8 incidents of runway incursion involving helicopters, although in each case the helicopters were not the instigator of the incursion but the recipient. Most involved encroachment of the runway by vehicles or unauthorised persons.

There were 35 incidences of AIRPROX (near miss events) of which only 5 events did not involve a military aircraft. Once again military co-ordination is a

concern.

There were three mid air collisions. In one incident a light aircraft descended on approach and collided with a Wasp helicopter which was in a low hover. One incident involved two military helicopters, albeit the type was a single turbine engine helicopter also used privately. The third incident involved a Robinson R22 helicopter and a microlight. These should be reviewed further under the review of fixed wing events recommended under Recommendation 41.

Safety Themes (A GA Safety 6?)

A closer scrutiny of the incidents shows that the following key factors or themes can be identified. To many in the industry these are almost self-evident. However, despite this they do represent the key threats and result in loss of life, personal injury or aircraft damage so should not be ignored.

Since a key part of the RA 2 programme is to look at Safety Improvement opportunities and identification of a strategy to deal with GA related safety issues in the CAA Safety Plan it is important that these be considered.

These are:

- Airspace Infringement
- Airborne Conflict
- CFIT
- Loss of Control
- Runway Excursion
- Human Factors in the GA Cockpit (Gear, Fuel, Decision Making)

There are a number of contributing factors that could be seen within the reports and some of these have been drawn out to set the themes in context and provide an indication about where we may wish to focus any further work as regards safety interventions.

Recommendation 29: The CAA should adopt the GA 'significant six' identified under the RA2 programme as focal themes within its Safety Plan to target the key safety threats in GA operations through appropriate safety interventions.

Airspace Infringement

- Encroachment on controlled airspace
  - Poor navigation planning
  - Poor en-route navigation technique
  - Failure to use available aids – LARS
- Lack of awareness of aerodrome control zones
  - Failure to carry out adequate planning
  - Poor en-route navigation technique
- Danger/Restricted area infringement
  - Poor navigation planning
  - Poor en-route navigation technique
  - Failure to check NOTAMS and operating hours
- Lack of situational awareness
  - Head in cockpit syndrome
  - Over reliance on GPS
  - Failure to keep track of flight path
  - Spatial disorientation
  - Poor airmanship

Airspace infringement clearly stands out in the MOR data as the most numerous type of event. An airspace infringement may appear relatively benign as it rarely leads to an accident however such an impression is false as infringement carries two levels of threat. The first is the hazard that an infringing aircraft poses to other aircraft within controlled airspace, whether that is a terminal area or an aerodrome control zone. This is a real threat if the pilot of an infringing aircraft is oblivious to the position of his aircraft in relation to other traffic, traffic patterns etc. Within a control zone it is a particular hazard if the infringing aircraft is at the same height as the circuit traffic. In such cases, a potential mid-air collision is a real threat.

Although the number of airspace infringements by helicopters was not

particularly significant the number of military aircraft infringements that compromised helicopter operations was a significant issue. It would appear that, for whatever reason, the co-ordination between military and civil operations is not ideal.

A secondary threat is the economic threat, the disruption that an infringement causes to the commercial operations of a larger airfield. Air traffic will normally put a temporary stop on take-off clearances or order an airliner to go-around in order to maintain the appropriate separation against an infringing aircraft. The errant aircraft may be totally ignorant of the chaos that is being caused, usually because they are not on the same operating frequency, do not realise they have infringed airspace and are oblivious of the simple fact that they are not where they think they are.

To counter the threat from airspace infringement and deal with airspace matters in general the CAA has several key initiatives running. The first is the CAA's Airspace Safety Initiative (ASI).

The ASI is a major review covering a number of different areas, with the aims of:

- Enhancing safety outside controlled airspace
- Identifying the hazards associated with the use of UK airspace,
- Identifying the needs of all airspace users,
- Prioritizing the hazards and
- Developing a strategy to mitigate those risks while meeting the needs of all airspace users.[143]

The CAA presently also has work underway specifically on airspace infringements through the Airspace Infringement Working Group (AIWG). AIWG is:

- '… a CAA sponsored working group, the purpose of which is to monitor airspace infringement data and identify trends in order to instigate remedial action through the appropriate regulatory or industry body[144]….'

As this group was already established, the MOR data under the RA2 project was subjected only to a basic sort of the data. It was clear from a casual review

[143] Extract from ASI web-site, www.airspacesafety.com .

[144] Extract from the terms of reference for AIWG.

of some of the data that the majority of airspace infringements take place as a result of poor planning in the first instance. Planning a track that takes an aircraft close to the boundary of controlled airspace leaves little room for error or drift, such as may be the case if the actual wind encountered is substantially different from that forecast.

Poor navigation technique, which is the actual ability of the pilot to adhere to the planned track data is what then leads to the infringement. This appears to be partly about basic navigational competence to relate actual visual waypoints to the planned route, which provides verification that the aircraft is still on the intended track. It is interesting to note from some discussion that, in many cases, there is real evidence that some basic skills are missing.

The CAA has required some pilots who have infringed airspace to undergo some re-training and re-examination. Some have been unable to carry out the basic pre-flight planning function whilst other can prepare a basic plan but fail to recognise that the intended flight takes them through controlled airspace. There was also some evidence that, even when planned properly, the pilot then flew a route other than what was planned often then encroaching controlled airspace although the plan clearly took steps to avoid it. Is this lack of basic navigational competence at the heart of the infringement dilemma?

A number of airspace infringement events were also noted where an aircraft entered or transited an aerodrome control zone when the airfield was operational without any permission or radio contact. It appears clear from these events that, once again, the offending pilot has not taken care during his pre-flight planning to check whether his route is likely to infringe such control zones. The same is true of danger areas where, because they may only be operational on a periodic basis, some pilots believe that they need not be considered. Do they routinely check NOTAMS?

From the point of view of the RA2 project, it is clear that there is the potential for the occasional loss of situational awareness, among pilots with experience as well as low time or newly qualified individuals. This is clearly a human factors issue. Even the use of modern GPS equipment can lead to infringements unless the presentation is easy to understand and provides all of the data that one would expect to find on an aeronautical chart. Is the database and chart presented up to date? Reliance on GPS when manually flying the aircraft also introduces the potential to be too much ‘heads in’ the cockpit whilst flying under VFR conditions, particularly if the pilot is wholly focused upon trying to keep the aircraft on the GPS track line, rather than keeping a visual lookout and tracking visual waypoints.

Under VFR, it is important that the pilot retains that outside scan for conflicting traffic and the GPS is really reinforcement of a good pre-flight planned route and the use of visual cues or waypoints to verify the track is being achieved. However, it seems that there is a human factors issue at play here. The improving visual presentation of data in the more modern GPS units clearly has the potential to lull the pilot into a false sense of security. What happens if the GPS fails? Is there a back-up plan? Are the maps readily to hand? Does the pilot have an understanding of the intended track that he intends to take, the direction and the key features that would confirm adherence to track?

The ASI programme incorporates the AIWG as well as other working groups such as that focused on Air Traffic Services Outside of Controlled Airspace (ATSOCAS). There is also further information and guidance on the 'Fly On Track' web-site, run on behalf of the General Aviation Safety Council (GASCo.). This provides useful data to pilots on infringement statistics, tips for avoiding infringements and examples of radar replays.

Airborne Conflict

- Mid Air Collisions
  - Circuit lookout
  - Joining procedures
  - Class G issues – free space
- Near misses
  - Poor visual lookout technique
  - Lack of visual conspicuity
  - Use of radar assistance – mode S

Although the bulk of the airborne conflict and airspace infringements were taken out of data which was then subject to the more detailed analysis, there were 11 mid air collisions that were included. These were investigated by the AAIB and reports analysing the events and identifying some causal factors were published.

The underlying causes appear to include a mix of a lack of situational awareness, lack of lookout and poor airmanship. However, given the often fatal nature of these particular incidents it is difficult to establish exactly what the mindset of the pilots involved was at the time of the accident. Were they

distracted trying to tune a radio? For whatever reason, the fact that the collision occurred would suggest that the pilots were not exercising the appropriate 'see and avoid' practice.

However, several mid air collisions happened within the circuit at an airfield so there may be scope to look at the issue associated with flights in the circuit. These would include joining procedures, mixing VFR and IFR traffic, air traffic control procedures. There is also an issue about mid air collisions in class G airspace where there are fewer rules to guide aircraft operation. It is therefore recommended that a further detailed review of mid air collisions be carried out to search out common threads and determine if any possible safety interventions can be identified, reference Recommendation 41.

Within the MOR data looked at there were a number of AIRPROX events. These should be included in the mid air collision review as they were close enough to a collision in some instances to give us valuable clues that may be of use.

CFIT

- Usually weather related
  - Operating beyond licence limits
  - Failure to obtain weather forecast
  - Failure to recognise weather deterioration and divert
  - Failure to maintain safe altitude once visual reference was lost
- Hit objects on take-off or landing
  - Failure to consider take off path and presence of objects
  - Failure to control approach path leading to low approach and collision with objects

In the aeroplane analysis there were noted to be 23 incidences of controlled flight into terrain where no fault with the aircraft could be established but the aircraft impacted with high terrain, normally in poor weather and instrument conditions. There were also 22 helicopter related incidents. These too were attributable to a belief that the flight could continue to be conducted safely in poor or full IMC weather conditions. For many of these incidents there are AAIB reports available and therefore it would be possible to look in more detail at the underlying causes. However, in view of the fact that many resulted in the death

of the pilot, there is no guarantee that the pilot's reasoning or mindset will be known or understood.

From a cursory review of some it appears that in most cases the pilots were operating beyond the privileges permitted by the licence, were not instrument qualified and, despite available options to divert or carry out a precautionary landing, the pilot elected to continue into deteriorating weather. There also appeared to be a reluctance to climb to a safe altitude once visual reference was lost, possibly because of the pilot's knowledge that he lacked the necessary instrument flying skills. This could well force him to continue trying to fly with marginal or very poor visual clues and no appreciation of the upcoming change in terrain. Given the high workload trying to retain some degree of visual perspective, does the pilot really have time to refer to a map and decide what a safe altitude may be?

It is clear that this theme represents a safety threat which ought to be included in a GA equivalent to the CAA's Significant 7.

Contact with objects was also notable during takeoff and landing with 30 incidences of pilots hitting objects after takeoff due to poor climb rates. These included hedges, trees and stone walls. There were also 30 incidences of objects being hit during approach and landing, including trees, hedges, and electric power cables and, in one instance, a vehicle under the approach path. Whilst not strictly CFIT in the conventional sense, they have been included for reference.

Loss of Control (Aeroplanes)

- Stall/spin
  - Loss of airspeed on go around
  - Loss of control during approach
  - Loss of control following engine failure
- Handling
  - Inattention to the aircraft configuration
  - Lack of awareness of speed
- Bounce
  - High round out

- Control snatch during flare
- Nose first landing (wheel barrowing)

- Heavy landing
  - High round out, high rate of descent
  - Loss of speed during flare
  - Lack of anticipation of wind shear
  - Loss of Power on final approach

It can be seen that quite a few sub-sets have been placed under the loss of control heading. Stall/spin remains a significant factor with 107 events, some 7% of the total MORs analysed. These are often attributed to a loss of awareness of the airspeed during manoeuvres. This includes turns, change in aircraft attitude following a go-around situation and lack of speed awareness on final approach.

It is also notable that there are several incidents where the pilot has lost control due to airspeed decay following an engine failure. Whilst the old adage about in the event of an emergency suggests that you fly the aeroplane, many appear to become distracted as they search for a field to land in. Is this simply a question of a lack of practice or a fundamental flaw in the licensing syllabus and the way that pilots are taught to fly? Trimming for a safe glide speed helps avoid potential airspeed loss whilst looking for a field or carrying out emergency actions.

Another aspect to be considered is the pilot's judgement during landing. This may simply be a question of technique. Many books on flying tuition recommend looking the length of the runway during flare since it gives a good perspective of the landing configuration. It is clear that the potential for error increases with more challenging conditions, e.g. turbulence on approach, windshear or a cross wind on landing. Is it symptomatic of pilots avoiding those conditions during most of their flying and then getting caught out? Is this a skill that can be enhanced by post licence training?

The Aircraft Owners and Pilots Association (AOPA) has their 'wings' scheme that encourages pilots to improve their skills and flying by undertaking a programme of challenges. The LAA and BMAA both have coaching schemes that help improve flying skills using experienced pilots, not all but many of whom are instructors. This is about the exchange of experience ad awareness of the

issues commonly found with a particular type or class of aircraft and to the inexperienced or novice pilot such information is valuable.

A bounce on landing can often escalate if inadequate actions are taken to control the aircraft. In some instances a go-around, even from a position of contact with the runway, is the best option. However, the data quite clearly shows that, even where the gear does not collapse due to overload during that particular bounce event, there is every possibility that it introduces some measure of fatigue which can ultimately lead to gear collapse at a later date.

First and foremost is the teaching of the correct technique to manage a bounce, including the need to go-around as a key option. The second element to be considered is the need to report such events so that an engineer can have a look for any damage incurred, reference Recommendation 37.

Heavy landing events similarly often represent a loss of control, through low or decaying airspeed or incorrect flare technique. It is accepted that windshear, often in the lee of hangars or tress along the airfield boundary, can be a contributing factor. It is important therefore that the pilot uses what clues they can to judge whether this is a potential risk, particular if the airfield does not have an air traffic service to issue cautions about known turbulence or adverse conditions.

Loss of Control (Helicopters)

- Handling
  - Inadequate sensitivity of pitch, roll and yaw control
  - Loss of Tail Rotor Effectiveness
  - Wind effect
  - Main rotor strike through excessive pitch/roll
  - Tail Rotor strike through excessive pitch/yaw
- Roll over
  - Lack of control (yaw/pitch) hover
  - Lack of control (yaw/roll) landing
  - Lack of control (roll/yaw) lift off
  - Lack of attention to controls inputs during start

It is clear that the different dynamic effects of the controls on a helicopter create a more challenging environment for the student and private pilot to master. It appears from a casual review of the data that many of the loss of control accidents relate to too much control input, over controlling, that leads to a situation where counter control inputs can no longer overcome the dynamic effects of the rotor.

A lack of understanding of the need for sensitivity may be one issue in pitch and roll. However, in yaw it appears that a number of incidents were exacerbated by lack of corrective input early enough or too much input too early.

Runway Excursion

- Overrun
  - Aborted take off
  - Indecision during go around/touch and go
  - Landed long
- Departure to side
  - Cross wind – loss of control
  - Pilot Handling – failure to correct drift
  - Gear failure due to bounce or heavy landing
- Ground loop
  - Cross wind – loss of control
- Undershoot
  - Allowing aircraft to drift below approach path
  - Windshear on approach
  - Loss of airspeed - stall
  - Carburettor icing – loss of power

The majority of these appear to stem from the fixed wing pilot's pre take off planning, or lack of it. Their lack of ability to judge how the aircraft is actually performing during takeoff, on approach and landing often leads to a late decision to take action. What is not known from the available data is the level of experience of the pilots. The information there was within the data indicated that

instructors and experienced pilots were just as likely in some cases to have an incident as student pilots.

Questions that GA pilots should be asking themselves prior to flight and at key stages of flight thereafter are fairly obvious. Is the field length adequate at my destination? What are the likely effects of the wind? Am I too low on the approach? If I can get in, can I get out?

There also seems to be some human factor issue about when to throw away an approach or an attempt at landing or take-off. This may simply be a lack of experience but a review of the commentary in the reports suggest that pilots are not, for example, noting a point on the runway where they would expect to be at the point of rotation. What they might not consider is that this may be beyond the point at which they can safely stop!

Likewise, is the pilot truly aware of extent to which the aircraft is using up the available landing distance when the aircraft is floating just above the surface? It was again interesting to note that in some of the overrun events the touchdown point was some two thirds into the runway length.

There are several safety sense leaflets already available on a range of subjects related to runway excursion and aircraft performance. However, in view of the number of incidents it is clear that the messages are not necessarily getting across in an effective manner. Consideration should therefore be given as to how this communication can be improved and the HF issues relating to decision making and judgement possibly reinforced through the biennial check ride.

Human Factors in the GA Cockpit (Gear, Fuel, Decision Making)

- **Gear Selection**
  - Failure to lower gear
  - Failure to carry out proper approach checks
- **Engine starting**
  - Starting with too much throttle set
  - Brakes not set
  - Not covering the brakes
  - Not enough attention to control positions (helicopters)

- **Engine Handling**
  - Carburettor icing
  - Use of carburettor heat
  - Fuel selection
- **Ground Collision**
  - Lack of awareness of ground obstacles

It is clear that general aviation is not exempt from the normal rules that apply whenever human beings are involved in an activity. Errors will inevitably be made by pilots, usually under stress or even when relaxed when there is a risk that complacency will set in.

The quality and scope of the initial training delivered to an inexperienced pilot makes all of the difference and therefore good instruction, both ground school and in flight, is essential. Learning to fly an aeroplane is also something that does not lend itself to learning by rote. Each flight is unique, even if the intent is to carry out the same air exercise, e.g. climbing turns.

The preparation, weather, planned routing and briefing are just a starting point. Once the wheels have left the ground the student and instructor have to adapt. An air exercise is dependent upon a number of factors, not least the way that the student reacts to the given instruction. For example, a simple stalling exercise can be straight forward if the student is thinking. However, the lower attention level later in a flight and the student may not be quite as sharp at the stalling exercise.

Part of the tuition must be to set in the student's minds the role that human factors and performance has to play. This is partly about instilling discipline at an early stage and consolidating that as time goes on. At the point that the navigation and the general flying tests are completed we should have a competent pilot, capable of handling the aircraft safely on flights under a range of suitable weather and operational conditions. However, how much of this discipline sticks if the individual is left to their own devices?

It was surprising to note the number of gear selection events where the pilot forgot to put the undercarriage down. In almost all cases the aircraft suffered damage but there were no injuries, apart from pride and a dent in the aircraft's insurance record. However, it perhaps indicates an issue with pilot use of checklist or mnemonics to remember key actions at various points in flight.

Perhaps this is an item for reinforcing at the instructor led check flight?

Likewise, the MOR and incident database contains evidence of poor technique on starting. Throttle not set properly, brakes not applied, brakes not covered (just in case the brakes are not applied!!) can all result in an aircraft jumping forward on start with the potential for third party injury and aircraft damage if a collision results.

Carburettor icing remains a significant feature underlying many incidences of engine stoppage. The issue appears to be difficulty among pilots as to the onset of such icing and the correct techniques to be applied to prevent it. Many will only select carburettor heat if there are clear signs of engine rough running. Unfortunately that may be too late. Some manufacturers recommend the use of partial carburettor heat on some engine types if there is a threat or actual icing symptoms. Such procedures are normally specified in the Aircraft Flight Manual or Pilot's Operating Handbook.

The CAA began some research into ways of trying to reduce the prevalence of carburettor icing but the work was not completed. It is suspected from the most recent analysis of the data that carburettor icing is still a safety risk and therefore should not be ignored, given the remit and intentions of the RA2 programme.

The mishandling of aircraft fuel systems also gives rise to a number of incidents. Lack of fuel, despite the best pre-flight planning precautions, leading to fuel starvation and engine stoppage is one of several scenarios. This is usually accompanied by a higher than scheduled throttle setting on the flight leading to higher fuel consumption. Failing to select the appropriate tanks during flight and running one tank dry is also of note. Water fuel drain discipline to remove water in the fuel is also essential.

One last human factor issue to consider is ground collisions. Inattention to potential obstacles, misjudgement of distances or clearances and lack of forethought on taxying the aircraft are all contributory factors.

The CAA has a wide reaching human factors review underway and it is clear that the issues above ought to be fed into that review so that opportunities of providing further guidance or to take a different approach to highlighting the issues and putting some safety improvement strategy in place is important.

Recommendation 30: The issue of human factors and performance appears to underpin a significant proportion of the MORs relating to recreational aviation. The RA2 MOR analysis provides information that

highlights a number of areas for further exploration where an understanding of the underlying causal factors may help identify a safety promotion, education or change of approach to training and qualification.

CHAPTER 9

Conclusions

The GASR and GARR reviews of 2006 opened up discussion on a whole range of general aviation related matters. They established a need for a high level strategic group to look at the more political and strategic policy issues and accordingly the General Aviation Strategic Forum was set up. This body has recently summarised their key concerns in a paper that has now been submitted to the UK Department for Transport. It is essential that this forum continues to focus upon those strategic issues and keeps a weather eye on similar high level issues and developments in Europe.

The establishment of a General Aviation Safety Partnership has also sowed the seeds for further collaboration between regulator and industry on the key safety issues that affect GA. This is an important development as it allows industry to take a leading role in ensuring that the CAA focuses upon the issues that matter. Identifying the key safety threats and taking appropriate safety action to address them is essential. Industry has a crucial role to play in this process as the experience they can bring about what the key safety issues is vital. Without doubt, the work being undertaken by that group will help provide a re-invigorated focus on GA matters in future CAA Safety Plans.

The purpose of this RA2 review was to take stock of the current regulatory situation, the GA safety record, and the issues affecting the various sectors, any identifiable trends and to consider the representations made by industry. The review also explored the potential to take a different look at risk and how it can be applied to recreational operations, a sub-set of GA. This focused attention on ‘what could be’ rather than singularly on what is and introduced the potential to develop a view on adventurous aviation activities. It offers opportunities to look at issues with a different mindset, a willingness to challenge the status quo and embrace a more open approach to recreational aviation and its regulation.

Central to the review is to consider what regulatory input, by means of regulation, requirement or CAA oversight, makes as difference to the way the industry operates and to safety as the bottom line.

A crucial aspect of this RA2 review was therefore to look at safety data trends for GA since the analysis was carried out for the GARR in 2006. No apologies are made in covering this important element of the review in some detail in

these conclusions. Although the RA2 safety data analysis has perhaps not been the subject of the same level of detailed scrutiny as that undertaken by the GASRWG in 2005, the analysis has provided a useful update on high level data for the five year period following the GARR analysis.

In summary, several improving trends can be seen but there are a number of issues that can still be identified in the data this time round that require further focus and work. The identification of a GA 'significant six' is important as a starting point for discussion on the key safety threats that need to be considered in more detail.

The simple sorting of the overall MOR data set confirmed airspace infringement as the number one issue, posing as it does a mix of safety threats and commercial disruption. Although there are measures being taken under the auspices of the Airspace Safety Initiative and the Airspace Infringement Working Group the latest data suggests that further focus on safety interventions is required. However, there is some evidence to suggest that most infringements are down to poor navigation skills, a lack of airmanship and pilot inattention during flight. Is the real solution to these issues just education? Perhaps adopting a similar strategy to the police for speeding offences could be part of the answer. Part enforcement, e.g. fixed penalty fine, but complemented with an 'infringement awareness course' and possibly a mandatory navigation check flight and assessment.

Understanding why these events occur is essential to providing a long term solution. Improvement in airspace awareness, development and consolidation of navigation skills and the wider use, in appropriate circumstances, of electronic conspicuity systems (e.g. Mode S transponders, ADS-B and similar systems) all have a part to play. It is also obvious that previous or current strategies to address the problem are not getting to the roots of the issue, although improvements have been seen. How many pilots are making more use of GPS systems as navigation aids but throwing away the basic skills learnt, map reading, navigation plotting and lookout, in the process?

Further work is also required to drill down into the data associated with mid-air collisions. Whilst the coming together in the air of two aircraft has been around since there were two aircraft to do so, there is a need to better identify the underlying circumstances and causes, as far as can be determined, of the most recent accidents. The reason for this is the potential impact of current technology, navigation aids and their potential for distraction that needs to be understood. Only then can solutions be identified to help address the potential pitfalls that can lead to such events. Once again electronic conspicuity may

have a role to play but equally important here is good practice, airmanship and improved visual conspicuity.

Loss of control is another key issue. In the air, loss of control appears to be related to a lack of awareness of what the aircraft is doing or, more importantly, what it is about to do if the pilot does not take corrective action. Stall/spin incidents are still a notable feature of the data, not only in turns but during take-off, go around and landing where attention to airspeed control is compromised because of some other distraction. Is this a fundamental training issue or simply attributable to a degree of complacency? Is it simply a matter of recency versus proficiency?

Likewise we see a high proportion of fixed wing aircraft events involving loss of control on the ground manifest itself in runway excursions, bounce events and consequently aircraft damage. Can this be targeted in any meaningful way so as to make a difference? The loss of control scenario is also the primary feature in the helicopter data, showing clearly that in many cases the pilot is not keeping up with what the aircraft is doing, with the resultant loss of yaw control or pitch control and a rotor strike, or worse. The dynamic feature of helicopter rotors often ends up with a roll over in the event of such loss of control.

In respect of gyroplanes, the data shows that most recent incidents and accidents are down to a lack of appreciation of the aircraft's performance or the techniques to get the best out of the aircraft. Work is already in hand, following the more detailed review of gyro MOR data to provide a Safety Sense Leaflet on the issues. This has been a collaborative effort between industry, the BRA, and the CAA involving not only licensing personnel and instructors but airworthiness flight test staff as well.

Gliding activities are well covered by the BGA's own internal reviews of safety data. Their work on winch safety, and the benefits that have already been seen through the reduction in fatal or serious injury events, is the sort of initiative that the CAA would like to see all GA sectors adopt. Winch events are not the only issue that BGA is focusing on and it underlines the importance of their SMS approach and the value of the BGA as a cohesive and leading organisation for the gliding sector. There are lessons to be learnt from the BGA approach to safety and analysis of occurrence data. It is accepted that they have a single sector to deal with but is it perhaps something for the CAA to look at by enrolling each industry representative body for the various sectors? Again, perhaps a collaborative arrangement may be the solution.

Human factors, in terms of the private pilot's propensity to make mistakes, are

an issue that lies under many, if not all of the different incidents and events. It is obvious that there is some sort of disconnect in many pilots from a proper awareness of a safety culture approach to their flying. Lack of preparation, failure to appreciate the developing risks in flights, such as deteriorating weather, and a possible fixation or unhealthy reliance on the available technology are all aspects that are worthy of looking at with the potential for human fallibility as a factor. It has often been said that the current CAA safety promotion is working with the converted. It is hoped that the analysis in this review and some of the issue that have been identified will help establish a means of capturing the interest of the rest.

The various aviation organisations, and there are many of them, all appear to have safety improvement as a key facet of their existence. A number have laudable schemes for promoting the development of pilot skills through coaching, supported conversion programmes or setting goals for pilots to aspire to. These present a useful tool in promoting a greater awareness and involvement in safety issues among their members and the CAA should continue to encourage them to do so. The FAA has already adopted a different approach to using such schemes. Perhaps the CAA could consider whether there is benefit in following suit.

However, the somewhat disparate nature of the organisations and their own agendas needs to be better corralled so that the schemes blend in to offer a more cohesive industry approach that can be built upon by all.

The other important facet of the RA2 work was to look at what constituted ‘recreational aviation’. Some things are easy to exclude, some easy to define and include. However, there are some issues that sit along the margins and could be defined as either in or out. A key issue was to look at recreational aviation in the same way as individuals consider other sports, recreational activities or leisure pursuits. As such, most areas of GA have tendrils of activity that can be considered within the concept of recreational aviation.

In the analysis, the review looked at the aircraft categories, operational sectors and current pressures. The relationship between the current regulatory regime, the current regulatory approach to third parties and risk and the potential to look at changes in regulatory approach were all explored. A number of regulatory changes are already under development, such as the alignment of the remaining national airworthiness requirements with the principles of the EASA system. This was something that industry clearly wanted to see following the GARR but challenged the CAA to achieve it without imposing or introducing all of the perceived bureaucracy of the EASA system.

The evolving regulations in Europe are an obvious area for focus given the industry backlash to them. However, it must be accepted that there are limitations on the degree of influence that can be exerted by the UK on the European rulemaking process. However, the Part M RIA and the EASA Management Board review of GA in general will undoubtedly offer industry and NAA's alike the opportunity to return some balance and proportionality to the requirements. It is essential therefore that the CAA evolves a strategy about how it wants to influence EASA's thinking to achieve this. The concepts explored in the review could be valuable in this respect.

One particular area of discussion among the stakeholders during the research for the RA2 programme was the impact of the better regulation principles and what that means for aviation, risk and regulation in the future. The establishment of a change of approach to aviation regulation, based on safety interventions, acceptance of risk or acceding to industry's requests for a shift in the CAA's historic position is possible. It requires, however, clear identification of the reasons for doing so, to address any potential third party concerns about the loss of standards, and any boundaries which may have to remain, to secure enough confidence that safety will not be eroded.

A review of the better regulation principles places an obligation on the CAA to regulate only to the extent necessary. It also encourages, under the latest guidelines, the wider acceptance of the individual's ability to accept the risks of participation. There are a number of potential candidates for a review of the regulatory provisions and determination as to whether a change in regulatory approach is possible, desirable and how it would be achieved. These issues have been identified in the report and covered by the recommendations and suggests project list. It is hoped that these will be agreed to be the subject of review by collaborative industry/CAA working groups.

A critical element of any evolution will be the extent o which the CAA can rely upon industry playing its part. There is no point is looking at regulatory alleviation in the name of proportionality if industry abuses the trust upon which it is based.

It is also clear that, in the event of any regulatory shift that the CAA's approach to oversight and consequently its approach to enforcement will need to be reviewed and aligned with the new framework. A CAA wide review of enforcement is already underway to look at the various enforcement options that are available, when and how these should be used and what alternative options there are. It is apparent from discussion with industry stakeholders that prosecutions and court actions are less of a deterrent to many individuals than

the temporary or permanent suspension of a licence.

It is important to understand why this may be the case and to look at processes that complement any change in regulator approach. A revised set of enforcement options that are more effective in achieving the change in attitude that is necessary to change behaviours is required. An example of a possible option that could be considered is the adoption of something similar to the 'speed awareness course' used by many police forces as an alternative education strategy for first time speeding offenders. Adoption of civil sanctions, such as fines, penalty points etc. may also be useful enforcement tools.

The potential for exploring the concept of adventurous aviation was considered to see if the thoughts on the acceptance of risk could be developed in more detail and what that might mean in terms of a new approach to risk in recreational aviation. Industry highlighted the approach in other States towards adventurous aviation activities and has openly challenged the CAA to consider allowing a similar system in the UK. However, the proposal requires careful consideration and whilst the RA2 programme supports such an initiative the detail of what this may involve and how it may be introduced. It is acknowledged that other States have already embraced the adventurous aviation concept but the relatively congested airspace in the UK, particularly in the South East, may dictate a different approach.

The introduction of light sport aircraft and the corresponding sport pilot licences has also piqued interest in some areas of industry as to whether this offers an alternative to the NPPL licensing system. Any review of this has to tie into the safety analysis and the potential piloting competence and human factors issues that can be drawn out. Further work may be required there.

Arising from this review is a number of recommendations that have been drawn up for consideration. Whilst this report does not provide solutions to every aspect of regulation that was considered it does open up opportunity to look further at issues where there appears to be the potential for taking a different approach. Having identified these recommended areas for further study it is important that industry and CAA work together to identify a different way of working, where it is possible to do so.

These recommendations have been drawn up as projects within the CAA to act as a catalyst for future work and to help define the scope of the project and some of the issues that ought to be considered.

As mentioned before there is scope to use the RA2 report as a launching point

for further reviews of how the principles within the report can be rolled out to other ‘non-recreational’ GA sectors and to influence European thinking on the issues.

CHAPTER 10

Recommendations

Introduction

The following section summarises the recommendations made in and drawn from the body of the report. For the purposes of identifying the key threads, they have been sorted into different themes, consolidated and presented as such. These have been drawn up as a series of projects and the recommendations expanded upon to provide baseline terms of reference for the potential follow on work and to identify some of the additional issues to be looked at during any future work.

Legal Issues and Enforcement

There is an obvious need to review the outcome of the potential projects as they progress to determine whether there is a need to change the legal structure or existing provision of the ANO. This would be necessary if, for example, a decision was taken to change the approach to valuable consideration and third parties in any work to embrace the adventurous aviation concept. Likewise, if we are adopting a different regulatory approach there is a need to consider the implications for enforcement, particularly if greater freedoms have been agreed.

Within the RA2 programme, one recommendation over this general caveat was made as shown below:

Recommendation 1: It is recommended that the CAA enter into discussions with BHPA and BMAA regarding what can be done about concern over allegations of abuse of the Rules of the Air by pilots of powered paragliders who are not members of either organisation.

Europe

A number of recommendation were made in the course of the RA2 programme relating to Europe, the role of EASA and the apparent mismatch between the European rules and what industry perceive would be a proportionate and pragmatic approach. These included the following:

- Recommendation 2: Part M RIA - It is recommended that, where possible, the CAA ensure that suitable input is made to the present EASA Part M RIA review and the work on the regulation of GA being conducted under the auspices of the EASA Management Board. The aim should be to restore some measure of proportionality to gliding activities and the impact of EU regulation based upon the UK's pre-EASA experience of the BGA and the success of the self-regulation model.
- Recommendation 5: The CAA should, in conjunction with its evaluation of the developing EASA rules on commercial operations, seek to influence EASA's view on GA and what 'recreational activities' should be deemed to fall outside of any definition of commercial operation, thereby allowing a more proportionate approach to regulation to be achieved. In essence this includes separation of recreational aviation related activity from pure commercially biased activity, which serves a 'transportation' need, towards the concept of 'adventurous aviation'.
- Recommendation 14: The CAA should seek, where appropriate to influence EASA's thinking on the use of balloons for pleasure flights as an adventurous aviation activity with proportionate regulation and oversight.
- Recommendation 19: The CAA should continue to lobby EASA and contribute to both the Part M RIA and the general EASA MB review of GA in respect of a more proportionate set of regulatory requirements for GA and in particular private or recreational activities.
- Recommendation 21: The CAA should consider the potential impact of the imposition of the EASA regulations for approved training organisations on the financial and operational viability of small and medium sized enterprises. Where appropriate the CAA should seek, as part of the EASA MB review on GA to influence their thinking on the negative impact of such regulation on small organisations that cannot embrace the financial or bureaucratic cost of the new requirements when there is no statistical evidence to suggest that it offers any safety benefit over the previous JAA registered facility.
- Recommendation 22: The CAA should, where possible ensure that it seeks to influence EASA's view on the proportionality of any intended syllabus for pilot or engineer licensing such that the syllabus is wholly appropriate to the technology and scope of aircraft the qualification is intended to cover. Such review should incorporate consideration of any issues arising from the safety analysis in the RA2 review.

Operations Issues

The existing UK operations system is based upon historic concepts of public transport, aerial work and the issue of valuable consideration. This has stood the test of time but in some case of simple, recreational style operations, it has potential to impose disproportionate requirements if a 'one size fits all' approach is adopted. In adopting a different regulatory approach these boundaries and historic conventions need to be reviewed and, where appropriate, revisions suggested.

The following recommendations were made in the course of the RA2 programme:

- Recommendation 6: It is recommended that the CAA consider whether it would be appropriate to allow certain aerial work activities to be undertaken by type approved microlights and potentially type approved gyroplanes, whether under a Permit to Fly or, alternatively, to give consideration of the additional requirements that would be necessary for such aircraft to hold a CofA.
- Recommendation 23: It is recommended that the CAA consider the purpose and operation of charity flights and, where possible, expand the provisions to allow greater freedoms to conduct charity flights, including the use of aircraft operating on Permits to Fly, e.g. Spitfire, and with less restriction on the payment or contribution to such flights, over and above any payment to a charitable cause.
- Recommendation 24: It is recommended that the CAA give consideration to defining and establishing an adventurous aviation regime, including pleasure flights, air experience flights in ex-military aircraft, aerobatic, simulated military flights, tail chasing and similar activity, where valuable consideration is permitted in recognition that the activity is recreational in its nature. As part of this review the CAA should consider NZCAA Part 115 and other regulatory authority provisions for adventurous aviation.

Airworthiness Issues

There is a general provision in section 10.3 covering Europe that includes airworthiness issues within the current reviews of Part M under the RIA and the EASA MB work. Appropriate CAA representation of the issues relating to airworthiness concerns should be included under those related recommendations.

The remaining 'National' system covering Annex II aircraft is still within the remit of the CAA and a number of recommendations were identified under RA2 for further consideration. These include:

- Recommendation 16: The CAA should complete its work, in conjunction with the HAA, on the review and re-issue of BCAR A8-20 to address HAA concerns about flexibility of use and CAA concerns over minimum standards, in particular through the introduction of a maintenance management function. The work should also account for developing policy regarding a more flexible approval system for organisations.
- Recommendation 17: The CAA should consider the HAA request for clearance of ex-military aircraft to operate at night and under IMC subject to being satisfied that suitable equipment fit, modifications and continuing airworthiness arrangements are in place.
- Recommendation 18: The CAA should consider the HAA request for the removal of the restriction for ex-military aircraft on the overflight of congested areas, subject to a review of the accident data, risks and potential mitigation to keep any risk to a minimum through pre-flight planning. This is linked to the potential grant of clearance for ex-military aircraft to operate in IMC.
- Recommendation 20: The CAA should continue and complete the revision of BCARs to embrace the intent of the GARR recommendation to look at further devolution of activity to industry and the alignment of BCARs to EASA regulatory philosophy where appropriate.

Microlight Aircraft

The RA2 review noted the disparity between UK practice in regard to microlight manufacture and that elsewhere in Europe. Whilst the historic imposition of additional requirements and standards in the 1980s is recognised their continued application is claimed to put the UK industry at a disadvantage.

The manufacturing requirements in particular are suggested as being too onerous and therefore one recommendation is made relating to these:

- Recommendation 7: Review the continuing relevance of the BCAR A8-1 requirements for microlight manufacturers once the EASA regulatory methodology for LSA aircraft is properly defined. This review should account for the desire to have a more openly proportionate requirement and also take into account other microlight manufacturing systems in other European States.

Sporting organisations

The use of sporting organisations in the UK is part of the established regulatory structure. However, the RA2 programme identified a number of initiatives that could further enhance the value of these organisations and, proportionate with a revised approach to risk and the type of aircraft overseen by the organisations, further devolution is appropriate.

The following recommendations seek to achieve this:

- Recommendation 8: The CAA should consider and further explore the possibility of allowing the BMAA to take a greater role in the ongoing oversight of microlight manufacturers under BCARs, either as an extension to their sporting organisation approval or as a qualified entity.
- Recommendation 9: The CAA should develop a regulatory requirement that provides a suitable formal framework for approval of sporting organisations, such as LAA and BMAA that embraces the role that the CAA wishes such organisations to play and defines, with greater clarity, the basis upon which the organisation is approved.
- Recommendation 10: The CAA should consider the position of homebuilt helicopters and where they fit within the regulatory framework, given the specific needs of these aircraft and the desire for further devolution.
- Recommendation 13: The CAA should consider further devolution of gyroplane oversight, including the airworthiness support, airworthiness review functions and the associated CofV process, to industry, through the LAA, BMAA (if appropriate) and possibly, with suitable approvals, directly to gyroplane manufacturers for airworthiness support.

Licensing

The new European licensing requirements have given rise to concern among the GA sector. The experience with the introduction of Part M proved traumatic for some industry organisations. It is best if the same faults can be avoided when rolling out the pilot licensing requirements. In addition, the analysis of safety statistics suggest there is some scope for interventions associated with the remaining national pilot licensing syllabus.

Accordingly a number of recommendations have been made relating to these issues:

- Recommendation 3: The CAA should seek to explore whether the system of approval for the BGA under Part M subparts G and F provide a suitable model for the introduction of the new European pilot training and licensing requirements. This reflects consideration of a pragmatic solution to the impending EASA rules.
- Recommendation 4: The CAA should seek to ensure that there is adequate provision in any forthcoming changes to Part 66 and its implementation for the recognition of 'grandfather rights' for the licensing of BGA glider maintenance staff.
- Recommendation 11: It is recommended that industry seek to establish a gyroplane pilot training system that has parallels with that operated under the auspices of the BMAA using type approved gyroplanes.
- Recommendation 12: It is recommended that the CAA consider the possibility of allowing established gyroplane flying clubs to hire 'type approved' gyroplanes to qualified pilots in the same manner as the system agreed for type approved microlights.
- Recommendation 13: The CAA should push for the appropriate recognition of UK balloon PPL licences with suitable grandfather rights on EASA Balloons.

CAA Business and Safety Issues

No business can operate without having some form of infrastructure, processes and procedures. The RA2 review encountered some issue when attempting to gather and analyse the MOR data relating to GA. There is therefore a recommendation that relates to improving the handling of MORs to assist future analyses.

A number of key safety themes were identified as part of the RA2 analysis and the GA safety six should be used within the CAA safety plan as a focal for GA related issues. There are also a few recommendations relating to identified safety themes which require further exploration and discussion and which should be co-ordinated through the GA Safety Partnership.

The recommendations are:

Recommendation 25: It is recommended that the CAA review its needs for reporting of incidents and the detail in required information to permit a realistic and meaningful analysis. This should ensure that the reporting requirements of the European ECCAIRS programme are met and replicated within the UK for

non-EASA aircraft. Any review should include provision for improved reporting from GA, identification of a better taxonomy for categorising MORs and greater attention to rends in incident data. The use of IT in submitting reports in an easier and more user-friendly manner should be encouraged.

Recommendation 26: It is recommended that the GA Safety Partnership (GASP) review the data from the RA2 MOR analysis to determine what safety interventions may be appropriate. In doing so the GASP should:

- Consider the data analysis carried out as part of the RA2 programme.
- Take account of the Airspace Safety Initiative's (ASI) continued focus on addressing the underlying reasons for airspace infringements in conjunction with the Airspace Infringement Working Group (AIWG).
- Consider a campaign to promote awareness of the need to report heavy landings or bounce events such that aircraft can be properly inspected to prevent pre-existing damage leading to failure on subsequent flights.
- Consider the human factor and performance element of the GA pilot in the events.

Recommendation 27: It is recommended that, given the threat to life in mid air collision events and the potential implications for third party death, injury or damage that, in conjunction with any detail in AAIB reports into these incidents, the CAA specifically analyse the data for the last ten years to identify any underlying root cause or underlying factors that may benefit from a safety intervention being raised to target the issue.

Recommendation 28: It is recommended that a further review of GA related CFIT events be carried out to identify any root cause or underlying causal factors that may be of benefit in addressing through a safety intervention.

Recommendation 29: The CAA should adopt the GA 'significant six' identified under the RA2 programme as focal themes within its Safety Plan to target the key safety threats in GA operations through appropriate safety interventions.

Recommendation 30: The issue of human factors and performance appears to underpin a significant proportion of the MORs relating to recreational aviation. The RA2 MOR analysis provides information that highlights a number of areas for further exploration where an understanding of the underlying causal factors may help identify a safety promotion, education or change of approach to training and qualification.

APPENDIX A

Chapter title

Heading 1

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