Safety Regulation Group

Civil Aviation Authority

Safety Plan

2008 Update

Update, April 2008

Enquiries regarding the content of this publication should be addressed to:

Safety Investigation and Data Department, Safety Regulation Group, Civil Aviation Authority, Aviation House, Gatwick Airport South, West Sussex, RH6 0YR.

The latest version of this document and all applicable amendments are available in electronic format at www.caa.co.uk/publications, where you may also register for e-mail notification of amendments.

Foreword

This is the second Update to the 2006/07 - 2010/11 Safety Regulation Group (SRG) Safety Plan. The Safety Plan is our long-term agenda for safety. It was agreed at the outset that we would not republish the entire Safety Plan each year, but would publish annual updates in the interim years to inform you of our performance and progress against the Safety Plan.

I believe that good progress has continued to be made in all areas. In particular, the CAA safety risk management process continues to be developed and updated. This process should be the major driver for the CAA to achieve continuous improvements in safety. By monitoring the key elements of safety performance, identifying trends and pre-cursors, we are able to focus our resources on areas where improvements can be made in a cost-effective and timely manner. We plan to describe this process in more detail in the next issue of the Safety Plan.

The safety risk management process begins with the analysis of fatal accidents to large public transport aeroplanes worldwide. A ten year update to this analysis has recently been completed and will be published this year. One important development in the process is the work of The High Risk Events Analysis Team (THREAT), which was set up in 2007. This team conducts detailed cross-discipline analysis of high risk events to UK operators. It makes use of safety reports classified as high risk events, obtained by the CAA under its Mandatory Occurrence Reporting Scheme (MORS). These reports are formally assessed by various experts to identify generic areas of potential safety improvement.

Having committed in December 2006 to supporting EASA's European Strategic Safety Initiative (ESSI), the CAA now contributes to all ESSI safety teams. These teams address commercial aviation, helicopters and, more recently, General Aviation (GA). Involvement in these safety teams will ensure that our own safety initiatives are aligned with those at the European level. A recent example of this is our work on the safety of ground handling operations.

I am particularly pleased with the progress made in promoting Safety Management Systems (SMS) in UK industry. Much was done in 2007, but much more will be done by the CAA in partnership with industry in the future. Our aim is to ensure SMS are implemented in accordance with ICAO timescales, particularly as the UK will be subject to an ICAO Safety Audit in February 2009. We firmly believe that the consistent adoption of SMS by the aviation industry will yield further improvements.

Not only are we promoting SMS in industry, but during 2008 the CAA is developing the UK's State Safety Programme (SSP). The SSP is required by ICAO and links with the requirement for SMS in industry. A UK SSP document will be issued in September 2008 and this will clarify the safety oversight responsibilities of the various State organisations involved.

An aspect that we are keen to pursue is how we further involve industry in our safety risk management process. This will be particularly important for the development of the new Safety Plan to be published in 2009. We therefore value your inputs to this safety planning process, and if you have any comments on this 2008 Update or the Safety Plan, please contact us at safetyplan@caa.co.uk

M J Bell
Group Director Safety Regulation

Contents

Contents

Introduction

This 2008 Update document revises actions detailed in the 2006/07-2010/11 Safety Plan and 2007 Safety Plan Update.

In particular, it is designed to:

- Provide details of progress against items in the Safety Plan and 2007 Update, and any revised completion dates
- Include a commentary on any change or event in the particular field
- Include and define any new actions to be addressed over the next five years as identified through our continued analysis of safety issues

The tables give a summary of progress on actions. In order to provide a focused document, detailed updates are given for those actions with deliverable target dates due during the financial year 2007/08, and for new actions. Additional updates are also provided for on-going actions where there is something significant to report.

Any items not included in this update were considered to be on track at the time of publication, with no significant update required. See Appendix 3.

The structure of the Update has been designed to be consistent with the formats of the previous 2006/07-2010/11 Safety Plan and 2007 Safety Plan Update, so that the three documents may be easily reconciled.

A web-based version of the Safety Plan and this update can be found at www.caa.co.uk/safetyplan, or at www.caa.co.uk by using the navigation on the left hand bar.

Aviation Safety Statistics

UK aviation continues to show an excellent level of safety, and this is continuously monitored through data at all levels.

UK Large Public Transport Aeroplanes

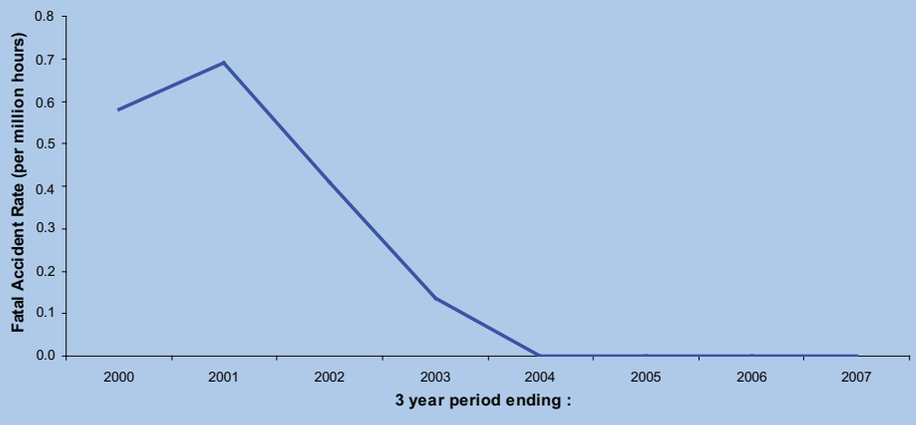


Figure 1: Fatal Accident Rate for UK Large Public Transport Aeroplanes

UK large public transport aeroplanes may be defined as UK-registered or operated aeroplanes with a maximum total weight authorised (MTWA) greater than 5,700 kg, flying public transport operations.

Figure 1 shows the impressive safety record of UK large public transport aeroplane operations. A fatal accident rate of zero has been maintained since 2004, despite growth in this sector.

In 2007, provisional figures show that UK large public transport aircraft carried over 128 million passengers, a 3% increase compared with 2006, and 48% growth over the last

decade. These operations resulted in 1.2 million flights and nearly 3 million flying hours. In total, these aircraft flew over 1.9 billion kilometres, a 7% increase compared to 2006 and a growth of 54% over the last decade.

There were seven accidents involving UK large public transport aeroplanes in 2007. Comparing 2007 with previous years, the number of accidents involving these aircraft has consistently decreased: from 17 in 2004, to 10 in 2005, 9 in 2006 and 7 in 2007. On average in 2007, these aircraft were involved in an accident once every 175,000 flights or every 425,000 flying hours. This is a significant improvement; over the last decade UK large public transport aeroplanes have averaged an accident every 84,000 flights or every 193,000 hours.

None of the seven accidents were fatal and none involved any injuries to passengers or to crew on board the aircraft. However, in one accident an aircraft loading vehicle struck an aircraft, seriously injuring the driver.

The last fatal accident involving this category of aircraft was in 2001, where a Shorts SD360, on a cargo flight, suffered a double engine flameout shortly after take-off from Edinburgh and crashed into the Firth of Forth, killing the two people on board. When considering passenger flights involving UK large public transport aeroplanes, the last fatal accident occurred in 1999, where a Boeing 757 crashed on landing at Gerona, Spain and one person suffered injuries that subsequently proved fatal. Using data from the last ten years, fatal accidents have occurred, on average, every 2.2 million flights or every 5.1 million flying hours.

UK Small Public Transport Aeroplanes

UK small public transport aeroplanes may be defined as UK-registered or operated aeroplanes with a MTWA below 5,700 kg, flying public transport operations.

In 2007, provisional figures show that UK small public transport aeroplanes operated nearly 64,000 flights and 45,000 flying hours. Compared with 2006, this is a 2% decrease in the number of flights, but a 6% increase in the number of flying hours. The number of flights and flying hours performed by this category of public transport has fluctuated around this relatively low level of utilisation over the last decade.

UK small public transport aeroplanes were involved in three reportable accidents in 2007. On average, this is one accident every 21,000 flights or 15,000 hours. There were no fatal accidents in this category in 2007. Over the last decade, there has been, on average, one accident every 34,000 flights or 22,000 hours.

The last fatal accident involving this category of aircraft was in 2000, when a Piper PA31 crashed into the river Mersey during an ambulance flight, resulting in five fatalities.

In 2005, an Islander crashed while on approach to Campbeltown. This accident was previously believed to be a public transport operation, however it has since been re-classified as a positioning flight. Although no less significant in terms of the severity of the accident, it no longer falls into the category of UK small public transport aeroplanes.

UK Large Public Transport Helicopters

UK large public transport helicopters are those, which are UK-registered or operated, with a MTWA greater than 2730 kg, flying public transport operations.

Provisional figures show that in 2007, UK large public transport helicopters flew a total of 244,000 flights and 129,000 hours, an increase of 5% and 13% respectively compared with 2006. Over the last decade, the annual number of flights has increased by 37% while flying hours have increased by 47%.

There were no accidents to this category of aircraft in 2007, compared with 5 in 2006. The last fatal accident in this category was in December 2006, when a SA365 Dauphin crashed into the sea in Morecambe Bay, fatally injuring all seven people on board.

On average, over the last decade, UK large public transport helicopters have been involved in an accident every 120,000 flights or 57,000 flying hours. Over the same time period, this category of aircraft has been involved in one fatal accident every 1 million flights or 485,000 flying hours.

General Aviation

UK general aviation is defined as UK-registered aircraft with a MTWA below 5,700 kg, and not flying on public transport operations. The category consists of aeroplanes, helicopters, microlights, gliders, gyroplanes and balloons.

General aviation aircraft flew an estimated 1.4 million hours in 2007, with 62% of these hours estimated to have been flown by aeroplanes and 18% by helicopters. The number of aeroplanes and helicopters registered in the UK has grown by 19% over the last decade.

In 2007, there were a total of 146 general aviation accidents involving aeroplanes and helicopters. This is less than in 2006, when aeroplanes and helicopters were involved in 176 accidents, however it is comparable to the 10-year average of 169 accidents per year.

Of the 146 accidents, there were 11 fatal accidents involving aeroplanes and three fatal accidents involving helicopters.

There were also 55 microlight accidents, of which four were fatal. The BGA has reported that in the 12-months between September 2006 and October 2007, there were 47 glider accidents, of which four were fatal. There were no fatal accidents involving gyroplanes or balloons.

Looking at all types of general aviation, there were 24 fatal accidents (with 44 fatalities) to UK registered aircraft and a further three fatal accidents (with four fatalities) that occurred in the UK to foreign registered aircraft, resulting in a total of 27 fatal accidents and 48 fatalities. This includes two paraglider and two paramotor fatal accidents. The number of fatal accidents and the average number of fatalities per accident in 2007 was higher than in previous years.

Further Information

Detailed information on aviation safety statistics is available in CAP 763 Aviation Safety Review 2005, which examines UK civil aviation safety over the ten-year period 1995 - 2004. It follows on from CAP 735 (1992 - 2001) and previous publications (CAPs 673 and 701); bringing together aviation safety related information into a single source document to be used by the aviation community for statistical reference. The next update is scheduled for late 2008.

CAP 763 can found on the CAA website at www.caa.co.uk/cap763.

Working with the European Aviation Safety Agency (EASA)

The Civil Aviation Authority (CAA) remains firmly committed to supporting the European Aviation Safety Agency (EASA). The Agency has continued to develop during this period. EASA, in partnership with National Aviation Authorities (NAAs) and with the support of all its stakeholders continues to tackle significant challenges.

Participation in Safety Strategy

EASA is working with NAAs and industry to develop further its European Strategic Safety Initiative (ESSI). The CAA is committed to providing resources and expertise to EASA to help this important safety initiative succeed. To this end, the CAA is participating in the three pillars of ESSI, the European Helicopter Safety Team (EHEST), the European Commercial Aviation Safety Team (ECAST), and the European General Aviation Safety Team (EGAST).

The ECAST have selected SMS and ground handling as their items for initial action. The EHEST is coordinating its efforts with the International Helicopter Safety Team (IHST), and forms the European arm of that initiative.

As part of its contribution to the EHEST, the CAA is leading a joint UK industry team that is reviewing all UK Air Accidents Investigation Branch (AAIB) investigated helicopter accidents, and classifying them according to the EHEST taxonomy. The output from the UK accident review group will be consolidated with the results from other European groups. This, in turn, will be used to determine the actions and initiatives that will be employed to achieve the EHEST safety target of an 80% reduction in helicopter accidents by 2016.

The CAA's Air Traffic Standards Division is preparing for the extension of the EASA remit to the regulation of Air Traffic Management and Air Navigation Services (ATM / ANS). The Division has actively contributed to the CAA response to an associated EASA Notice of Proposed Amendment (NPA) in early 2008, and will remain fully engaged in the process of regulatory change within Europe.

The CAA will continue to provide support and encourage the development of EASA. Further details may be found in the CAA's Annual Review and Corporate Plan on the CAA's website at www.caa.co.uk.

Participation in New Actions

The CAA is pleased to work in co-operation with EASA in progressing new safety actions, for example, in providing assistance in initiation of research activities and collating previous CAA research for publication.

Large Public Transport Helicopter Emergency Flotation

A presentation of all the research on ditching and water impact, outlined in CAA Paper 2005/06 'Summary Report on Helicopter Ditching and Crashworthiness Research,' was given to EASA in July 2006. EASA subsequently committed to progressing the final work item of the helicopter type-specific design study for the side-floating scheme. EASA let the contract for the work to Eurocopter and Aer Azur in September 2007. This research is scheduled to be completed by the end of December 2008.

Human Centred Design

EASA intends to circulate an Advance NPA on the subject of Human Centred Design. This describes a requirement to make aircraft design less vulnerable to safety risks that could arise from human error during production and maintenance activities. In support of this activity, the CAA will publish a document that summarises the principles of achieving this goal and appends some worked case studies from CAA research with major manufacturers, as this may assist the regulatory teams in producing a mature means of compliance.

The CAA Safety Risk Management Process

The CAA Risk Management process has continued to be developed and updated, and is illustrated in Figure 2 in the form of a strategic analysis pyramid.

At the highest level, the main risks to large public transport aeroplanes are first identified through analysis of fatal accidents worldwide. This shows that loss of control, fire, Controlled Flight Into Terrain (CFIT) and runway excursions are the most common consequences in fatal accidents, and that various aspects of pilot performance continue to be the leading causal factors. A ten year update to the analysis of fatal accidents to large aeroplanes worldwide will be published this year as CAP 776.

At the next level, high risk events specific to the UK are analysed in more detail through a new group, The High Risk Events Analysis Team (THREAT). This includes other reportable accidents and other 'high risk' incidents that may not have resulted in an accident but represent an undesirable level of risk. This helps explore the UK situation in terms of the global risk areas from the first level, and identify any additional risks that are relevant to the UK. For example, on a worldwide basis, mid-air collision is only 2% of fatal accidents, but in the complex, crowded airspace of the UK, a significant proportion of serious occurrences involve the risk of mid-air collision. This level of analysis also adds ground events and technical failure to the list of important risk areas. These main risk areas, derived from fatal accidents worldwide and high risk events in the UK, receive further attention in two ways, and this is shown in the base level of the pyramid.

First, they are the subjects selected for top down analysis by 'fishbone' groups. 'Fishbone' refers to the structured analysis method that these groups use to search for any safety weaknesses that could contribute to the specified risk. The 'fishbone' groups identify where improvement is needed and propose many of the actions that form the content of the Safety Plan. Second, although these main risks rarely result in fatal accidents in the UK, it is useful to assess how close the UK fleet comes to such events. For this purpose, there is a project to identify lower level events or 'pre-cursors' in the data that show an aircraft has been one step closer to the risk than safety standards demand. For example, whilst there has not been a mid-air collision in the UK in over fifty years involving a public transport aircraft, there have been significant loss of separation events, level busts, and infringements of controlled airspace, which are potential pre-cursors to mid-air collision. By developing better pre-cursor measures, we hope to improve awareness of where risks exist and where effort to improve is necessary. Figure 2 shows this as protrusions into the base level of data, the database of Mandatory Occurrence Reports (MORs), and other lower level data. However, it is not trivial to find the right measures or the right data for every risk area. The activity to develop pre-cursor measures is listed as an action below and is likely to involve MORs, Flight Data Monitoring (FDM) and research to sample short periods of time in high levels of detail.

Some new risk management actions have been added during the period. Airworthiness and technical failure appeared quite frequently in the high risk and reportable events data. This has prompted some new actions to explore risk in the area of aircraft maintenance. This is not well suited to the cross-disciplinary 'fishbone' process, and whilst design standards are now the province of EASA, the UK remains responsible for the oversight of aircraft maintenance. Therefore three activities are identified to increase understanding of current and future risks connected with aircraft maintenance error: detailed safety data analysis, research into the reliability of maintenance inspection of composite aeroplane structures, and modelling of safety risk in the maintenance environment.

Much of the data mentioned above will be made available by publication of the Aviation Safety Review, and the ten year update on fatal accidents (CAP 776) listed as actions 1.6 and 1.5 respectively.

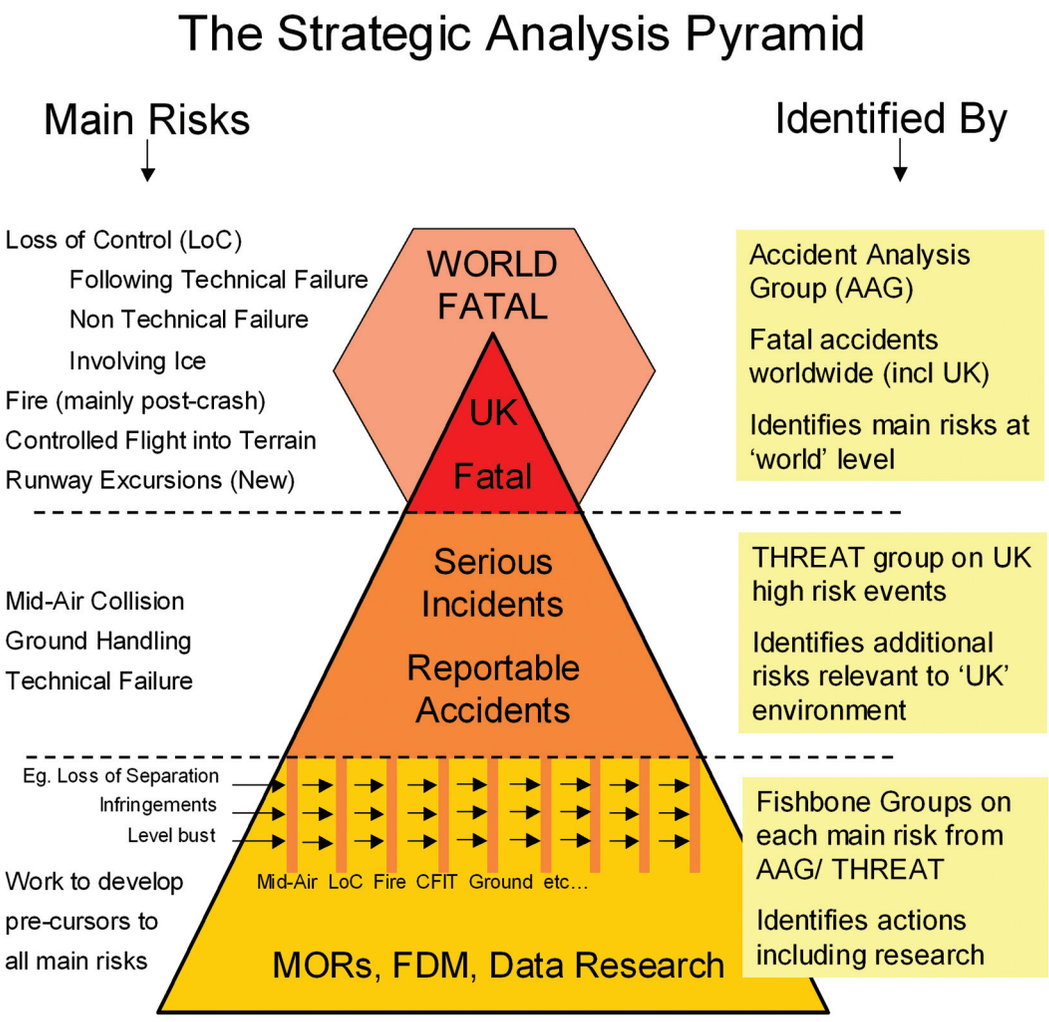


Figure 2: Diagram illustrating the CAA's safety risk management process

Future Risks

There are limitations to an entirely data driven approach to risk. Where new technology or operating practices are anticipated, there will be no data to highlight them, but it is clear that the potential for risks should be assessed: greater use of composite structures with the potential for requiring different inspection characteristics (action 1.9), Global Navigation Satellite System (GNSS) (actions 2.31, 2.32 and 2.34), Unmanned Aerial Systems (UASs) (action 3.8) and Very Light Jets (action 3.9) are among the changes that have given rise to safety activities. Trends in the market are also of interest and have led to continued interest in areas of strong growth such as business jets (actions 7.14, 7.15 and 7.16).

Another source of prognosis on future hazards is the Future Aviation Safety Team (FAST) that originated under the JAA and continues to contribute to ESSI. This team used a systematic method amongst aviation experts to identify future safety risks. The top four areas of change that FAST raised as safety issues are:

1. Increasing crew reliance on flight deck automation
2. Emergence of new concepts for airspace management
3. Introduction of new technologies with unforeseen human factors aspects
4. Proliferation of heterogeneous aircraft with widely varying equipment and capabilities

These priorities will be considered during CAA safety planning work, and the highest priority of flight crew reliance on flight deck automation is addressed by CAA research on the training for automation and manual flying skills, see actions 2.1 to 2.5.

Progress on Actions

Issue		Actions	Status	Dates
Monitoring Industry Performance	1.5	Complete a ten year update on the analysis of fatal accidents to large public transport aeroplanes worldwide *See update*	New action	July 08
	1.6	Update the Aviation Safety Review to disseminate current safety data to the UK industry *See update*	New action	Nov 08
	1.4	Conduct analysis of high risk events to UK registered aircraft *See update*	Completed early	Jun 07
	1.1	Explore ways to improve data collection and processing in order to monitor the 'safety health' of UK civil aviation and feed the information back to the industry *See update*	Completed	Jul 07
	1.2	Develop and progress pre-cursor measures to improve data collection and processing, for the monitoring of the 'safety health' of UK civil aviation *See update*	New action	Ongoing
	1.3	Investigate the use of aggregate FDM data as indicators of the overall safety performance of the UK aviation industry *See update*	On track	Apr 09
Technical Failure	1.7	Assess the potential for safety risks from aircraft maintenance error and identify any necessary actions *See update*	New action completed	Dec 07
	1.8	Sponsor a PhD study on modelling risk in aircraft maintenance *See update*	New action	Dec 10
	1.9	Sponsor a PhD study on reliability of inspections of composite structures *See update*	New action	Dec 09

Monitoring Industry Performance

Complete a ten year update on the analysis of fatal accidents to large public transport aeroplanes worldwide

The CAA Accident Analysis Group (AAG) conducts an annual analysis of fatal accidents to large public transport aeroplanes worldwide. The data is drawn from Ascend reports plus any additional information available that can be sourced from accident investigations and the aviation press. During the analysis, each accident is assigned a primary causal factor, other causal factors, circumstantial factors and consequences (e.g. CFIT) and a confidence rating, reflecting the extent of information available. The ten year update will be published as CAP 776, covering a decade of fatal accidents up to 31st December 2006. CAP 776 covers worldwide fatal accidents to jet and turbo-prop aeroplanes with a maximum take-off weight above 5,700 kg, engaged in passenger, cargo or ferry/positioning flights and with at least one fatality to an aircraft occupant.

Update the Aviation Safety Review to disseminate current safety data to the UK industry

An update to CAP 763, the Aviation Safety Review 2005, will be published in November 2008. This contains some worldwide and European data, plus more detailed data on UK events.

Conduct analysis of high risk events to UK registered aircraft

THREAT was established in May 2007 to review reportable accidents, serious incidents and other high risk MORs involving UK registered or operated public transport aeroplanes. The initial analysis focused on one year, 2005, which yielded a number of useful generic observations on potential ongoing safety risks. These observations have been fed into the CAA safety planning process. Endorsement was given for THREAT to continue with incremental annual analysis.

Explore ways to improve data collection and processing in order to monitor the 'safety health' of UK civil aviation and feed the information back to the industry

An initial review of current data sources was conducted and a preliminary internal paper circulated and discussed through the Safety Regulation Group (SRG) Safety Risks Team. The decision was made to undertake a project that would develop 'pre-cursor' measures for each main risk area, recognising that whilst this was relatively straight forward in some areas it would require some problem solving work in others. See action below.

Develop and progress pre-cursor measures to improve data collection and processing, for the monitoring of the 'safety health' of UK civil aviation

The MORS database was initially constructed to monitor technical failures on aircraft and is very successful at doing that. Today, risks are often more related to flight crew or complex multi-factor issues, and so the data that is required to monitor risks has changed. As described earlier, the main safety risk areas are identified through the AAG and THREAT. The UK rarely encounters any of these catastrophic loss events, so accident numbers cannot be the only source of data to assess risk. In order to improve risk monitoring data, events should be identified that represent possible pre-cursors to these major risk headings, and could provide an indication of the safety health for UK operations in assuring safety from these major risk categories. For example, since there have been no CFIT accidents to UK large public transport aeroplanes in recent years, it is difficult to assess the extent to which the UK is safe from the risk of CFIT. Pre-cursors could include measures such as excursions below minimum safe altitude, hard Terrain Awareness and Warning System (TAWS) warnings, navigation database errors and so on. None of these has thus far ended in a CFIT, but the extent to which they are present in UK operations should be of interest for the purpose of monitoring safety health. The list of pre-cursors will be continuously developed, although it is much easier to identify potential pre-cursors in some areas than others, and some indicators (e.g. loading errors) are more easily accessible from the current MORS database, others (e.g. TAWS warnings) are theoretically available from MORS but with low reporting rates. Some data of interest is not yet available and would require research. Work to develop these measures continues.

Investigate the use of aggregate FDM data as indicators of the overall safety performance of the UK aviation industry

Work is ongoing with UK operators and FDM suppliers to outline the scope for a practical FDM overview of UK operations that will provide useful information for both the Industry and regulator. Associated with this initiative is a Flight Operations Division Special Objective Check (SOC) on UK Operators' FDM programmes. This is expected to raise the profile of both the fundamental

strengths of a good FDM programme within an Accident Prevention & Flight Safety Programme, or SMS, and also the wider benefits of aggregated FDM data. As part of the SOC's pre-audit questionnaire, operators will be requested to produce a summary of key results from their FDM programme over the preceding year. This will then be used to produce a de-identified overview prototype for further review and development.

Technical Failure

Assess the potential for safety risks from aircraft maintenance error and identify any necessary actions

Pilot performance is well documented in the safety planning process, and the possibility of specific maintenance errors is included in the analysis of risk under the main safety headings. However, the general issues associated with maintenance error had not been investigated statistically. Analysis of a ten year sample of maintenance related MORs for large jet aeroplanes has been published as CAA Paper 2007/04 'Aircraft Maintenance Incident Analysis.' The study comprised a literature review, the development of a maintenance incident taxonomy and the analysis of 3,535 maintenance related MORs. The study showed a decrease in the proportion of MORs caused by maintenance error during the period. This could be associated with the introduction of human factors training, which seems, in particular, to have affected the most common error type (incorrect maintenance action). The most frequent ATA Chapters affected by human error are Flight Controls, Powerplant, Landing Gear and Equipment & Furnishings. The recommendations emerging from the MOR analysis are now under consideration.

Sponsor a PhD study on modelling risk in aircraft maintenance

The analysis that resulted in CAA Paper 2007/04 'Aircraft Maintenance Incident Analysis' suggested that the development of a maintenance incident taxonomy could be used to provide a process for modelling risk in aircraft maintenance. The CAA has co-sponsored (with the Engineering and Physical Sciences Research Council) a PhD study at Cranfield University relating to this risk modelling.

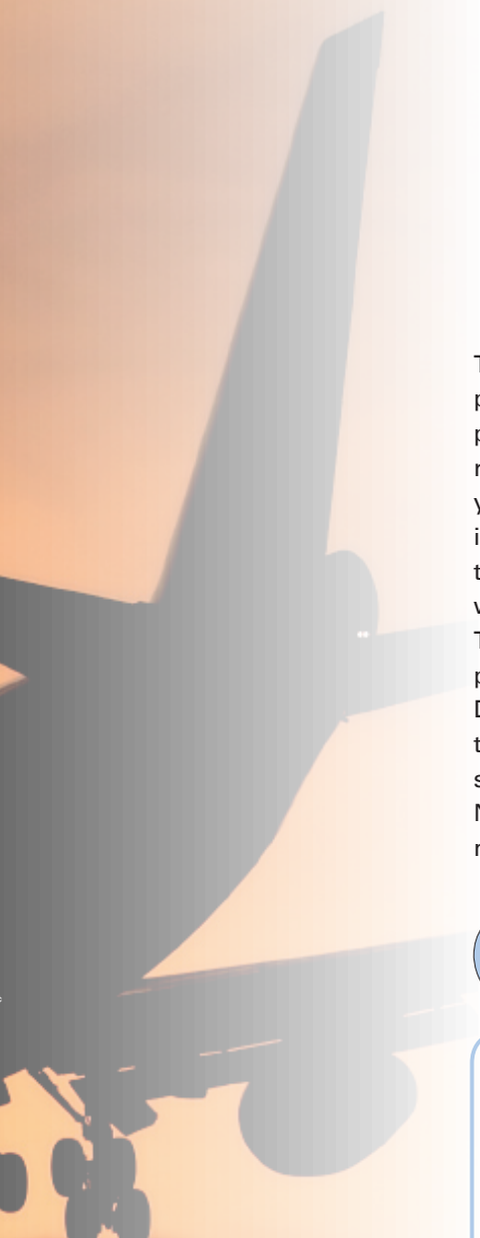
The project will investigate methodologies for assessing risk to the safety of air transport attributed to errors in continuing airworthiness and the accomplishment of aircraft maintenance. This study stems from foreseen air transport industry requirements for introducing and focusing more on risk assessment, which arises from two sources:

1. The International Civil Aviation Organisation (ICAO) has introduced a mandatory requirement on contracting States to have a SSP, and to require organisations approved by them to have a SMS. This initiative focuses upon control of risks and risk assessment processes.
2. Regulatory risk-based oversight, as recommended in the Hampton Report, which is part of the HM Treasury initiative into Better Regulation.

The primary objective of the study is to design a generic model for risk assessment and this will be a new application of existing methodologies and decision analysis tools in continuing airworthiness processes. The model will be validated in a continuing airworthiness environment.

Sponsor a PhD study on reliability of inspections of composite structures

A CAA sponsored PhD at Cranfield University is investigating the reliability of visual techniques in detecting damage to composite aircraft structures. The use of composite structural materials is increasing. Boeing's newest aircraft design, the 787, will be the first large public transport aeroplane with a pressurised all-composite fuselage. However, when a composite structure suffers impact damage, the surface evidence can be very small compared to the underlying damage that is not visible. This is different from metallic structures where the evidence of damage would be much larger and more visible. This study has been sponsored in order to monitor the foreseeable potential for safety risks to arise from this important new technology, which cannot be assessed using occurrence data, because the technology has not yet been fully implemented. The research aims to evaluate the likely reliability of maintenance inspections in detecting damage.



Large Public Transport Aeroplanes

Supporting Pilot Performance

The importance of pilot performance in aviation safety keeps this subject high in CAA planning priorities. The CAA has launched an Airspace & Safety Initiative (ASI), which will provide education material to pilots; this is described more fully under the 'Mid-Air Collision' risk. New data on worldwide fatal accidents has been produced and shows that in the ten years ending 31st December 2006, 219 fatal accidents involved flight crew performance issues, with 82 involving flight handling as a causal factor (and in 39 cases, it was judged to be the primary cause). Eight fatal accidents during this period involved pilot interaction with automation issues. In 2006, 13 fatal accidents involved flight crew performance issues. This should not be taken to mean that the flight crew were 'to blame'. Some flight crew performance issues can arise due to lack of support or high demands placed upon the crew. During 2007, CAA research has produced a 'world first' in establishing a validated method to measure objectively manual flying skills among professional aircrew; a fully endorsed syllabus for a trial of an improved training method; international uptake of the Required Navigation Performance (RNP) terminology database; a completed pilot fatigue model; and a new colour vision test that will allow more pilots to fly.

Progress on Actions

Issue		Actions	Status	Dates
Improved Pilot Training	2.1	Conduct research trial on improved training for highly automated aircraft *See update*	Revised completion date	Mar 09
	2.2	The CAA will publish the core 'highly automated aircraft' training syllabus as a CAA Paper *See update*	Revised completion date	Mar 09
	2.3	The CAA will investigate the possibility of expanding the highly automated aircraft trial to a second aircraft type or operator *See update*	On track	Mar 09
	2.4	Conduct research into loss of manual flying skills *See update*	Revised completion date	Jun 08
	2.5	The CAA will investigate the possibility of transferring the manual flying skills assessment techniques from the simulator to line flying *See update*	On track	Mar 09

Progress on Actions - continued

Issue		Actions	Status	Dates
Pilot Physical Capabilities	2.8	Monitor incorporation of the fatigue model 'SAFE' into operational use *See update*	Completed	Jul 07
	2.9	Explore means to make the SAFE model available to industry *See update*	Completed	Sep 07
	2.10	Complete a medical study into the most appropriate requirement for medical fitness to fly, to ensure that the aeromedical standards reflect the modern cockpit environment *See update*	On track	Sep 08
	2.11	Complete the research on Long Term Exposure to the flying environment *See update*	Revised completion date	Mar 10
	2.12	The CAA will publish a paper detailing the full analysis *See update*	Revised completion date	Oct 10
	2.13	Develop objective computerised colour vision tests based on current operational demands *See update*	Completed	May 07
	2.14	The CAA will publish a paper detailing the methodology, results and conclusions *See update*	Revised completion date	May 08
Terms and Definitions Supporting RNAV/RNP Operations	2.16	The CAA will produce a functional upgrade in the light of comments and continue to encourage wider participation in the database tool *See update*	On track	Dec 08
	2.17	The CAA will consider moving this now established tool into the control of the industry *See update*	New action	Dec 08

Improved Pilot Training

Conduct research trial on improved training for highly automated aircraft

A fully approved Type Rating syllabus, incorporating the new training principles, has been produced. The course has been implemented on a limited number of crews with a major UK operator, and closely monitored. Initial experience will be reviewed and any necessary revisions included in the course.

The CAA will publish the core 'highly automated aircraft' training syllabus as a CAA Paper

A revised syllabus was produced but not published due to significant changes required to facilitate practical implementation. To replace this detailed syllabus, a report embodying the principles involved will be published in 2009.

The CAA will investigate the possibility of expanding the highly automated aircraft trial to a second aircraft type or operator

The CAA and Flight Operations Research Centre of Excellence (FORCE) have been approached by other operators who would like to be involved in the assessment of the revised syllabus and discussions are ongoing.

Conduct research into loss of manual flying skills

A fully validated method to evaluate the manual flying skills of pilots has been produced, and is being used to assess pilots' manual handling skills with a major UK operator. The aim of the study is to discover whether there is a loss of manual flying skills among crews of highly automated aircraft. After delays while the training facility and student groups were brought together, the simulator based measurement and assessment of manual flying skills has been completed. The initial data batch has been reviewed and the analysis methodology refined prior to compilation of the final results.

The CAA will investigate the possibility of transferring the manual flying skills assessment techniques from the simulator to line flying

Both the CAA and FORCE have been approached by a second UK operator interested in participating in this study. The operators are interested both in assessing the manual flying skills of their crews through simulator assessment and examining the potential for transferring the methodology to line flying utilising the medium of FDM. This work will be initiated when the original study's results have been evaluated (see update for above action: Conduct research into loss of manual flying skills).

Pilot Physical Capabilities

Monitor incorporation of the fatigue model 'SAFE' into operational use

See update below.

Explore means to make the SAFE model available to industry

CAA research has developed the System for Aircrew Fatigue Evaluation (SAFE) software model to support the CAA when assessing whether variations to operator's Flight Time Limitations (FTL) schemes can be safely permitted. The SAFE software has been further validated using operator data, an improved cumulative fatigue function and information from the updated CAA Paper 2005/04 'Aircrew Fatigue: A Review of Research Undertaken on Behalf of the UK Civil Aviation Authority.' The CAA considers that the SAFE model is now sufficiently robust to be used in the risk assessment process for fatigue management and is working with EASA to determine the role of fatigue management within the European regulatory framework. Version 5 of the software model, now considered to be mature, has been delivered to the CAA for use, and the summary report 2005/04 has been updated to include the most recent information. The SAFE model is now used an average of 2-3 times per month in order to assess variations to rosters that have been proposed by industry.

In terms of making the SAFE model available to industry, work is in progress for it to be made available to rostering companies and possibly also individual operators on a commercial basis. Initial discussions have been successful and there is now a trial underway to test the feasibility of integrating the SAFE software into the existing software of a commercial rostering package.

There have also been discussions with EASA and Qinetiq to determine what role the SAFE model could play in supporting the scientific evaluation of proposed regulatory material. However, the SAFE model requires proposed roster patterns as a basis for analysis. As a result it would be the operators who would have to use the model to analyse their individual roster patterns. Those not utilising the commercial packages that adopt SAFE within their planning system would need a 'stand-alone' software package.

Complete a medical study into the most appropriate requirement for medical fitness to fly, to ensure that the aeromedical standards reflect the modern cockpit environment

A report on the results of the pilot study will be published in September 2008. The results will be limited due to the low engagement from industry and resource constraints. However, it is likely to indicate the value of undertaking larger-scale studies to provide a more conclusive up-to-date evidence base for proposals to reduce the regulatory burden of medical assessments.

Complete the research on long term exposure to the flying environment

This study took longer than expected due to issues involved in accessing medical records, the high volume of data, and the administrative tasks involved in retrieving the necessary medical files. The initial study is now complete, but having reviewed the preliminary findings, an extension to the work has been commissioned in order to conduct a case control study of melanoma.

The CAA will publish a paper detailing the full analysis [of data supporting research on long term exposure to the flying environment]

Due to the extension of this study content to include a case control study of melanoma (see previous action) the paper detailing the study results and analysis will not be published until all of the relevant research has been completed.

Develop objective computerised colour vision tests based on current operational demands

Colour vision testing has not previously been standardised. A completely new set of objective, computerised colour vision tests has been developed that are now being evaluated by the CAA Medical Department. These are accurate, repeatable tests, tailored to the colour discrimination demands of the flying task. The new tests will be recommended to ICAO for adoption as an international standard, and are likely to allow more pilots to fly than has previously been the case (an offshoot of this research into colour vision has discovered a method to reduce human error rates among normally sighted pilots when using Precision Approach Path Indicator (PAPI) lights).

The CAA will publish a paper detailing the methodology, results and conclusions [of the research that produced new colour vision tests]

Additional unforeseen work arose during the development of the colour vision tests. Therefore, in order to deliver a more complete outcome, the publication of the paper detailing the methodology, results and conclusions has been delayed.

Terms and Definitions Supporting RNAV / RNP Operations

The CAA will produce a functional upgrade in the light of comments and continue to encourage wider participation in the database tool

See update below.

The CAA will consider moving this now established tool into the control of industry

The RNP database upgrade is progressing and the database is now in use by major international rulemaking and technical groups. As the system matures, the CAA will consider the most appropriate location for the control and further development of this tool.

Loss of Control

Mitigating the risk of loss of control remains high on the CAA's safety agenda. Worldwide fatal accident data shows that this continues to be a leading concern, as it is the most frequent type of fatal accident to large public transport aeroplanes. During the ten year period up to 31st December 2006 there were 110 worldwide fatal accidents involving a loss of control in flight, resulting in over 4,000 fatalities. Of these, seven accidents occurred in 2006. However, loss of control is not a homogenous category because of the wide range of potential causes for this type of accident. During the CAA safety planning process, three general sources of risk have been considered: loss of control due to 'ice': loss of control following a 'technical failure'; and loss of control arising from 'non-technical' causes as sub-categories of the general 'loss of control' risk. The 110 fatal accidents involving a loss of control in flight can be broken down by eight due to ice, 47 following a 'technical failure' and 47 following 'non technical' causes (the remaining eight accidents had insufficient information to allow categorisation).

Progress on Actions

Issue		Actions	Status	Dates
Loading Error	2.18	Monitor MORs to assess effectiveness of ongoing actions *See update*	On track	Ongoing
Flight Handling	2.19	Investigate Training and SOPs related to upsets and go arounds *See update*	Completed early	Dec 07
Ice Accumulation In-Flight	2.20	Monitor MOR data to assess effectiveness of ongoing actions *See update*	Completed	Mar 08
Ground De-Icing Effectiveness	2.22	The CAA will join industry initiatives to review ground de-icing *See update*	Completed	Jun 07

Loading Error

Monitor MORs to assess effectiveness of ongoing actions

In the past decade, there have been 1,300 MORs involving loading error. Of these, 1.5% were given a MOR grading in one of the highest two categories. Provisional figures for 2007 show the current rate of loading error occurrence is in line with recent years, at ten loading errors per 100,000 flights. It can be seen in Figure 3 that the 3-year moving average rate of loading errors has remained stable over the past ten years. However, Figure 3 also shows that there was an increase in the rate of loading error reports in the late 1990s. This is believed to have been caused by an improved reporting rate due to the increased profile and industry awareness of loading errors in that period.

Irrespective of the stabilisation in the rate of reported loading errors, the potential remains for an error in aircraft loading to cause a serious safety incident. In light of this, the CAA remains committed to reducing the number of loading errors.

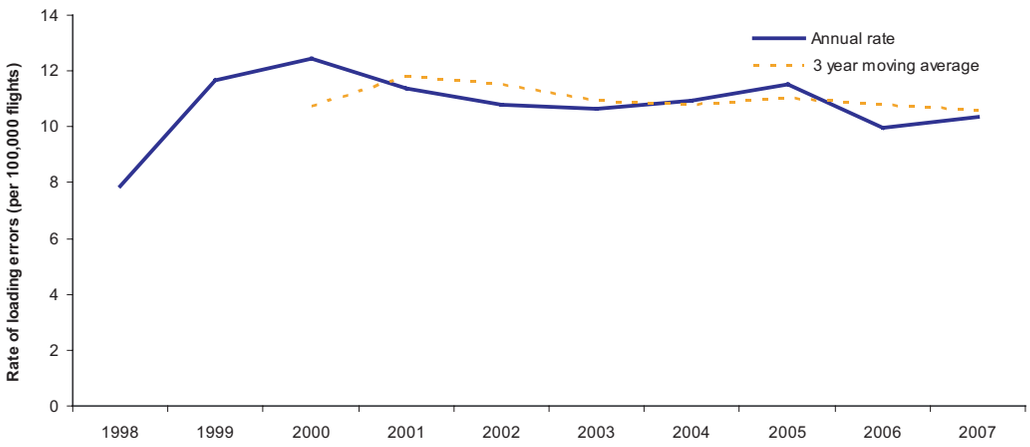


Figure 3: Loading Errors Reported as MORs 1998-2007

Flight Handling

Investigate Training and SOPs related to upsets and go arounds

Presently, upset recovery is not a mandated item for training pilots. In addition to which, the current simulators provide very little in the way of upset recovery training, because the technical standards to which they were designed and built did not cater for this exercise. Nevertheless, some manufacturers have recognised this need and are now developing standards, such that future simulators will have the capability to provide this important training.

As training in this area can be of value, an Aeronautical Information Circular (AIC) is to be produced advising training organisations that upset recovery training should be developed as part of their training package, whilst using existing devices. Furthermore, the CAA is, through the ICAO International Working Group on Simulator Standards, proposing to include the technical requirements that will permit upset recovery training in simulators. The output from this group is unlikely to influence simulator technical standards until 2009-2010.

At a recent seminar organised for the senior trainers/examiners within industry, there was a significant consensus that indicated that the present focus on training for a go around, with one engine inoperative, is inadequate. In light of this, an AIC was developed, for publication in March 2008. It will recommend that operators should conduct go arounds, with all engines operating, from positions other than at decision altitude, and include this exercise as part of their normal triennial training events.

Ice Accumulation In-Flight

Monitor MOR data to assess effectiveness of ongoing actions

UK large public transport aeroplanes were involved in a total of 202 in-flight icing events in the five year period 2003-2007. Of these, 43 (21%) occurred in 2007. The incident types range from suspected icing or problems using anti-icing equipment to severe airframe icing. Of these 202 occurrences, five were classified by the AAIB as Serious Incidents. One of these Serious Incidents occurred in 2007, when the engine of a Jetstream 41 ran down during descent, thought to be due to ice accretion. The most common aircraft type to report icing problems in the five year period was the BAe 146, whereas during 2007 it was the DHC-8, followed by the EMB 145. The MOR data has been passed to the relevant specialists for their consideration.

Ground De-Icing Effectiveness

The CAA will join industry initiatives to review ground de-icing

Aircraft with non-powered flight controls have been known to experience control restrictions caused by residues deriving from anti-icing fluid. On the BAe 146, DHC-8 and EMB 145; over the past five years, there have been 101 occurrences of control restrictions of this type, of which 70% have been confirmed to be caused by anti-icing fluid residue. The remaining 30% showed very similar symptoms however no anti-icing fluid residue was found. On the DHC-8, there is a chance that some of the control restrictions reported could have been caused by stiffened lubricant around the flight control surfaces.

At the time of printing, it is too early to report the number of control restrictions caused by anti-icing fluid residues for the winter season 2007/2008. However, there were no reported control restrictions caused by anti-icing fluid in 2007.

The CAA Ground Icing Working Group investigated the causes and mitigation methods associated with anti-icing fluid residues and joined a group from the Society of Automotive Engineers (SAE) looking specifically at the effects on flight controls. As a result of this involvement, the CAA sponsored a research project in 2006; to help define a test methodology for classifying fluid expansion. The CAA continues to attend the working group, however no further sponsorship of research has been required in 2007. At present, the group is in the process of agreeing the format in which test results might be published for anti-icing fluid residue expansion.

In addition, the CAA continues to work closely with industry on issues surrounding aircraft ground de-icing. The Ground Icing Working Group has been subdivided into two working areas. One is looking at the possibilities of regulation versus best practice, whilst the second is looking at training issues for flight crew, cabin crew & ground staff.

Controlled Flight Into Terrain

CFIT is the subject of divergent opinion amongst aviation safety experts. Many believe that this is no longer a threat because since the introduction of TAWS, and it has been almost exclusively non-TAWS equipped aircraft that have suffered CFIT accidents. The CAA has continued to remain vigilant, because whilst there have been no CFIT accidents to the UK large public transport fleet in recent years, there have been some incidents that have alerted the CAA to the potential for a CFIT risk. For example, when there is faulty ground-based navigation equipment, or a discrepancy between the aircraft's navigation database and the approach chart used by the pilots, or when positional awareness is lost during a non-precision approach in poor visibility with mountainous terrain. Worldwide fatal accident data shows that during the ten year period up to 31st December 2006 there were 71 fatal CFIT accidents, resulting in some 2,350 fatalities. Of these, three accidents occurred in 2006.

Progress on Actions

Issue		Actions	Status	Dates
Approach and Landing	2.28	Undertake a cost benefit analysis of SSR and/or other approach monitoring improvements *See update*	Completed	Dec 07
	2.29	Complete the design and assessment work for the Gatwick 'Approach and Vertical Guidance' (APV) BaroVNAV trial *See update*	Completed	Oct 07
	2.31	Publish results of Area Navigation (RNAV) Global Navigation Satellite System (GNSS) trial at six UK airports in a CAA Paper *See update*	Completed	Sep 07
	2.32	Complete the development of a GNSS approach validation tool and make available for use *See update*	Completed	Jan 08
	2.33	Prepare strategy for APV implementation based on the results of the trial *See update*	Completed	Jul 07
	2.34	Seek changes to the specification of the displayed information to reduce the potential CFIT risk during RNAV (GNSS) operations *See update*	New action	Mar 08
	2.35	Raise awareness of the meaning and correct use of the information displayed *See update*	New action	Jun 08

Approach and Landing

Undertake a cost benefit analysis of SSR and/or other approach monitoring improvements

The CAA has undertaken a feasibility study and initial cost benefit analysis into the provision of Secondary Surveillance Radar (SSR) and approach monitoring aids at significant UK airports. The results of the study showed that such a provision was likely to be technically unsustainable due to radio frequency congestion, and cost prohibitive, possibly running to over £100 million. As a result, no further effort will be spent on this study.

Complete the design and assessment work for the Gatwick 'Approach with Vertical Guidance' (APV) BaroVNAV trial

Following the successful completion of the APV Barometric Vertical Navigation (BaroVNAV) trial at Gatwick, the CAA has approved the use of 3-Dimensional BaroVNAV procedures subject to certain conditions. Such approach procedures will only be authorised to suitable instrument runways, at appropriately equipped licensed aerodromes with Air Traffic Control (ATC) services. The standard CAA process will be followed for the design and publication of each individual procedure and the sponsor of each procedure will be required to provide a safety case to the CAA. APV BaroVNAV procedures for London Gatwick Runways 08R and 26L and London Heathrow 27L are published in Aeronautical Information Package Supplement S34/2007.

Publish results of Area Navigation (RNAV) Global Navigation Satellite System (GNSS) trial at six UK airports in a CAA Paper

CAA Paper 2007/06 'RNAV (GNSS) Non-Precision Approach – Flight Trials Analysis Report' was published on the CAA website in September 2007, and has received favourable feedback. As part of the preparation for the introduction of RNAV (GNSS) approaches for general aviation in the UK, the CAA also published CAP 773 'Flying RNAV (GNSS) Non-Precision Approaches in Private and General Aviation Aircraft,' which details how to fly these approaches.

Complete the development of a GNSS approach validation tool and make available for use

Imperial College has delivered a software-based simulation capability to assess the effects of failures on the Global Positioning System (GPS) navigation system's capability to support non-precision approach operations. CAA International is exploring commercial development opportunities for this software.

Prepare strategy for 'Approach with Vertical Guidance' (APV) implementation based on the results of the trial

APV Barometric Vertical Navigation (BaroVNAV) approach procedures will only be authorised to suitable instrument runways at appropriately equipped and licensed aerodromes, with ATC services. The design and roll-out of APV BaroVNAV approach procedures will be in response to individual requests for such designs from sponsors.

Seek changes to the specification of the displayed information to reduce the potential CFIT risk during RNAV (GNSS) operations

See update below.

Raise awareness of the meaning and correct use of the information displayed

In approving the use of RNAV (GNSS) non-precision approaches, the CAA has recognised that a risk of CFIT may be created. It was noted during the flight trial that a number of General Aviation (GA) pilots, using certain navigational equipment, reported a loss of situational awareness during the final approach that could have led to a premature final descent.

On the specific equipment step down fixes can appear as waypoints, thus segmenting the distance from the final approach fix to the threshold or missed approach point. A pilot, unfamiliar with the correct use of the information displayed, could mistake the distance displayed as the distance to the runway and commence a descent at the wrong time, and in an area that is not free from obstacles.

The CAA has raised a Safety Plan item to mitigate the risk by raising awareness of the meaning and correct use of the information displayed and by seeking changes to the specification of the displayed information to reduce the potential CFIT risk during RNAV (GNSS) operations. With these mitigations, this additional safety risk is not thought to outweigh the safety benefits of the introduction of such approaches.

Aircraft Fire

Risks from fire falls into two categories, in-flight fire and post-crash fire. Post-crash fire can be the cause of fatality to occupants who had survived the initial impact, and features highly in global data for numbers of fatalities. Worldwide fatal accident data shows that during the ten year period up to 31st December 2006 there were 120 fatal accidents, resulting in over 4,500 fatalities that were followed by post-crash fire, although not all of these were survivable. In 2006 alone, there were 11 fatal accidents with a post-crash fire, and in at least four cases it was highly likely that some survivors of the initial impact were killed by the resulting fire.

Fire in-flight continues to have a marked presence in the data, and is clearly an extremely undesirable situation and the potential for catastrophic loss exists. Some data sources suggest that in-flight fire is the fourth leading cause of fatality in airline operations and that the probability of passengers experiencing an in-flight smoke event is greater than one in 10,000. Other sources report the short time periods that are available to resolve successfully a smoke or in-flight fire before it becomes unrecoverable. For a fire that becomes out of control, it is likely that no longer than 15 minutes remain before the resulting loss of control of the aircraft. The CAA has therefore invested in activities to raise confidence in the protection of public transport operations from the risk of fire.

Progress on Actions

Issue		Actions	Status	Dates
Cabin Crew Fire Training	2.39	FAA/CAA/TCCA requirement to produce updated training material reflecting latest research into in-flight fire fighting. Video/DVD/ Web. Filming funded by the FAA with UK script development *See update*	Completed early	Nov 07
Cabin Crew Evacuation Training	2.40	Production of training demonstration material *See update*	New action	Dec 09
Enhanced Ground Fire Fighting	2.43	Conduct studies of cabin fire fighting and post evacuation passenger management *See update*	Revised completion date	Jun 09
	2.44	The CAA will work with other National Aviation Authorities in the development of a new ICAO specification for advanced extinguishing agents *See update*	Revised completion date	Apr 09
Fire Data	2.47	Compilation of fire data research studies *See update*	New action	Sep 08

Cabin Crew Fire Training

FAA/CAA/TCCA requirement to produce updated training material reflecting latest research into in-flight fire fighting. Video/DVD/Web. Filming funded by the FAA with UK script development

The Federal Aviation Administration (FAA), Transport Canada Civil Aviation Directorate (TCCA) and the CAA jointly defined a need for new training material that could inform cabin crew of research findings related to cabin fire fighting. This took the form of a video that was produced slightly ahead of schedule and was shown at the International Fire and Cabin Safety Research Conference in Atlantic City, USA, in November 2007. (It can also be made available in DVD and web based formats). Some changes are likely before the FAA will provide the material on their website.

Cabin Crew Evacuation Training

Production of training demonstration material

The potential for the airEXODUS evacuation model (previously developed under CAA research funding for certification considerations) to support cabin crew evacuation training will be explored, and some demonstration training material produced for evaluation. This will then be considered for new applications such as evacuation training material to aid persons of reduced mobility in co-operation with other NAAs.

Enhanced Ground Fire Fighting

Conduct studies of cabin fire fighting and post evacuation passenger management

A research study of post-crash cabin fire fighting has been completed and a report produced. The work indicated the potential benefits and possibilities of new technology in this area. This will be used for policy development and further research is under consideration.

The research on post-crash passenger management has been delayed through the work being unable to be completed by the original research supplier. The concept is to extend passenger evacuation from beyond aircraft exits to a better defined point of safety than the immediate vicinity of an accident site. The research will consider rapidly deployable passenger evacuation crowd management/direction control aids. Additional work in the area of post-crash fire fighting for aircraft with composite fuselage construction is anticipated in conjunction with other NAAs, with timescales under discussion.

The CAA will work with other National Aviation Authorities in the development of a new ICAO specification for advanced extinguishing agents

The advanced fire fighting foam research has been significantly enhanced by collaboration and funding support from Transport Canada and potential support from other NAAs. A more complex programme is now anticipated with resultant timescale changes. Further work is under discussion regarding foam environmental and quality aspects.

Fire Data

Compilation of fire data research studies

Although many research studies have been conducted in the area of aircraft fires, readily assimilated information for non-specialists making policy decisions, where a high level awareness of fire issues would be beneficial, is not available. This small project will present published information in the popular Internet FAQ (Frequently Asked Questions) format. The data will mainly be derived from recent collaborative work with Transport Canada.

Airspace
Mid-Air Collision

Worldwide fatal accident data shows that during the ten year period up to 31st December 2006 there were five fatal mid-air collisions, resulting in 246 fatalities. There was one fatal mid-air collision in 2006. However, UK airspace is busy and complex, and the risk from mid-air collision is therefore a higher priority for the CAA than might be suggested by the worldwide statistics. In 2007, the Airspace & Safety Initiative (ASI) was launched jointly between the CAA, National Air Traffic Services (NATS), Airport Operators Association (AOA), GA and the Ministry of Defence (MoD) in an effort to investigate and tackle the major safety risks in UK airspace and addresses safety in relation to the needs of the full range of airspace users. The work of ASI can be seen at www.airspacesafety.com. Other work supporting the regulation of air traffic service providers is listed under the 'Supporting Approved Organisations' section.

Progress on Actions

Issue		Actions	Status	Dates
Public Transport Operations Outside Controlled Airspace	3.3	Launch an airspace safety initiative jointly with other major parties *See update*	New action completed	May 06
	3.1	Publish guidance appropriate for general aviation resulting from the Conspicuity Working Group and the Regulatory Impact Assessment on the wider carriage of transponders *See update*	Revised completion date	Jul 09

Public Transport Operations Outside Controlled Airspace

Launch an airspace safety initiative jointly with other major parties

The ASI emerged from a top-level discussion between the CAA Chairman, NATS Chief Executive and MoD Assistant Chief of the Air Staff following a number of incidents where light aircraft infringed controlled airspace, or military and commercial flights lost separation outside controlled airspace.

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
- Prioritising the hazards
- Developing a strategy to mitigate those risks while meeting the needs of all airspace users

There are working groups on air traffic services outside controlled airspace, infringements, airspace design and classification, equipment carriage, and off-route commercial operations.

In addition, any communication and education safety issues that are identified through ASI will be addressed by a separate working group.

Publish guidance appropriate for general aviation resulting from the Conspicuity Working Group and the Regulatory Impact Assessment on the wider carriage of transponders

The completion date for this action has been extended to July 2009 due to the ongoing public consultation associated with Phase 2 of the Mode S transition.

Level Busts

The UK Level Busts Working Group activity continues to address this high priority safety issue with a range of strategies. Enhanced awareness campaigns are seeking to refresh formal communication channels and distribution of guidance. The group continues to seek additional novel methods of communication to ensure that the message does not become jaded. Regular close liaison between key players in CAA, NATS, DfT and industry is a vital element in data sharing and strategy development to ensure targeted and well co-ordinated actions. The overall aim is to maintain a continued high level of awareness whilst seeking training, technological and operational solutions to address root causes as well as symptoms, reduce the likelihood of occurrence and subsequently mitigate risk if they do occur.

UK Operational Policy and Procedures for UASs

The name of this section has changed from previous Safety Plans and Safety Plan Updates, from UK Operational Policy and Procedures for Unmanned Aerial Vehicles (UAVs) to Unmanned Aerial Systems (UASs). This change in name from UAV to UAS has been adopted in reflection of these aircraft now being more commonly referred to as UASs by industry.

Progress on Actions

Issue		Actions	Status	Dates
UAS Policy	3.8	Revise and re-issue CAP 722 'UAV Operation in UK Airspace - Guidance' *See update*	On track	Apr 08

UAS Policy

A significant increase in both civil and military UAS flying is anticipated, much of which would require routine access to all classes of airspace if it is to be commercially viable and operationally effective.

EASA will be responsible for developing policy for the certification of UASs above 150kg (although not for state service UASs such as police and customs). EASA certification policy was the subject of an EASA consultation exercise launched in late 2007. However, many UASs in the UK may be below 150kg and the CAA is currently responsible for operational matters of all weights of UASs.

A dedicated CAA group has been established to coordinate UAS activity. The group is active in advising major initiatives and it is expected that this workload will grow substantially. There is also a separate group that includes UK industry. In 2006, the CAA commenced supporting a new EUROCAE initiative to develop common European standards, which will work with existing US groups.

Revise and re-issue CAP 722 'UAV Operation in UK Airspace – Guidance'

This work has now been given a completion date, and will be finished by the end of April 2008.

Very Light Jets

The CAA is evaluating the potential safety implications of the introduction of a new generation of Very Light Jet (VLJ) aircraft into the air transport environment. VLJs are aeroplanes with a maximum total weight authorised of 10,000 lb (4,545 kg). They are powered by turbo-jet engines, and are capable of being flown by a single pilot. The performance capabilities and specification of VLJs makes them complex aeroplanes that are capable of operating in all classes of airspace, meeting reduced vertical separation minima and at least Basic Area Navigation (B-RNAV) and probably Precision Area Navigation (P-RNAV) requirements.

Progress on Actions

Issue		Actions	Status	Dates
VLJ Integration into European Airspace	3.9	The CAA will participate in a Eurocontrol initiative, the VLJ Implementation Platform (VIP) *See update*	New action	Ongoing

VLJ Integration into European Airspace

The CAA will participate in a Eurocontrol initiative, the VLJ Implementation Platform (VIP)

VLJs are increasingly attractive to the European market because of their relatively low cost, and their ability to be based and operated at airfields close to the businesses or residences of potential owners, thus avoiding the increasingly time consuming check-in and boarding/disembarkation procedures at airports.

Most VLJs are configured for single pilot operation although they can be operated with two pilots. However, the cockpit workload in busy European airspace and marginal weather conditions may prove too much for a single pilot. In some cases VLJs cruise at lower Mach numbers than Commercial Air Transport (CAT) aircraft at similar levels, and thus put pressure on airspace. The lighter VLJs are not required to fit Airborne Collision Avoidance Systems (ACAS), and the introduction of an airspace requirement for carriage, to mitigate the risk of a level bust or other collision hazard involving a VLJ and a large CAT aircraft, might be problematical because of a lack of physical space in some VLJ cockpits. There are concerns that single pilot operation of VLJs in complex European airspace will present an unacceptable risk to the safety of CAT operations, unless restrictions are imposed. The workload might be acceptable for a fully trained and current pilot, in ideal conditions, but there is no mechanism to ensure that all VLJ pilots meet this requirement at present and in poor weather. Late clearance or frequency changes and any technical problem with the aircraft may increase cockpit workload beyond the ability of a single pilot. CAA staff are engaged with European colleagues to address these concerns. In particular, the CAA is participating in a Eurocontrol initiative known as the VLJ Implementation Platform (VIP).

Airports

Airports are the most familiar part of the aviation system for most members of the public, but they also serve a crucial role in supporting flight safety. Runway incursions are prominent in most assessments of safety risk and are often associated with specific airport design features. In addition, there are issues where the source of risks may not be the airport, but the mitigations may be largely in their hands, for example risks from runway excursions and overruns.

Progress on Actions

Issue		Actions	Status	Dates
Runway Incursions	4.2	Monitor ongoing actions and analyse the resultant change in runway incursion rates per movement for the period Apr 2006 to Mar 2007, based on the established rate per movement in Apr 2005 to Mar 2006, with a target reduction of 5% *See update*	Completed	Apr 07
	4.3	Monitor ongoing actions and analyse the resultant change in reported runway incursion rates *See update*	New action	Apr 09
Runway Excursions and Overruns	4.7	Conduct a new fishbone analysis to explore opportunities to improve safety from the risk of excursions and overruns *See update*	New action	Jun 08

Runway Incursions

On the 1st January 2007, the CAA definition of a runway incursion was extended to capture "Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft."

The new definition is more encompassing than the previous version and required an education campaign to promulgate the change to stakeholders. This raised the profile of runway incursions as a safety consideration and generated an increased level of occurrence reporting. A significant proportion of the increase in reporting is attributable to this consideration, but it is evident that the downward trend established in 2006 has not been sustained.

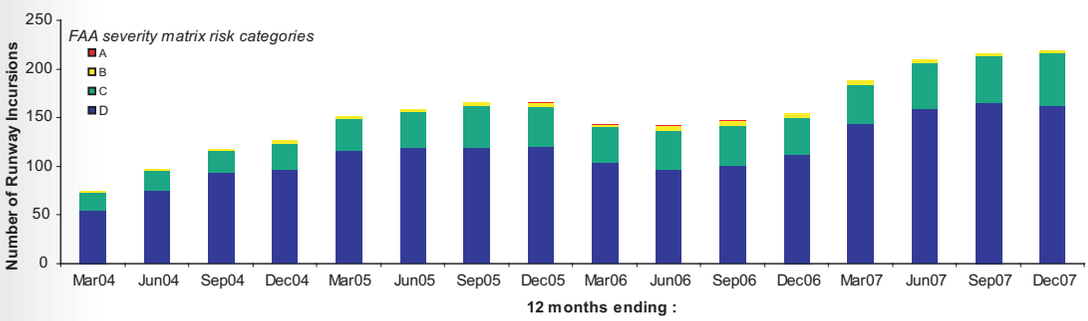


Figure 4: Yearly Moving Average Number of Reported Runway Incursions in the UK

The CAA has initiated a number of new remedial measures to raise safety awareness and resolve causal factors within the identified areas of aviation activity that feature regularly in runway incursion reports.

The Runway Incursions Steering Group activity continues, including an enhanced industry awareness campaign, and production of a radio phraseology and procedures guide for airfield drivers that aims to reduce communication errors. Within the CAA, the group is working on developments in cross-disciplinary co-operation and improved use of data to identify the most productive targets for action. Research has been conducted to evaluate a range of available technology interventions that may have the potential to help prevent runway incursions; that report is now under review.

Monitor ongoing actions and analyse the resultant change in runway incursion rates per movement for the period Apr 2006 to Mar 2007, based on the established rate per movement in Apr 2005 to Mar 2006, with a target reduction of 5%

See update below.

Monitor ongoing actions and analyse the resultant change in reported runway incursion rates

The downward trend noted in the Safety Plan Update 2007 has not been sustained. The wide promulgation of the extension of the CAA definition of a runway incursion, to ensure this was utilised, raised the profile of runway incursions as a safety consideration and generated an increased level of reporting. A number of new remedial actions have been initiated and a research study of commercially available technologies to reduce runway incursions to support future policy development has been completed.

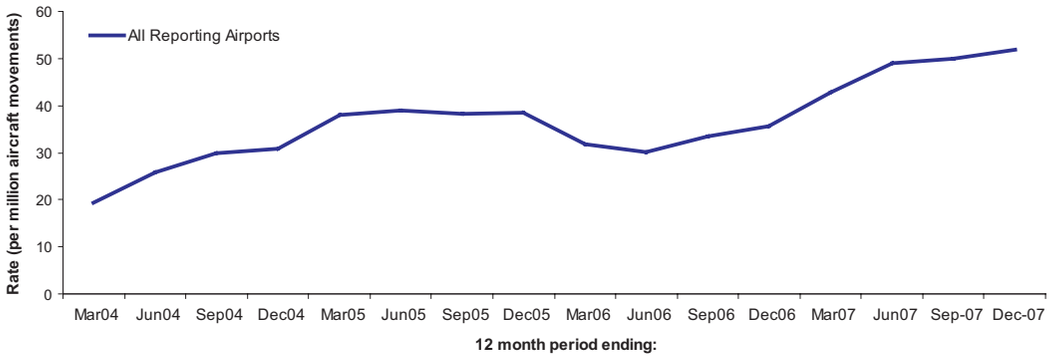


Figure 5: Rate of Runway Incursions at Reporting UK Airports (year ending by quarter)

Runway incursions are monitored at all UK licensed aerodromes. Not all aerodromes are required to report how many aircraft movements they have, therefore it is not possible to generate an incursion rate at non-reporting aerodromes, which account for approximately 15% of the total number. Figure 5 shows the runway incursion rate at reporting aerodromes and Figure 4 shows the number of runway incursions at all licensed aerodromes.

Runway Excursions and Overruns

Conduct a new fishbone analysis to explore opportunities to improve safety from the risk of excursions and overruns

Worldwide fatal accident data shows that during the ten year period up to 31st December 2006 there were 32 fatal accidents, resulting in 623 fatalities that involved aircraft running off the side or end of the runway, of which 17 occurred during landing and 15 during take-off. There is one UK aircraft in this list (Boeing 757 at Gerona, Spain in 1999). In 2006, there were four fatal accidents involving runway excursions. Although the AAG has yet to analyse worldwide fatal accidents from 2007, it is already known that there were at least three high profile runway excursions (Boeing 737 at Yogyakarta, Indonesia; Airbus A320 at Sao Paulo, Brazil; and McDonnell Douglas MD-82 at Phuket, Thailand which resulted in a total of 311 fatalities). In addition, during recent years there have been a number of significant hull loss occurrences, albeit not resulting in fatalities (for example, the Airbus A340 at Toronto, Canada, in 2005).

Large Public Transport Helicopters

The majority of large public transport helicopter operations in the UK are associated with the support of the offshore oil and gas industry. During the period 1976 to 2006, offshore helicopter operations accounted for a total of just under 3 million flight hours. Over this period there were 12 fatal accidents resulting in 105 fatalities, giving a fatal accident rate of 4 per million flight hours (as compared with 0.3 fatal accidents per million flight hours for UK operated large public transport aeroplanes over the same period). During this period, there have also been 17 non-fatal accidents, judged sufficiently serious to warrant a full investigation by the AAIB.

The current large public transport helicopter safety research programme is focused primarily on offshore operations, and is funded and monitored by the CAA-run Helicopter Safety Research Management Committee (HSRMC), comprising representatives from Oil & Gas UK, Shell Aircraft, British Helicopter Advisory Board, European Helicopter Association, Health & Safety Executive, MoD (Defence Science & Technology Laboratory), CAA Norway, Norwegian Oil Industry Association (OLF), and EASA.

Progress on Actions

Issue		Actions	Status	Dates
Helicopter Airworthiness	5.1	Publish the final report on the development and demonstration of enhanced Health & Usage Monitoring System (HUMS) Vibration Health Monitoring (VHM) data analysis *See update*	Revised completion date	Dec 08
	5.2	Completion of six month extension of in-service trials *See update*	On track	Jun 08
	5.3	Publish a review of the state of the art of the application of HUMS techniques to detect rotor system faults *See update*	Revised (earlier) completion date	Dec 08
	5.5	Complete the investigation of the use of advanced analysis techniques to exploit existing rotor system vibration data collected by current HUMS *See update*	New action	Dec 09
Operational Safety	5.11	Produce a specification for emergency breathing systems. Publish as a CAA Paper *See update*	On track	Sep 09

Issue		Actions	Status	Dates
	5.6	Publish the final report on the development of an artificial neural network based measure of helicopter low airspeed to extend helicopter operations monitoring to the low speed envelope *See update*	Revised completion date	Dec 09
	5.7	Publish the final report on the three phase safety assessment of the use of GPS for helicopter operations in the North Sea *See update*	Revised completion date	Sep 08
	5.8	Implement GPS-assisted weather radar approach procedure *See update*	New action	Dec 08
	5.9	Publish EGNOS data collection and analysis exercise *See update*	Revised completion date	Mar 09
Helideck Safety	5.12	Publish a report detailing the development and validation of a wind shear criterion for inclusion in CAP 437 *See update*	Revised completion date	Sep 08
	5.13	Publish the final report on the development and trials of the new helicopter moving deck landing criteria *See update*	Revised completion date	Sep 09
	5.14	Publish a report on the Stage 1 and Stage 2 helideck lighting systems trials during winter 2006/7 *See update*	Revised completion date	Jun 09
	5.15	Publish a review of existing CAP 437 helideck friction criterion *See update*	Revised completion date	Mar 09
	5.16	Develop a new criterion for aluminium helidecks *See update*	On hold	TBA
	5.17	Establish correct flashing light test procedure and update CAA Paper 2003/06 *See update*	Revised completion date	Dec 08

Helicopter Airworthiness

Publish the final report on the development and demonstration of enhanced Health & Usage Monitoring System (HUMS) Vibration Health Monitoring (VHM) data analysis

See update below.

Completion of six month extension of in-service trials

The initial six month in-service trial of the enhanced HUMS VHM data analysis was very successful, and the potential for further enhancements was identified. Work on these enhancements has been completed and will be evaluated during the second six month in-service trial, which started in January 2008. The final report on this research will be produced following completion of the trials, and will be published by December 2008, slightly later than originally anticipated. Discussions with the industry are underway on how best to facilitate the full-scale implementation of the output from this research.

Publish a review of the state of the art of the application of HUMS techniques to detect rotor system faults

The final report on the review of rotor system health monitoring has been completed and is to be published by December 2008. This is earlier than expected at the time of the 2007 Safety Plan Update due to the decision not to include any follow-on research in this report.

Complete the investigation of the use of advanced analysis techniques to exploit existing rotor system vibration data collected by current HUMS

Following on from the above study, further work is being launched which will investigate the use of the advanced analysis techniques successfully applied to transmission VHM data (see action 5.1) to exploit the rotor system vibration data already routinely collected by current HUMS. This work will focus initially on tail rotors and is expected to be completed by December 2009.

A study to investigate how best to detect rotor system defects, including the addition of sensors to rotating components, is under consideration.

Operational Safety

Produce a specification for emergency breathing systems. Publish as a CAA Paper

Emergency Breathing Systems (EBS) are considered to have the potential to partially mitigate the safety risk associated with water impact/post ditching capsize in the short to medium term, pending availability of side-floating emergency flotation systems, and in the event that retrofit of the side-floating scheme is judged to be impractical. Work on developing the example draft technical standard for EBS contained in CAA Paper 2003/13 'Preliminary Study of the Implementation and use of Emergency Breathing Systems', into a full specification is underway, and scheduled to be completed by March 2009. The specification will be published as a CAA Paper by September 2009, and will be available for voluntary use by the offshore industry. It will also be presented to EASA for adoption as a formal specification (i.e. European Technical Standard Order).

Publish the final report on the development of an artificial neural network based measure of helicopter low airspeed to extend helicopter operations monitoring to the low speed envelope

The use of a Search and Rescue (SAR) helicopter to conduct the flight trials necessary to progress this research has been secured. However, the original contractor is effectively no longer able to support the research. A review of the research completed to date by a potential alternative contractor has highlighted alternative ways of utilising the existing flight data. A feasibility study to investigate this possibility is under consideration. Efforts to progress the flight trials will be suspended pending either the outcome of the feasibility study, or a decision not to proceed with the feasibility study.

Publish the final report on the three phase safety assessment of the use of GPS for helicopter operations in the North Sea

See update below.

Implement GPS-assisted weather radar approach procedure

Safety assessments for the use of GPS for en-route navigation (Phase 1), for the present weather radar approaches (Phase 3a), and for weather radar approaches enhanced by existing GPS equipment fits (Phase 2) have been completed and summarised in a single report. This report is to be published as a CAA Paper by September 2008, a little later than anticipated due to the need to concentrate efforts on the new European Geostationary Navigation Overlay Service (EGNOS) approach work (see next paragraph). The en-route safety assessment has been translated into CAA Specification No.22 'Global Positioning Systems (GPS) for Use in Rotorcraft for En-Route Navigation,' which has been implemented by the helicopter operators. The GPS-assisted, or 'hybrid', weather radar approach developed and tested during this research is to be progressed to implementation by December 2008.

Work on the EGNOS enabled, or 'full', GPS approach is progressing. The approach procedure has been designed, evaluated through simulator trials and finalised. The safety assessment of the approach procedure (Phase 3b) is in progress and is expected to be completed by December 2008. This study will be published with the results of the EGNOS reception study (see update below) in a single CAA Paper.

Publish EGNOS data collection and analysis exercise

The EGNOS data collection and analysis exercise has been delayed due to logistical difficulties associated with the flight trials, and also due to EGNOS not being fully operational. This research is now expected to be completed by March 2009.

Helideck Safety

Publish a report detailing the development and validation of a wind shear criterion for inclusion in CAP 437

Analysis of helicopter flight data from the Helicopter Operations Monitoring Programme (HOMP) and offshore helideck wind tunnel test data has not identified any evidence of any wind flow problems other than those caused by turbulence and/or hot gas plume encounters. Furthermore, a dedicated wind tunnel study has confirmed that the new turbulence criterion will, by itself, ensure a satisfactory wind flow environment around offshore helidecks. It has therefore been determined that there is no need for a wind shear criterion, and that the present 0.9 m/s vertical flow criterion in CAP 437 'Offshore Helicopter Landing Areas - Guidance on Standards,' can be deleted. These findings were presented to the industry in December 2007 and were ratified. The final report on the study will be published as a CAA Paper by September 2008, later than originally estimated due to the desire to consult with the industry.

Publish the final report on the development and trials of the new helicopter moving deck landing criteria

Initial investigations indicated that the use of a quantitative probabilistic safety assessment that had been planned for the generation of the helicopter landing limits was inappropriate. Additional work was consequently required to rebuild, verify and validate the computer model in a form suitable for use with the Monte-Carlo simulation technique (it was re-written in MathCad). This work has now been completed. Preliminary limits for the Eurocopter Super Puma and Sikorsky S-76 have been generated and work is underway to start the limited introduction into service trials during 2008.

Since it is highly desirable for the in-service trials to cover a winter period, the trials cannot now be completed until March 2009. The publication of the final report has consequently been deferred until September 2009.

Publish a report on Stage 1 and Stage 2 helideck lighting systems trials during winter 2006/7

The in-service trials of the Stage 1 helideck lighting system were effectively superseded by the dedicated flight trial performed in February 2006. The results of this trial were incorporated in CAA Paper 2006/03 'Enhancing Offshore Helideck Lighting - Onshore Trials at Norwich Airport.'

The prototype Stage 2 system installed on the Perenco Thames A platform in the southern North Sea was evaluated during a demonstration flight in July 2007. The landing circle was judged to be not bright enough and subsequent investigations revealed that the lighting system did not meet the design specification. A replacement system compliant with the specification has been produced and is expected to be installed by spring 2008. Further testing will now be required during the winter 2008/9 night flying season.

Installation of the second Stage 2 system on the BP Miller platform has been delayed further due to the decision to decommission the platform. The new lighting system is expected to be installed at the new 'home' for the offshore-based SAR helicopter, which has yet to be decided by BP.

The report on the Stage 2 trials will be deferred until June 2009 in order to include feedback from the winter 2008/9 night flying season.

Publish a review of existing CAP 437 helideck friction criterion

The contract for this research was awarded to the National Aerospace Laboratory (NLR) in the Netherlands. The launch meeting for this project was not held until the end of October 2007, some eight months later than expected, due to negotiations over programme content and general contract terms and conditions. Preparations for the experimental work are now underway, however, and testing should be concluded by mid to late 2008. The final report will be published as a CAA Paper by March 2009.

Develop a new criterion for aluminium helidecks

This research presently forms an optional extension to the research at NLR on the existing helideck friction criterion, as described in CAP 437 'Offshore Helicopter Landing Areas - Guidance on Standards'. Tasking awaits sourcing of sufficient funding.

Establish correct flashing light test procedure and update CAA Paper 2003/06

The study of flashing light test procedures contracted to the National Physical Laboratory (NPL) has been completed and the final report has been received. The study has established an international, cross-industry consensus that is supported by the Commission Internationale de l'Eclairage (CIE). Changes to the guidance contained in the CAA's helideck status light specification, currently published in CAA Paper 2003/06 'Specification for an Offshore Helideck Status Light System,' have been recommended. This material is being updated and will be re-issued in a new CAA Paper by December 2008, later than expected due to internal delays on the work at NPL.

General Aviation

Improving the safety of GA operations in the UK is an important part of the CAA's overall safety programme. During 2007 there were 27 fatal accidents to GA aircraft (24 that were UK registered and three foreign registered where the accident occurred in the UK) resulting in 48 fatalities, higher than the number seen in recent years. This has drawn attention when compared with 2006, which had a lower accident rate with only 16 fatal accidents resulting in 19 fatalities; however when seen in context over a five year period 2007 is higher than average, but not exceptional.

Clearly, any fatal accidents involving GA aircraft are a source of concern, but analysis of the accidents has not revealed any consistent factors behind this trend. However, it is a clear indication that there is no room for complacency and support for GA related safety initiatives remains high.

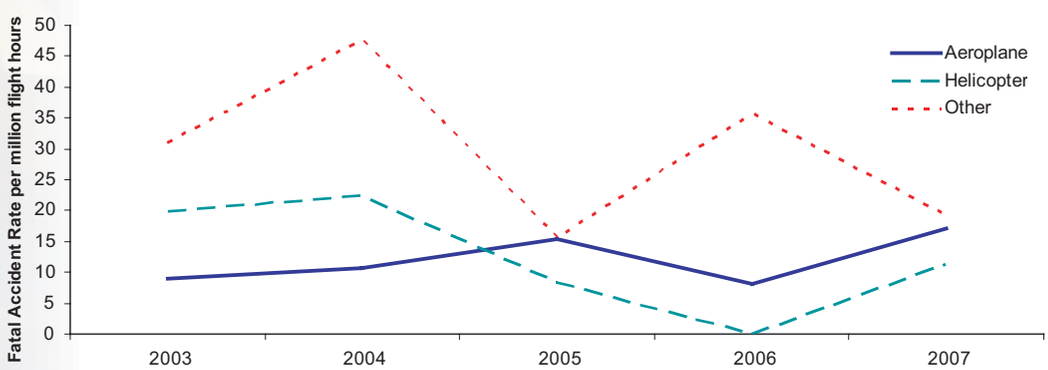


Figure 6: Fatal Accident Rate for GA Aircraft – All Types

General Aviation - All Types of Aircraft

A GA Safety Review Working Group (GASRWG) is using the fishbone method to analyse every GA accident individually and consider possible contributory causal factors, to identify any trends that may become apparent and ensure that safety actions can be targeted effectively. A full statistical analysis of GA accidents has been produced in order to support the work of the GASRWG and there are plans for an additional group to consider issues specifically associated with rotorcraft.

Progress on Actions

Issue		Actions	Status	Dates
Statistical Analysis	6.1	Complete a full statistical analysis of fatal accidents to all types of GA aircraft over the past five years *See update*	New action completed	Feb 08
Analysis of Accident Causal Factors	6.2	GASRWG to conduct an analysis of every individual fatal accident to a GA aircraft to identify causal factors *See update*	New action on track	Ongoing
Small Helicopters	6.3	Initiate a sub-group of the GASRWG to specifically address issues related to small rotorcraft *See update*	New action on track	Apr 08

Statistical Analysis

Complete a full statistical analysis of fatal accidents to all types of GA aircraft over the past five years

The analysis was completed in February 2008; it examined fatal accidents during the period 2003–2007 inclusive. In addition to comparing the number of fatal accidents/fatalities and fatal accident/fatality rates year by year, the accidents were grouped by aircraft class and location.

Analysis of Accident Causal Factors

GASRWG to conduct an analysis of every individual fatal accident to a GA aircraft to identify causal factors

GASRWG is a multi-disciplinary team that meets twice annually. Analysis teams, comprising of the same GA experts from the CAA, the AAIB and industry that attend GASRWG, hold additional meetings to allocate causal factors to serious incidents and accidents involving GA aircraft, excluding helicopters.

Small Helicopters

Initiate a sub-group of the GASRWG to specifically address issues related to small rotorcraft

In April 2008 the Small Helicopter Action Group will resume its meetings with a view to allocating causal factors, using the same taxonomy as GASRWG, to occurrences specifically involving GA helicopters. The analysis will be used to inform policy decisions on safety actions.

General Aviation Aeroplanes

Progress on Actions

Issue		Actions	Status	Dates
Carburettor Icing	6.4	Complete the research programme to identify possible solutions to carburettor icing and resultant handling problems, report on potential mitigations *See update*	Revised completion date	Apr 09
Decision Making by GA Pilots	6.5	Define and produce training material to improve decision making on weather conditions and airspace infringements *See update*	Revised completion date	Jul 10
Recreational Aviation Activities	6.7	Complete review of findings of trial period of activities manuals *See update*	Completed	Dec 07

Carburettor Icing

Complete the research programme to identify possible solutions to carburettor icing and resultant handling problems, report on potential mitigations

Additional technical support was made available in late 2007 to progress the research. This will include helicopter flight trials to validate ground test-rig measurements. Whilst essential to enable data gathering trials to take place, the resolution of a number of contractual issues, together with the need for trials at different environmental conditions has resulted in timescale changes to include winter 2008/09.

Decision Making by GA Pilots

Define and produce training material to improve decision making on weather conditions and airspace infringements

The support of CAA International has enabled a clearer commercial understanding of the potential product to be developed. The high level product content definition has taken longer than originally planned, due to the need for more detailed discussions with the content supplier, and wider international involvement. The resulting product is likely to have increased safety benefits as a result of the refinement.

Recreational Aviation Activities

Complete review of findings of trial period of activities manuals

The trials of the Recreational Aviation Manual have been terminated. Based on the trial results, it was concluded that it would be unlikely that any significant safety improvement would result from extending the trial, and that the general public should be better informed of the potential risks of participating in such activities. The introduction paragraphs to the manual have been re-written to be less prescriptive, and the CAP will remain active awaiting the outcome of the potential EASA legislation on aerial work guidelines.

General Aviation Helicopters

Progress on Actions

Issue		Actions	Status	Dates
Degraded Visual Cueing	6.8	Inadvertent flight in IMC – publish the final report on the research into flight in degraded visual cueing conditions *See update*	Completed	Sep 07
	6.9	Presentation of research results at September 2007 International Helicopter Safety Symposium (IHSS) *See update*	Completed	Sep 07
	6.10	Investigate the feasibility of supplementing the visual cueing available to pilots *See update*	New action	Dec 09

Degraded Visual Cueing

Inadvertent flight in IMC – publish the final report on the research into flight in degraded visual cueing conditions

The final report on the inadvertent flight Instrument Meteorological Conditions (IMC) research was published in CAA Paper 2007/03 'Helicopter Flight in Degraded Visual Conditions' in September 2007.

Presentation of research results at September 2007 International Helicopter Safety Symposium (IHSS)

The results of the research were presented at the 2nd IHSS in Montreal in September 2007.

Investigate the feasibility of supplementing the visual cueing available to pilots

The clear message of the research is that the rules and regulations need to be modified to account for flight in degraded visual environments. The research suggests that, in particular, the long-term solution to this significant safety issue lies in improving the minimum acceptable helicopter handling qualities requirements. In the nearer term, means of supplementing the visual cueing available to pilots could be investigated.

Gyroplanes

Progress on Actions

Issue		Actions	Status	Dates
Aerodynamic Characteristics	6.12	Review the validation of the gyroplane computer model on completion of the work on teeter behaviour and rotor aeroelastics, modify the model and revise the earlier studies as appropriate and consider any necessary changes to BCAR Section T *See update*	Completed early	Dec 06
	6.13	Complete the study of rotor aeroelastic characteristics, review the validation of the gyroplane computer model on completion of the study, modify the model and revise the earlier studies as appropriate, considering any necessary changes to BCAR Section T *See update*	On track	Oct 08
	6.14	Publish a report on the research into the aerodynamic characteristics of gyroplanes *See update*	New action	Dec 08
Gyroplane Pilot Licensing	6.16	Provide online support for the widely geographically distributed gyroplane examiner and instructor community *See update*	New action	Dec 08
	6.15	Make minor changes to PPL(G) requirements, including detailed policies on flight tests, wheel balancing and differences training *See update*	New action	Dec 08
Training of Gyroplane Pilots, Instructors and Examiners	6.19	Revision of BRA PPL(G) syllabus, AFI(G) syllabus and provision of Standards Document 44 *See update*	New action	Dec 08

Aerodynamic Characteristics

Review the validation of the gyroplane computer model on completion of the work on teeter behaviour and rotor aeroelastics, modify the model and revise the earlier studies as appropriate and consider any necessary changes to BCAR Section T

The results of the work on rotor teeter behaviour have been reviewed and no changes or improvements to the gyroplane computer model identified. The applicability of a proposed change to the British Civil Airworthiness Requirements (BCAR) Section T has been confirmed by the rotor teeter behaviour flight trial and this change will be included in the next amendment to Section T. This work was completed early, by December 2006. The original completion date was October 2008 to allow for further modelling work, which in the event proved unnecessary.

Complete the study of rotor aeroelastic characteristics, review the validation of the gyroplane computer model on completion of the study, modify the model and revise the earlier studies as appropriate, considering any necessary changes to BCAR Section T

The study of rotor aeroelastic characteristics is progressing well. The validation of the gyroplane computer model and the content of BCAR Section T will be reviewed once this work has been completed.

Publish a report on the research into the aerodynamic characteristics of gyroplanes

All of the gyroplane research already completed is being consolidated into a single final report for publication in the public domain as a CAA Paper. As part of this exercise, the data from the two earlier instrumented gyroplane flight test programmes is being re-analysed using the gyroplane computer model in its current and most developed form. In addition, a simple blade torsion model is being implemented in the computer model in an attempt to identify the first order effects of rotor aeroelastics on the validation of the model. The objective of this exercise is to inform the decision on whether to attempt to implement the results of the rotor aeroelastics research in the computer model, and repeat the earlier stability and handling qualities studies.

Gyroplane Pilot Licensing

Provide online support for the widely geographically distributed gyroplane examiner and instructor community

Online support is being provided for gyroplane examiners and instructors. This is not yet complete, but will provide uniform and accessible information to the geographically diverse community.

Make minor changes to PPL(G) requirements, including detailed policies on flight tests, wheel balancing and differences training

There is little appetite for wholesale change to the Private Pilot Licence (Gyroplane) (PPL(G)), but some minor adjustments have been suggested by the gyroplane community, and these are being implemented. Changes to the requirement for two separate PPL(G) flight tests for single seat PPL(G) training are being made, and more detailed policies for the use of wheel balancing and differences training, are being introduced.

Training of Gyroplane Pilots, Instructors and Examiners

Revision of BRA PPL(G) syllabus, AFI(G) syllabus and provision of Standards Document 44

Work continues on improvements to gyroplane flight training. Biannual meetings have been instituted between the CAA and gyroplane examiners and instructors. These meetings serve as a forum for the formulation of improvements to gyroplane flight training, and as a means of standardisation.

A revision to the British Rotorcraft Association (BRA) PPL(G) syllabus is under way, and once this is issued, the Gyroplane Examiner and Instructor Handbook, or Standards Document 44, will be drafted. This will be followed by a revision to the BRA syllabus for the Assistant Flying Instructor rating (AFI(G)), and new syllabus for Flying Instructor Gyroplanes and Flying Instructor Course Gyroplanes.

Once the supporting documentation is in place, it is intended that standardisation visits to gyroplane training schools will be undertaken.

Supporting Approved Organisations

Approved organisations, like pilot performance, are a key element in supporting the safety of aviation. Many catastrophic events, ranging from the Columbia shuttle disaster to the more recent BP fatal accident report, have emphasised the role of organisational factors in the anatomy of an accident causal chain. Major initiatives have arisen from changes in the regulatory landscape due to European influences, the increasing emphasis on SMS, soon to be mandated through ICAO, and the UK Government's direction to adopt a more risk based style of oversight, have all been at the forefront of activities during the year. In addition, a study of safety issues in the operation of business jets will shortly be published and, in co-operation with NATS and the business jet operating industry, initiatives are being launched to address the recommendations.

Progress on Actions

Issue		Actions	Status	Dates
Safety Management Systems	7.2	Update guidance on SMS and promote effective use within operating industry *See update*	Deleted [superseded by actions listed below]	May 07
	7.3	Publish a document describing the means by which the CAA complies with the ICAO requirement for a State Safety Programme *See update*	Revised completion date	Sep 08
	7.4	Deliver a training programme for CAA staff to ensure common understanding of SMS principles and the oversight of approved organisations' SMS *See update*	Completed	Feb 08
	7.5	Seminar for senior industry personnel on the business and safety benefits of SMS *See update*	Completed early	Sep 07
	7.6	Review current CAA guidance material for consistency, revise and re-publish as required *See update*	Revised completion date	May 08
	7.7	Engage with Joint Aviation Authorities (JAA) / EASA / European Commission (EC) initiatives to implement SMS through changes to regulation *See update*	On track	Dec 08

Issue		Actions	Status	Dates
Single European Sky	7.8	Continue to provide a broad range of information on the Single European Sky (SES) initiative, including briefing material, workshops and seminars for service providers *See update*	On track	Ongoing
	7.9	Develop an objective model of the regulatory risk involved in assessing a change to part of an Air Traffic Management (ATM) system *See update*	On track [corrected]	Oct 09
	7.10	Develop an objective model for component based modular safety arguments *See update*	Revised completion date [corrected]	Oct 10
Managing Operational Demands	7.11	Produce a risk management model to support the CAA in allocating scarce resources to the oversight of approved organisations and, in particular Air Operator Certificate (AOC) holders *See update*	Completed	Jan 08
	7.13	Conduct study of regulator oversight resource allocation *See update*	Completed	Mar 08
Safety of 'Light' Jet Operations	7.14	Work with NATS to explore collaborative approaches to safety improvement *See update*	Revised completion date	Ongoing
	7.15	Publish a leaflet to improve regulatory information to the business jet community *See update*	Completed	Mar 08
	7.16	Research the feasibility of a method to improve flight crew training by: • Tracking student performance, including simulator metrics, and improve the effectiveness of courses • Application of the FORCE work on the use of automation and its relevance to business jet operations *See update*	On track	Mar 09

Issue		Actions	Status	Dates
ESARR 4 Compliance	7.17	Complete research into means of compliance for small Air Navigation Service Providers to meet Eurocontrol Safety Regulatory Requirement 4 (ESARR 4) *See update*	Revised completion date	Aug 08
Ground Handling Operations	7.19	Review recommendations from this analysis group to determine the way forward *See update*	Completed	Sep 07
	7.20	Launch a CAA / industry working group to consider the results of the fishbone group on ground handling and identify actions to improve safety *See update*	New action completed	Nov 07
	7.21	Conduct a study of occurrence reporting culture among ground handlers *See update*	New action	Nov 08

Safety Management Systems

Update guidance on SMS and promote effective use within operating industry

Superseded by the creation of new actions. See updates below.

Publish a document describing the means by which the CAA complies with the ICAO requirement for a State Safety Programme

In response to new ICAO standards, the CAA is to develop the UK SSP and aims to complete this document by September 2008. This will be a high-level document and will present the UK's integrated set of regulations and activities that are aimed at improving safety. The task will be overseen by the CAA's Safety Investigation & Data Department (SIDD) and will involve external organisations such as the DfT, AAIB, UK Airprox Board, Maritime & Coastguard Agency as well as European bodies, such as EASA and Eurocontrol. This action has been delayed due to the increased time required to get CAA and DfT agreement to proceed and to define a way forward.

Deliver a training programme for CAA staff to ensure common understanding of SMS principles and the oversight of approved organisations' SMS

CAA inspecting staff covering the areas of flight operations, air traffic standards, aerodrome standards and airworthiness have been trained in SMS principles during six separate one-week courses developed for the CAA by the University of York. These training courses were completed by February 2008. In addition, a one-day SMS course has been held for CAA senior managers.

Seminar for senior industry personnel on the business and safety benefits of SMS

A seminar on SMS was organised by the CAA at the Royal Aeronautical Society in London, on the 21st of September 2007. Approximately 130 senior airline and CAA representatives attended the seminar.

Review current CAA guidance material for consistency, revise and re-publish as required

SMS guidance material already available is under review. The ATM SMS guidance is current, and has been adjusted to reflect the CAA's obligation under the SES common requirements legislation. The CAA Flight Operations Department has produced guidance which was published on the CAA website in early 2008. A CAP providing guidance for small operators will be produced in the autumn of 2008, once EASA implementing rules are published.

Engage with Joint Aviation Authorities (JAA) / EASA / European Commission (EC) initiatives to implement SMS through changes to regulation

The CAA has been working with EASA on developing implementing rules, and has participated in EASA working groups and workshops. Also, through participation in the ESSI, SMS has been selected as an action area for the ECAST. EASA will publish a NPA during 2008, proposing implementing rules for management systems for operators. These implementing rules will include a requirement for a SMS.

The CAA will work to ensure SMS is implemented in accordance with ICAO timescales, particularly as the UK will be subject to an ICAO Safety Audit in February 2009.

In view of the likely delay in time scales in putting revised legislative requirements in place within the JAA, EU and EASA processes, the CAA has decided to propose mandatory implementation of SMS in Commercial Air Transport operators and the supporting maintenance organisations by the 1st January 2009. A draft amendment to the UK Air Navigation Order, the justification for the change and the associated Impact Assessment have been prepared and published for consultation with a closing date of 14th August 2008. A related FODCOM and letter to the affected supporting maintenance organisations have been issued to raise awareness of the proposal. The ANO amendment, if agreed, would be put in place by December 2008 and would require Commercial Air Transport operators and the supporting maintenance organisations to declare a commitment to the adoption of SMS and have in place an outline programme for transition to full implementation by 2011.

Single European Sky

Continue to provide a broad range of information on the Single European Sky (SES) initiative, including briefing material, workshops and seminars for service providers

As the implementation of the Common Requirements legislation progressed, a series of letters, presentations, and briefing materials were issued to Air Navigation Service Providers (ANSPs). These have been placed on the CAA website for user reference and new material is added when appropriate. The website also contains details of UK certified organisations and their designated service provision locations.

The CAA's interoperability website provides updates on the progress of the interoperability regulation 552/2004, related implementing rules and community specifications and guidance notes to ANSPs and manufacturers on interoperability compliance. Air Traffic Service Information Notices (ATSIN) have also been sent to ANSPs to provide further clarification on regulation compliance and applicability dates.

Develop an objective model of the regulatory risk involved in assessing a change to part of an Air Traffic Management (ATM) system

This action was raised in the 2007 Safety Plan Update. However, the wrong text was attributed to the action, and therefore it has been repeated for clarity. Progress on this action is also mentioned below.

SES regulations have introduced a need for National Supervisory Authority (NSA) Inspectors to audit ANSP safety cases. However, there is currently no objective guidance on how best to carry out such audits, nor is there any objective view of the risk remaining to a regulator after an audit has been performed.

The purpose of this research is to develop an objective model of the regulatory risk involved in assessing a change to a part of the ATM system. The model should inform decisions concerning the level and depth of review of an ANSP's safety argument to be made, and should guide the audit process. A definition of regulatory risk and criteria for its measurement has been produced, and a model is under development.

Develop an objective model for component based modular safety arguments

This action was raised in the 2007 Safety Plan Update. However, the wrong text was attributed to the action, and therefore it has been repeated for clarity. Additionally, due to financial restraints, the project start was delayed until early 2008. Therefore, the deadline has been extended by one year.

SES regulations have introduced the concept of standardising ATM systems and components with the aim of improved interoperability. The problem is that it is extremely difficult, if not impossible, to produce a complete specification for a component.

The purpose of this research is to develop a method for composing arguments about components into a system safety case, where the arguments about the components may be thought of as "modular safety arguments".

Managing Operational Demands

Produce a risk management model to support the CAA in allocating scarce resources to the oversight of approved organisation and, in particular Air Operator Certificate (AOC) holders

A first prototype risk management model has been formulated, and presented to CAA management. Implementation and continuous development of the model is expected to be ongoing for some time to come.

Conduct study of regulator oversight resource allocation

An internal study into the SRG's current application of risk assessment to managing oversight has been successfully completed, and the results incorporated into the ongoing work to produce a risk management model (See 2007 Safety Plan Update).

Safety of 'Light' Jet Operations

Work with NATS to explore collaborative approaches to safety improvement

A CAA/ NATS group has been formed and discussions commenced. As an initial activity, a workshop is planned in autumn 2008 as a communication forum with industry. This will be led by NATS and supported by the CAA.

Publish a leaflet to improve regulatory information to the business jet community

A Business Aviation Safety group has been formed involving SRG, NATS, the British Business and General Aviation Association (BBGA), European Business Aviation Association (EBAA), Flight Safety International UK, and other industry organisations. The team has resolved differences between industry statistics and CAA data, and have planned a safety seminar for autumn 2008. The research report on Business Jet Safety Research, agreed with industry, will be published on the CAA website by October 2008. A leaflet for business jet operators has been agreed with industry through the same group and published by the CAA.

Research the feasibility of a method to improve flight crew training by:

- **Tracking student performance, including simulator metrics, and improve the effectiveness of courses**
- **Application of the FORCE work on the use of automation and its relevance to business jet operations**

Initial discussions have taken place between an industry training organisation and FORCE. This explored the possibility of a postgraduate research project that combined the experience of the FORCE work with the needs of the business jet training environment. It is anticipated that this task will also draw upon the CAA's FDM analysis expertise.

ESARR 4 Compliance

Complete research into means of compliance for small Air Navigation Service Providers to meet Eurocontrol Safety Regulatory Requirement 4 (ESARR 4)

Research to identify a satisfactory means of compliance for small ANSPs is progressing following the production of a feasibility report that identified the main options. Work on the feasibility study took longer to complete than expected, largely due to internal funding uncertainties and the novel aspects of the research and complexities associated with air traffic service provision outside of controlled airspace, which tend to be more applicable to the smaller ANSPs.

Ground Handling Operations

In 2007, there was a systematic top down analysis of safety risks that could arise from the aircraft time on the apron. Work was completed in March 2007, and recommendations were produced for consideration by the Ground Handling Operations Safety Team (GHOST).

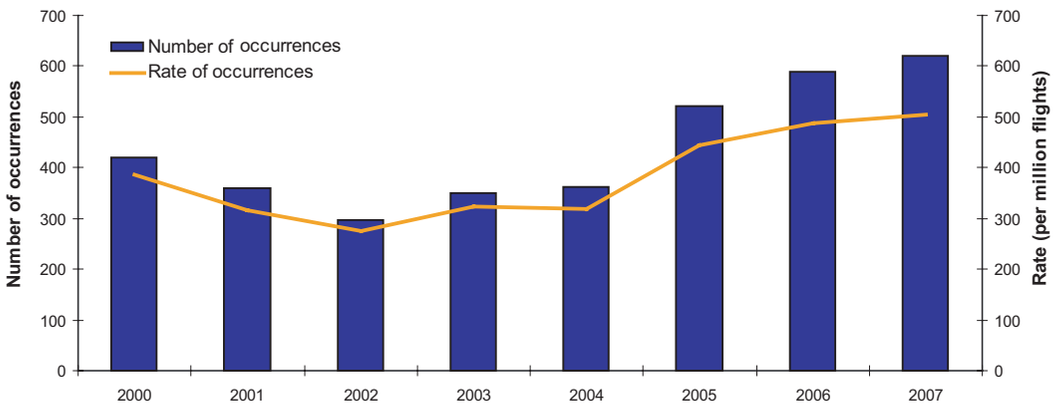


Figure 7: Ground Handling Occurrences involving UK Public Transport Aeroplanes 2000-2007

Review recommendations from this analysis group to determine the way forward

In December 2006, a CAA group (with participation from BAA plc) was established to analyse the root causes of incidents that occur on the apron. This group subsequently recommended a series of actions aimed at reducing the risk to aircraft and their occupants, that were introduced during the aircraft's time on the apron area, for example during loading or de-icing. During 2007, CAA management considered these recommendations and proposed a new CAA/industry working group to formulate an action plan to address each issue. This new GHOST met for the first time in December 2007. Its members are drawn from the CAA, airport operators, airlines and ground handling companies.

Launch a CAA / industry working group to consider the results of the fishbone group on ground handling and identify actions to improve safety

A new joint CAA / industry group called the GHOST has been initiated following the successful fishbone team on this subject last year. This new group will consider the outcomes of the fishbone analysis and identify the best means to progress safety actions, which will be included in the next Safety Plan.

Conduct a study of occurrence reporting culture among ground handlers

In 2005, the MORS was expanded to include ground handling events, reportable by pilots, engineers, or ground handlers themselves. However, very few reports have been filed by ground handlers, who are the people in the best position to be aware of events as they occur. A short questionnaire study has been conducted to assess the reasons behind the lack of reporting, and assist the CAA in formulating an effective communication strategy to improve the situation. Early results indicate that the majority of ground handlers are unaware that they are able to report, although most had heard of the scheme. Those that were aware of their obligations raised doubts about the outcome and harboured some concerns that they or their employers would be penalised for events if they were reported.

Concluding Statement

As the CAA is funded by the industry it regulates, there is always a balance to strike between resources and safety benefits. This has resulted in a systematic and focused safety risk management process that targets the principal safety risks, in areas for which the CAA has continuing responsibility. The UK safety results are monitored carefully and it is to the credit of the UK industry that the database of MORs provides the data that is used to monitor many of these safety risks. Overall the level of safety in the UK remains very high, but this must not be a source of complacency because this excellent performance has been achieved through sustained effort, which must continue to be applied.

Appendix 1 – Acronyms and Abbreviations

AAG	Accident Analysis Group
AAIB	Air Accidents Investigation Branch
AFI(G)	Assistance Flying Instructor (Gyroplane)
AIC	Aeronautical Information Circular
ANS	Air Navigation Services
ANSP	Air Navigation Service Providers
AOA	Airport Operators Association
AOC	Air Operator Certificate
APV	Approach with Vertical Guidance
ASI	Airspace & Safety Initiative
ATA	Air Transport Association
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSIN	Air Traffic Service Information Notice
BaroVNAV	Barometric Vertical Navigation
BBGA	British Business and General Aviation Association
BCAR	British Civil Airworthiness Requirement
BRA	British Rotorcraft Association
B-RNAV	Basic Area Navigation
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CFIT	Controlled Flight Into Terrain
DfT	Department for Transport
EASA	European Aviation Safety Agency
EBAA	European Business Aviation Association
EBS	Emergency Breathing Systems
EC	European Commission
ECAST	European Commercial Aviation Safety Team
EGAST	European General Aviation Safety Team
EGNOS	European Geostationary Navigation Overlay Service
EHEST	European Helicopter Safety Team
ESARR	Eurocontrol Safety Regulatory Requirement
ESSI	European Strategic Safety Initiative
FAA	Federal Aviation Administration
FAST	Future Aviation Safety Team
FDM	Flight Data Monitoring
FODCOM	Flight Operations Department Communication
FORCE	Flight Operations Research Centre of Excellence
GA	General Aviation
GASRWG	General Aviation Safety Review Working Group
GHOST	Ground Handling Operations Safety Team

GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HOMP	Helicopter Operations Monitoring Programme
HUMS	Health & Usage Monitoring System
ICAO	International Civil Aviation Organization
IHSS	International Helicopter Safety Symposium
IHST	International Helicopter Safety Team
IMC	Instrument Meteorological Conditions
JAA	Joint Aviation Authorities
LP-LAST	Low Powered Light Aviation Secondary Surveillance Radar Transponder
MoD	Ministry of Defence
MOR	Mandatory Occurrence Report
MORS	Mandatory Occurrence Reporting Scheme
MTWA	Maximum Total Weight Authorised
NAA	National Aviation Authority
NATS	National Air Traffic Services
NLR	National Aerospace Laboratory – Netherlands
NPA	Notice of Proposed Amendment
NPL	National Physical Laboratory
NSA	National Supervisory Authority
PAPI	Precision Approach Path Indicator
PPL(G)	Private Pilot Licence (Gyroplane)
P-RNAV	Precision Area Navigation
RNAV	Area Navigation
RNP	Required Navigation Performance
SAFE	System for Aircrew Fatigue Evaluation
SAR	Search And Rescue
SES	Single European Sky
SIDD	Safety Investigation & Data Department
SMS	Safety Management System
SOC	Special Objective Check
SOP	Standard Operating Procedure
SRG	Safety Regulation Group
SSP	State Safety Programme
SSR	Secondary Surveillance Radar
TAWS	Terrain Awareness and Warning System
TCCA	Transport Canada Civil Aviation Directorate
THREAT	The High Risk Events Analysis Team
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicle
VHM	Vibration Health Monitoring
VLJ	Very Light Jet

Appendix 2 – Progress Summary for Safety Plan Actions

The following table provides a brief progress summary of the actions initiated in the Safety Plan 2006/07 (SP 06/07), Safety Plan Update 2007 (SPUD 07) and Safety Plan Update 2008 (SPUD 08). The deadlines shown in the table reflect any updates provided in SPUD 08. The actions are listed by Safety Plan section and those that are complete are grey-ed out for reference purposes.

Items that do not appear in this Safety Plan Update 2008 have been listed separately in Appendix 3.

Action Number	Action	Referenced in:			Deadline	History of changes to deadlines
		SP 06/07	SPUD 07	SPUD 08		
THE CAA SAFETY RISK MANAGEMENT PROCESS						
Monitoring Industry Performance						
1.1	Explore ways to improve data collection and processing in order to monitor the 'safety health' of UK civil aviation and feed the information back to the industry	●	●	●	Jul 07	
1.2	Develop and progress pre-cursor measures to improve data collection and processing, for the monitoring of the 'safety health' of UK civil aviation			●	Ongoing	
1.3	Investigate the use of aggregate FDM data as indicators of the overall safety performance of the UK industry		●	●	Apr 09	
1.4	Conduct analysis of high risk events to UK registered aircraft		●	●	Jun 07	Apr 08 in Safety Plan 2006/07
1.5	Complete a ten year update on the analysis of fatal accidents to large public transport aeroplanes worldwide			●	Jul 08	
1.6	Update the Aviation Safety Review to disseminate current safety data to the UK industry			●	Nov 08	
Technical Failure						
1.7	Assess the potential for safety risks from aircraft maintenance error and identify any necessary actions			●	Dec 07	
1.8	Sponsor a PhD study on modelling risk in aircraft maintenance			●	Dec 10	
1.9	Sponsor a PhD study on reliability of inspections of composite structures			●	Dec 09	
LARGE PUBLIC TRANSPORT AEROPLANES						
Supporting Pilot Performance						
Improved Pilot Training						
2.1	Conduct research trial on improved training for highly automated aircraft	●	●	●	Mar 09	Mar 07 in Safety Plan 2006/07 Dec 07 in Safety Plan Update 2007
2.2	The CAA will publish the core 'highly automated aircraft' syllabus as a CAA paper		●	●	Mar 09	Sep 07 in Safety Plan Update 2007
2.3	The CAA will investigate the possibility of expanding the 'highly automated aircraft' trial to a second aircraft type or operator		●	●	Mar 09	
2.4	Conduct research into loss of manual flying skills	●		●	Jun 08	Jul 07 in Safety Plan 2006/07
2.5	The CAA will investigate the possibility of transferring the manual flying skills assessment techniques from the simulator to line flying		●	●	Mar 09	

Action Number	Action	Referenced in: SP 06/07	SPUD 07	SPUD 08	Deadline	History of changes to deadlines
LARGE PUBLIC TRANSPORT AEROPLANES continued						
Supporting Pilot Performance continued						
Pilot Physical Capabilities						
2.8	Monitor incorporation of the fatigue model "SAFE" into operational use	●	●	●	Jul 07	Mar 07 in Safety Plan 2006/07 (wording changed from 'rosters' to 'operational use')
2.9	Explore means to make the SAFE model available to industry		●	●	Sep 07	
2.10	Complete a medical study into the most appropriate requirement for medical fitness to fly, to ensure that the aeromedical standards reflect the modern cockpit environment	●		●	Sep 08	
2.11	Complete the research on Long Term Exposure to the Flying Environment	●	●	●	Mar 10	Dec 06 in Safety Plan 2006/07 Mar 07 in Safety Plan Update 2007
2.12	The CAA will publish a paper detailing the full analysis [re: Long Term Exposure to the Flying Environment]		●	●	Oct 10	Jun 07 in Safety Plan Update 2007
2.13	Develop objective computerised colour vision tests based on current operational demands	●	●	●	May 07	Mar 07 in Safety Plan 2006/07
2.14	The CAA will publish a paper detailing the methodology, results and conclusions [re: Objective computerised colour vision tests]		●	●	May 08	Jul 07 in Safety Plan Update 2007
Terms and Definitions Supporting RNAV /RNP Operation						
2.16	The CAA will produce a functional upgrade in the light of comments and continue to encourage wider participation in the database tool		●	●	Dec 08	
2.17	The CAA will consider moving this now established tool into the control of industry			●	Dec 08	
Loss of Control						
Loading Error						
2.18	Monitor MOR data to assess effectiveness of ongoing actions	●	●	●	Ongoing	
Flight Handling						
2.19	Investigate Training and SOPs related to Upsets and Go Arounds	●		●	Dec 07	Mar 08 in Safety Plan 2006/07
Ice Accumulation in Flight						
2.20	Monitor MOR data to assess effectiveness of ongoing actions	●		●	Mar 08	
Ground De-Icing Effectiveness						
2.22	The CAA will join industry initiatives to review ground de-icing	●		●	Jun 07	
Controlled Flight Into Terrain						
Approach and Landing						
2.28	Undertake a cost benefit analysis of SSR and/or other approach monitoring improvements	●		●	Dec 07	
2.29	Complete the design and assessment work for the Gatwick 'Approach with Vertical Guidance' (APV) BaroVNAV trial	●	●	●	Oct 07	Dec 06 in Safety Plan 2006/07 (at this time it was combined with the following action, which relates to GNSS trial approaches)
2.31	Publish results of RNAV Global Navigation Satellite System (GNSS) trial at six UK airports in a CAA Paper		●	●	Sep 07	Jul 07 in Safety Plan Update 2007 (action title changed slightly)
2.32	Complete the development of a GNSS approach validation tool and make available for use	●	●	●	Jan 08	Mar 07 in Safety Plan 2006/07 Oct 07 in Safety Plan Update 2007

Action Number	Action	Referenced in: SP 06/07	SPUD 07	SPUD 08	Deadline	History of changes to deadlines
LARGE PUBLIC TRANSPORT AEROPLANES continued						
Controlled Flight Into Terrain						
Approach and Landing						
2.33	Prepare strategy for APV implementation based on the results of the trial	●		●	Jul 07	
2.34	Seek changes to the specification of the displayed information to reduce the potential CFIT risk during RNAV (GNSS) operations			●	Mar 08	
2.35	Raise awareness of the meaning and correct use of the information displayed			●	Jun 08	
Fire						
Cabin Crew Fire Training						
2.39	FAA/CAA/TCCA requirement to produce updated training material reflecting latest research into in-flight fire fighting. Video/DVD/Web. Filming funded by FAA with UK script development	●		●	Nov 07	Dec 07 in Safety Plan 2006/07
Cabin Crew Evacuation Training						
2.40	Production of training demonstration material			●	Dec 09	
Enhanced Ground Fire Fighting						
2.43	Conduct studies of cabin fire fighting and post evacuation passenger management	●		●	Jun 09	Oct 07 in Safety Plan 2006/07
2.44	The CAA will work with other National Aviation Authorities in the development a new ICAO specification for advanced extinguishing agents	●		●	Apr 09	Apr 08 in Safety Plan 2006/07
Fire Data						
2.47	Compilation of fire data research studies			●	Sep 08	
AIRSPACE						
Mid-Air Collision						
Public Transport Operations Outside Controlled Airspace						
3.1	Publish guidance appropriate for general aviation resulting from the Conspicuity Working Group and the Regulatory Impact Assessment on the wider carriage of transponders	●	●	●	Jul 09	Jul 07 in Safety Plan 2006/07 Jul 08 in Safety Plan Update 2007
3.3	Launch an airspace safety initiative jointly with other major parties			●	May 06	
UK Operational Policy on Unmanned Aerial Systems (UASs)						
3.8	Revise and re-issue CAP722 'UAV Operation in UK Airspace – Guidance'		●	●	Apr 08	
Very Light Jets						
3.9	The CAA will participate in a Eurocontrol initiative, the VLJ Implementation Platform (VIP)			●	Ongoing	
AIRPORTS						
Runway Incursions						
4.2	Monitor ongoing actions and analyse the resultant change in runway incursion rates per movement for the period Apr 2006 to Mar 2007, based on the established rate per movement in Apr 2005 to Mar 2006, with a target reduction of 5%		●	●	Apr 07	
4.3	Monitor ongoing actions and analyse the resultant change in reported runway incursion rates			●	Apr 09	
Runway Excursions and Overruns						
4.7	Conduct a new fishbone analysis to explore opportunities to improve safety from the risk of excursions and overruns			●	Jun 08	

Action Number	Action	Referenced in:			Deadline	History of changes to deadlines
		SP 06/07	SPUD 07	SPUD 08		
LARGE PUBLIC TRANSPORT HELICOPTERS						
Helicopter Airworthiness						
5.1	Publish the final report on the development and demonstration of enhanced HUMS VHM data analysis	●	●	●	Dec 08	Mar 07 in Safety Plan 2006/07 Sep 08 in Safety Plan Update 2007
5.2	Completion of six month extension of in-service trials		●	●	Jun 08	
5.3	Publish a review of the state of the art of the application of HUMS techniques to detect rotor system faults	●	●	●	Dec 08	Dec 06 in Safety Plan 2006/07 Mar 09 in Safety Plan Update 2007
5.5	Complete the investigation of the use of advanced analysis techniques to exploit existing rotor system vibration data collected by current HUMS			●	Dec 09	
Operational Safety						
5.6	Publish the final report on the development of an artificial neural network based measure of helicopter low airspeed to extend helicopter operations monitoring to the low speed envelope	●	●	●	Dec 09	Mar 07 in Safety Plan 2006/07 Mar 08 in Safety Plan Update 2007
5.7	Publish the final report on the three phase safety assessment of the use of GPS for helicopter operations in the North Sea	●	●	●	Sep 08	Dec 06 in Safety Plan 2006/07 Dec 07 in Safety Plan Update 2007
5.8	Implement GPS-assisted weather radar approach procedure			●	Dec 08	
5.9	Publish EGNOS data collection and analysis exercise	●	●	●	Mar 09	Mar 07 in Safety Plan 2006/07 Sep 08 in Safety Plan Update 2007
5.11	Produce a specification for emergency breathing systems. Publish as a CAA Paper		●	●	Sep 09	
Helideck Safety						
5.12	Publish a report detailing the development and validation of a wind shear criterion for inclusion in CAP 437	●	●	●	Sep 08	Mar 07 in Safety Plan 2006/07 Nov 07 in Safety Plan Update 2007
5.13	Publish the final report on the development and trials of the new helicopter moving deck landing criteria	●		●	Sep 09	Dec 07 in Safety Plan 2006/07
5.14	Publish a report on the Stage 1 and Stage 2 helideck lighting systems trials during winter 2006/7	●	●	●	Jun 09	Sep 07 in Safety Plan 2006/07 Mar 08 in Safety Plan Update 2007
5.15	Publish a review of existing CAP 437 helideck friction criterion	●	●	●	Mar 09	Sep 07 in Safety Plan 2006/07 Sep 08 in Safety Plan Update 2007
5.16	Develop a new criterion for aluminium helidecks	●	●	●	TBA	Sep 07 in Safety Plan 2006/07 Jan 09 in Safety Plan Update 2007
5.17	Establish correct flashing light test procedure and update CAA Paper 2003/06		●	●	Dec 08	Mar 08 in Safety Plan Update 2007

Action Number	Action	Referenced in: SP 06/07	SPUD 07	SPUD 08	Deadline	History of changes to deadlines
GENERAL AVIATION						
General Aviation – All Types of Aircraft						
Statistical Analysis						
6.1	Complete a full statistical analysis of fatal accidents to all types of GA aircraft over the past five years			●	Feb 08	Complete
Analysis of Accident Causal Factors						
6.2	GASRWG to conduct an analysis of every individual fatal accident to a GA aircraft to identify causal factors			●	Ongoing	
Small Helicopters						
6.3	Initiate a sub-group of the GASRWG to specifically address issues related to small rotorcraft			●	Apr 08	
General Aviation Aeroplanes						
Carburettor Icing						
6.4	Complete the research programme to identify possible solutions to carburettor icing and resultant handling problems, report on potential mitigations	●	●	●	Apr 09	Feb 07 in Safety Plan 2006/07 Aug 08 in Safety Plan Update 2007
Decision Making by GA Pilots						
6.5	Define and produce training material to improve decision making on weather conditions and airspace infringements	●	●	●	Jul 10	Aug 07 in Safety Plan 2006/07 Aug 08 in Safety Plan Update 2007
Recreational Aviation Activities						
6.7	Complete review of findings of trial period of activities manuals	●	●	●	Dec 07	Dec 06 in Safety Plan 2006/07
General Aviation Helicopters						
Degraded Visual Cueing						
6.8	Inadvertent Flight in IMC - publish the final report on the research into flight in degraded visual cueing conditions	●	●	●	Sep 07	Sep 06 in Safety Plan 2006/07 Jul 07 in Safety Plan Update 2007
6.9	Presentation of research results at September 2007 IHSS		●	●	Sep 07	
6.10	Investigate the feasibility of supplementing the visual cueing available to pilots			●	Dec 09	
Gyroplanes						
Aerodynamic Characteristics						
6.12	Review the validation of the gyroplane computer model on completion of the work on teeter behaviour and rotor aeroelastics, modify the model and revise the earlier studies as appropriate and consider any necessary changes to BCAR Section T	●		●	Dec 06	Oct 08 in Safety Plan 2006/07
6.13	Complete the study of rotor elastic characteristics, review the validation of the gyroplane computer model on completion of the study, modify the model and revise the earlier studies as appropriate, considering any necessary changes to BCAR Section T	●		●	Oct 08	
6.14	Publish a report on the research into the aerodynamic characteristics of gyroplanes			●	Dec 08	
Gyroplane Pilot Licensing						
6.16	Provide online support for the widely geographically distributed gyroplane examiner and instructor community			●	Dec 08	
6.17	Make minor changes to PPL(G) requirements, including detailed policies on flight tests, wheel balancing and differences training			●	Dec 08	
Training of Gyroplane Pilots, Instructors and Examiners						
6.19	Revision of BRA PPL(G) syllabus, AFI(G) syllabus and provision of Standards Document 44			●	Dec 08	

Action Number	Action	Referenced in:			Deadline	History of changes to deadlines
		SP 06/07	SPUD 07	SPUD 08		
SUPPORTING APPROVED ORGANISATIONS						
Safety Management Systems						
7.2	Update guidance on SMS and promote effective use within Operating industry	●		●	Deleted	This action was superseded by the other SMS actions introduced in Safety Plan Update 2007
7.3	Publish a document describing the means by which the CAA complies with the ICAO requirement for a State Safety Programme		●	●	Sep 08	Oct 07 in Safety Plan Update 2007 (original title wording corrected from 'plan' to 'programme')
7.4	Deliver a training programme for CAA staff to ensure common understanding of SMS principles and the oversight of approved organisations' SMS		●	●	Feb 08	Dec 07 in Safety Plan Update 2007
7.5	Seminar for senior industry personnel on the business and safety benefits of SMS		●	●	Sep 07	Oct 07 in Safety Plan Update 2007
7.6	Review current CAA guidance material for consistency, revise and re-publish as required		●	●	May 08	Sep 07 in Safety Plan Update 2007
7.7	Engage with JAA/EASA/EC initiatives to implement SMS through changes to regulation		●	●	Dec 08	
Single European Skies						
7.8	Continue to provide a broad range of information on the Single European Sky (SES) Initiative, including briefing material, workshops and seminars for Service Providers	●	●	●	Ongoing	
7.9	Develop an objective model of the regulatory risk involved in assessing a change to part of an ATM system		●	●	Oct 09	
7.10	Develop an objective model for component based modular safety arguments		●	●	Oct 10	Oct 09 in Safety Plan Update 2007
Managing Operational Demands						
7.11	Produce a risk management model to support the CAA in allocating scarce resources to the oversight of approved organisations and, in particular AOC holders	●	●	●	Jan 08	
7.12	Conduct study of regulator oversight resource allocation		●	●	Mar 08	
Safety of 'Light' Jet Operations						
7.14	Work with NATS to explore collaborative approaches to safety improvement		●	●	Ongoing	Dec 07 in Safety Plan Update 2007
7.15	Publish a leaflet to improve regulatory information to business jet community		●	●	Mar 08	
7.16	Research the feasibility of a method to improve flight crew training by: - tracking student performance, including simulator metrics, and improve the effectiveness of courses, - application of the FORCE work on the use of automation and its relevance to business jet operations		●	●	Mar 09	
ESARR 4 Compliance						
7.17	Complete research into means of compliance for small ANSPs to meet ESARR 4	●	●	●	Aug 08	Jun 07 in Safety Plan 2006/07 Dec 07 in Safety Plan Update 2007 (title modified slightly)
Ground Handling Operations						
7.19	Review recommendations from this analysis group to determine the way forward		●	●	Sep 07	
7.20	Launch a CAA / industry working group to consider the results of the fishbone group on ground handling and identify actions to improve safety			●	Nov 07	
7.21	Conduct a study of occurrence reporting culture among ground handlers			●	Nov 08	

Appendix 3 – Progress Summary for Ongoing Safety Plan Actions not reported in this Safety Plan Update

The following table provides a brief progress summary of the actions initiated in the Safety Plan 2006/07 (SP 06/07) or the Safety Plan Update 2007 for which the action is ongoing or complete, and there has been no update in this Safety Plan Update. The actions are listed by Safety Plan section.

Action Number	Action	Referenced in:			Deadline	History of changes to deadlines
		SP 06/07	SPUD 07	SPUD 08		
LARGE PUBLIC TRANSPORT AEROPLANES						
Supporting Pilot Performance						
Effective Communication						
2.6	Conduct study of R/T discipline	●	●		Dec 06	Complete
2.7	Lead a team to investigate 'sleeping receivers' causing prolonged loss of communication (PLOC) between pilots and ATC	●	●		Aug 06	Complete
Terms and Definitions Supporting RNAV /RNP Operation						
2.15	Promote the use of standard terminology by presentation of the database tool to relevant parties and active facilitation of its use and will review the need for further action	●	●		Jan 07	Complete
Loss of Control						
Freezing Residues						
2.21	Investigate the causes of de-icing fluid residues that may freeze and methods for mitigating them, in conjunction with the relevant SAE group	●	●		Apr 09	Oct 06 in Safety Plan 2006/07 (action content revised to add "in conjunction with the relevant SAE group")
Contaminated Runways						
2.23	Facilitate research on measuring runway friction, linking ESDU expertise with performance specialists at Boeing and Airbus	●			Nov 09	On track
Handling Engine Malfunctions						
2.24	Review the PSM+ICR report's recommendations and their application and effectiveness in the UK	●	●		Oct 06	Complete
2.25	Submit recommendations for actions related to PSM+ICR to EASA		●		May 09	On track
2.26	Complete and distribute a turboprop engine failure awareness video	●	●		Jul 06	Complete
Continued Airworthiness of Composite Structures						
2.27	Complete research into reliability of visual inspection on composite structures. Results will be reviewed for potential use in engineer training or industry guidance	●			Feb 09	On track
Controlled Flight Into Terrain						
Approach and Landing						
2.30	Complete the design and assessment work for the six GNSS trial approaches	●	●		Dec 06	Complete
Crew Resource Management						
2.36	CAA to encourage operators to review training procedures on how to deal with GPWS alerts	●	●		Feb 07	Complete

Action Number	Action	Referenced in: SP 06/07	SPUD 07	SPUD 08	Deadline	History of changes to deadlines
LARGE PUBLIC TRANSPORT AEROPLANES continued						
Controlled Flight Into Terrain continued						
Crew Resource Management continued						
2.37	Review CAP 516	●	●		Jan 07	Complete
Fire						
Cabin Crew Fire Training						
2.38	Carry out Training Needs Analysis	●	●		Apr 08	Sep 07 in Safety Plan 2006/07
Operational Implications of Integrated Fire Suppression Systems						
2.41	Work with the International Fire Test materials Group to establish operational policies to reduce flammability risks	●			Dec 08	On track
2.42	Manage internationally funded research studies to develop the Integrated Fire Suppression System concepts, in particular operational aspects. Coordination through the Systems Fire Protection Working Group and the Cabin Safety research Technical Group will result in research reports and concepts to reduce flammability risks	●			Dec 08	On track
Dangerous Goods Information						
2.45	Study of the effectiveness of dangerous goods information provided to passengers at airports		●		Dec 09	On track
Fuel Cell Fire Safety						
2.46	Co-operative study with FAA		●		Apr 09	On hold
AIRSPACE						
Mid-Air Collision						
Public Transport Operations Outside Controlled Airspace						
3.2	Continue implementation of the NEAT recommendations	●	●		Dec 06	Complete
Use of Airborne Collision Avoidance Systems						
3.4	Review the requirements for general aviation flight crew training in the use of ACAS	●	●		Apr 07	Complete
Airspace Infringements						
3.5	In conjunction with NATS, investigate, propose and co-ordinate an education programme for NOTAM users, primarily focused on the GA community. In addition, investigate with NATS improved methods linking NOTAMS associated with the same event	●	●		Jan 07	Complete
Level Busts						
3.6	Analyse level bust incident data for the periods Feb-Jul 2005 and Oct 2005-Mar 2006 and ascertain whether a 5% improvement in the yearly moving average number (or rate) has been achieved	●	●		Mar 06	Complete
UK Operational Policy and Procedures for UASs						
3.7	The CAA continues to work with other Government agencies in developing and establishing UAS policy and regulation	●	●		Apr 08	On track
AIRPORTS						
Runway Incursions						
4.1	Monitor ongoing actions and analyse the resultant change in runway incursion rates per movement for the period Apr 2005 to Mar 2006, based on the established rate per movement in Apr 2004 to Mar 2005, with a target reduction of 5%	●	●		Apr 06	Complete

Action Number	Action	Referenced in: SP 06/07	Referenced in: SPUD 07	Referenced in: SPUD 08	Deadline	History of changes to deadlines
AIRPORTS continued						
Apron Safety						
4.4	Follow-up actions from joint CAA/HSE audits completed, timescales subject to Industry consultation	●	●		Dec 06	Complete
Bird Strike Reporting						
4.5	Publish a report considering the completeness accuracy of bird strike reporting in the UK	●	●		Sep 06	Complete
4.6	Publish a revised CAP 680, Aerodrome Bird Control [CAP 680 has been replaced by CAP 772)	●	●		Apr 07	Dec 06 in Safety Plan 2006/07
LARGE PUBLIC TRANSPORT HELICOPTERS						
Helicopter Airworthiness						
5.4	Present to EASA all available information on helicopter emergency flotation systems, in particular the side floating scheme	●	●		Jul 06	Jun 06 in Safety Plan 2006/07
Operational Safety						
5.10	Publish final report detailing operational trials of ACAS II on North Sea helicopters	●			Sep 08	On track
GENERAL AVIATION						
General Aviation Aeroplanes						
Low Powered Light Aviation SSR Transponder (LP-LAST)						
6.6	Launch a Regulatory Impact Assessment considering the wider carriage of transponders	●	●		Jun 06	Complete
Gyroplanes						
Aerodynamic Characteristics						
6.11	Assess the handling qualities of a two seat gyroplane type. Consider regulatory action in line with that taken for single seat gyroplanes	●	●		Oct 06	Complete
Gyroplane Pilot Licensing						
6.15	The CAA will review 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	●	●		Dec 06	Complete
Training of Gyroplane Pilots, Instructors and Examiners						
6.18	The CAA will review the training arrangements for gyroplane pilots, instructors and examiners, in consultation with industry, with a view to revising training syllabus and materials	●	●		Dec 06	Complete
Ballooning						
Passenger Brace Positions						
6.20	Sponsor a study to determine the most effective brace position on landing and improve understanding of balloon crashworthiness	●	●		Oct 06	Complete
SUPPORTING APPROVED ORGANISATIONS						
Competence of Key Personnel						
7.1	Produce guidance material for the assessment of persons nominated as accountable managers and posts that are crucial to safety	●	●		Sep 06	Complete
Safety of 'Light' Jet Operations						
7.13	Conduct a study of lighter jet operations in the UK, to ascertain whether the safety of this class of operations is in need of further attention	●	●		Dec 06	Jul 06 in Safety Plan 2006/07
Ground Handling Operations						
7.18	Conduct a systematic top down analysis of safety risks that could arise from the aircraft time on the apron and recommend actions		●		Mar 07	Complete
Safety Management Systems						
7.22	Complete roadshow events for safety managers		●		Jun 08	