Safety review of offshore public transport helicopter operations in support of the exploitation of oil and gas

Progress report – 2016

CAP 1386

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Foreword

Between 2009 and 2013 there were five significant accidents in the UK offshore helicopter aviation sector, two of which tragically resulted in fatalities. Following these accidents, the CAA Board commissioned a comprehensive review of the safety of offshore helicopter operations (CAP1145, published 20 February 2014). The review resulted in a number of wide ranging recommendations and actions to improve safety standards. The review made clear our determination to implement these actions and recommendations as swiftly as possible.

In January 2015, we published CAP 1243, a Progress Report outlining the advances being made against the actions and recommendations. The report described how significant and important progress had been made towards improvements in offshore helicopter safety, such as flights no longer taking place over the most extreme sea conditions and passengers being equipped with new and improved Emergency Breathing Systems (EBS) with the associated training having been completed.

Since the publication of the progress report, we have continued to work closely with industry and the European Aviation Safety Agency (EASA) to complete the remaining actions and recommendations. Passengers are now seated next to emergency exits that correspond to their body size, EBS was introduced for offshore flight crew from April 2016, and we have made good progress to implement new proposals for safety improvements at Normally Unattended Installations (NUIs).

The majority of the actions and recommendations are now completed and we have identified a number of ongoing workstreams to ensure that we continue to see improvements in offshore helicopter safety. This further progress report details the completed actions and recommendations and highlights the ongoing work streams. The CAA intends to continue its efforts through close collaboration and support with stakeholders, and further progress will be measured and reported as part of the developing role of the Offshore Helicopter Safety Action Group (OHSAG)[1] following this publication.

We are pleased that there continues to be a strong collective commitment to change, which is evidenced by the co-operation received from all parties represented by the OHSAG and its Technical Sub Group. This forum has proved to be an excellent catalyst for increased dialogue between helicopter operators, the oil and gas industry, employee

[1] The CAA established a new top level group to drive change, the Offshore Helicopter Safety Action Group (OHSAG) that includes unions, CEOs from the helicopter operators, representatives from the oil and gas industry, Step Change in Safety and the CAA.

representatives, helicopter manufacturers and regulators. We are strongly committed to ensuring that this co-operation and commitment extends beyond the implementation of the actions and recommendations and that the work of the OHSAG will remain focussed on achieving real steps in reducing the number of safety occurrences.

The ultimate aim is for rotary wing safety performance to be on a par with large commercial fixed wing operations; recent events have only served to reinforce the need for the relative safety performance gap to be reduced. To do so, the focus needs to be on prevention, as opposed to survival, through helicopter design improvements. In this regard, our ambition is to have a defined certification strategy where rotary wing can realistically approach commercial fixed wing safety and reliability performance. The CAA and the OHSAG have no direct means to secure these design ambitions and, as such, we will continue to work closely with EASA and support all necessary EASA working groups to assist in this objective. We are pleased to be participating in the work currently undertaken by EASA as part of their Safety Risk Portfolio – Offshore Helicopter Operations. It is clear that EASA is devoting significant energy, time and expert resources into this activity. This work provides an opportunity for real and lasting progress in this area. We also acknowledge and welcome the initiative, announced in August 2015 by EASA, to commission an independent study into Helicopter North Sea Operations Management Current Practices Safety Review and have already provided them with the requested information to assist them in their task.

The safety of those who rely on offshore helicopters remains our priority; the CAA is committed to continuing to work with industry to take the further steps needed to secure the long term change envisaged by the review, even against the challenging financial conditions in which the oil sector is trading at present. The next step will be to define the future role of OHSAG post this report with an ambition to continue to influence and improve safety standards and performance for this sector and the workforce. We are also now working with the emergent offshore renewable energy industry to ensure that lessons learned from the oil and gas industry experience can be suitably incorporated into this expanding aviation sector.

Mark Swan

Group Director, Safety and Airspace Regulation, CAA

Introduction

In February 2014, we published a Safety Review ('the Review') of offshore helicopter operations (CAP 1145). The Review examined the risks to helicopter operations to support the oil and gas industry in and around the North Sea. It was conducted in conjunction with the EASA and the Norwegian Civil Aviation Authority and was peer-reviewed by independent experts. It identified a wide range of opportunities to improve the safety of those operations and, in particular, to increase the chances of passengers and crew surviving an accident.

In total, the Review listed 32 actions and 29 recommendations that would all contribute towards the end goal of improving the safety of offshore helicopter operations. Some of these would necessitate long term changes in areas such as helicopter design and others could be implemented almost immediately, and have an instant impact on survivability.

About this report

We stated that we would report publicly on the progress of all actions and recommendations in the Review. Our first progress report (CAP 1243) was published in January 2015, and provided an update on progress at that date. This report provides an update to the January 2015 report, highlighting where further progress has been made against the remaining actions and recommendations, and where we have identified further work streams to continue to improve the safety of offshore helicopter operations. This will be the final CAA report on progress, with the newly re-formed Safety Action Group producing future reports.

Appendix A summarises progress against each action and recommendation. The majority of actions and recommendations have now been completed. The table in the Appendix also shows where further work streams have been identified.

Chapter 1

Passenger safety and survivability

The evidence presented in the Review showed that just over half of the accidents in which offshore helicopters impacted the sea between 1976 and 2012 in the UK were potentially survivable. However, these accidents led to 38 fatalities. CAP 1243 highlighted several areas where significant progress had been made in improving the protection of passengers in the event of an accident, including:

- improving the chances of a safe rescue from the sea by prohibiting operations over sea conditions exceeding 6 metres significant wave height;
- reducing the risk of capsize in a ditching by prohibiting operations over sea conditions exceeding the certified ditching performance of the helicopter;
- reducing the likelihood of the helicopter sinking by requiring helicopter operators to ensure that the Emergency Floatation System (EFS) is armed for all overwater departures and arrivals;
- increasing underwater survival time to improve the chances of escape from a capsized helicopter through the introduction of new improved Category A Emergency Breathing Systems[2] (EBS) for all passengers;
- introducing a new standardised clothing policy to ensure core body heat is retained while waiting for rescue.

All of these measures, except the last, were mandated by CAA Safety Directive SD-2014/001 (issued on 21 May 2014), subsequently replaced by SD-2014/002 (issued on 14 October 2014) and then SD-2015/001 (issued on 28 January 2015). Since then, significant progress has been made in introducing new requirements relating to the compatibility of passenger body size and underwater escape exit (window) size. Further work has also been performed in the areas of EBS training and extending EBS to flight crew on offshore helicopters. The current Safety Directive (SD-2015/005 issued on 8 December 2015) introduced cover for support to Lighthouse Authorities and, in response to concerns raised by the industry, also introduced alleviation for the carriage of EBS for medically incapacitated passengers. An additional alleviation has been provided against the operating rules for such passengers in respect of life jackets and survival suits.

[2] Category A EBS is one that may be deployed underwater within the breath-hold time of the user and using only one hand. CAA published CAP 1034 in May 2013 to define a draft technical standard for these systems. CAA is currently participating with EASA in the development of a European standard that will incorporate the draft CAA standard and the experience gained during the CAA approvals of EBS for passengers and crew.

As a result of the aforementioned safety directives, we believe that the exposure has been reduced and that, in the event of service difficulties over water, the changes introduced should greatly improve the chances of survival.

Passenger size versus window size

As described in CAP 1243, the action that received the most publicity at the time the Review was published was around passengers' body size. The Review highlighted that if passengers cannot fit through the push-out windows that form the underwater escape exits, they were not only at greater risk themselves, but they also potentially increased the risk to their fellow passengers, whose access to an exit might be blocked. The Review stated that from 1 April 2015, helicopter operators would not be allowed to carry passengers who could not fit through the push-out window exits. This action led to discussions with the Trade Unions and the Transport Select Committee, who were concerned that the Review action may result in some offshore workers being prevented from flying offshore. This was not the intention of the Review, and we worked closely with Step Change (SC[3]), helicopter operators and experts at Robert Gordon University (RGU) to identify a suitable solution that would address these concerns without compromising the safety objective.

In January 2015, a minimum width and diagonal measurement had been established and agreed for push-out window exits. Earlier research performed for the CAA had indicated that the width of the opening should correspond to the passenger's chest depth and the diagonal to their shoulder width. Results from the ongoing study at RGU indicated that only shoulder width needed to be considered; if a passenger's shoulder width was within prescribed limits, then their chest depth would be too.

SC conducted an initial campaign to measure all offshore workers in early 2015, and over 40,000 had been measured before the 1 April 2015 target date. This figure represented 100% of the core workforce and 50% of those who travel less frequently. Of all the workers measured, just under 3% had a shoulder width exceeding the minimum window diagonal and were classified as XBR (Extra Broad). Under the scheme agreed, XBR passengers are now seated next to the larger exits that are required under the Airworthiness regulations on all helicopters and which have a diagonal measurement and width large enough for any passenger. To ensure that passengers are seated correctly in the helicopter, XBR passengers now wear a chequered arm-band and the seats suitable for them are identified with a matching chequered head rest cover. From 1 April 2015, all passengers are now seated next to exits large enough for their body size and are checked by the helicopter flight and ground crews before takeoff as part of standard pre-flight procedures.

[3] Step Change in Safety (SC) is a not for profit tripartite organisation (representing the workforce, regulators and employers) with an overall aim of making the UK the safest place to work in the global oil and gas industry. SC is independent of Oil & Gas UK.

Emergency Breathing Systems

Since 1 January 2015, all passengers have been required to wear suitable Cat A EBS (CAP 1034 Category A). In our previous progress report, we described how this had been introduced ahead of schedule for all passengers on 1 September 2014, and how the oil and gas industry had worked hard to provide the basic training required on EBS usage to all offshore workers.

In response to a recommendation in the Review (R07), the Offshore Petroleum Industry Training Organisation (OPITO) has been leading on a review of the broader safety and survival training provided to offshore workers. A working group was formed in Autumn 2014 to perform a review of the industry standard, and the initial focus was on training for the new Cat A EBS. The Basic Offshore Safety Induction and Emergency Training (BOSIET) and Further Offshore Emergency Training (FOET) initially continued to use the earlier hybrid EBS for in-water training after the introduction of the Cat A EBS, which raised pertinent questions regarding the possibility of 'negative transfer of training'. The most obvious solution would be to replace the hybrid system with Cat A EBS.

Using Cat A EBS in-water, however, is currently considered by the Health and Safety Executive (HSE) to fall within the scope of the Diving At Work Regulations (DAWR) due to the use of compressed air. Consequently, the training for the new Cat A EBS currently comprises 'dry' poolside/classroom training only. All in-water training using the earlier hybrid EBS has ceased, however, which will avoid any negative training transfer. Drawing on favourable experience in Canada, in July 2016 HSE agreed in principle to exempt 'shallow water' Cat A EBS training from the DAWR. If implemented, this will significantly improve the fidelity of the current EBS training and will represent a worthwhile step towards the ultimate goal of full in-water training with the new Cat A EBS.

In addition, we have been working with helicopter operators to approve and introduce EBS for flight crew in order to provide them with the same or equivalent benefits now available to their passengers. Slightly different Cat A EBS and associated lifejacket changes are required for flight crews to ensure that the equipment does not interfere with any controls or switches, or the pilots' ability to operate the aircraft in all normal and emergency conditions. A protocol for testing the suitability of the EBS for the flight deck environment has been agreed with the helicopter operators. Three flight crew EBS systems have been approved. EBS for flight crew was introduced into operations on time from 1 April 2016.

To ensure that the introduction of Cat A EBS in the UK is afforded a wider platform for international safety, a working group to produce a formal standard as a European Technical Standard Order (ETSO) for EBS has been established. Work is nearing completion and the ETSO is based on the CAA specification contained in CAP 1034, which has so far been used to approve the introduced Cat A EBS.

Longer term improvements

The Review also recommended that helicopter operators should consider addressing some of the survivability improvements under discussion in the EASA Rule Making Task on helicopter ditching and water impact survivability (RMT.0120). SC committed to investigate the feasibility of changes in this area, working with helicopter manufacturers and operators.

Since January 2015, we have confirmed with one UK operator that it is feasible for all of the key items identified in the Review's Recommendation (R05) to be retrofitted within 2 to 3 years, with the possible exception of the side-floating helicopter scheme. However, we are currently unaware of any voluntary activity in this area apart from work on handholds and revised push-out window pull-tabs performed by Airbus Helicopters for their helicopter types.

The RMT.0120 initiative has represented a major step forward and the associated working group has included extensive international industry and regulatory expertise. All of the Recommendation R05 items were included in the EASA Notice of Proposed Amendment (NPA) 2016-01 produced by RMT.0120 and published in March 2016. If adopted however, they will only be mandatory for new helicopter designs after any resulting rule changes have been introduced (Significant Design Changes as required by Part 21.101). EASA has agreed that RMT.0120 will continue its work and produce a further NPA to cover the retrofit of measures considered to be practical and proportionate for the existing helicopter fleet. This may eventually lead to the introduction of some of the Recommendation R05 improvements, but voluntary adoption would deliver the safety benefits much sooner.

The actions already mandated were originally introduced as short term measures pending the introduction of rule changes by EASA. In summary, improvements could be introduced more quickly either through EASA action or operators voluntarily applying these changes to their existing helicopter fleets based upon their individual Safety Management System's assessments, or by a contractual requirement imposed by the oil and gas industry.

Chapter 2
Operations

The actions and recommendations for operations were focused on the medium term, and the CAA has continued to work with helicopter operators and the wider oil and gas industry to agree the most effective ways to raise safety standards.

The previous progress report highlighted that advances had been made in the areas of:

- The Safety Management System (SMS) and the identification of a list of top ten safety issues, suggestions for mitigation and meaningful measures of their performance;
- Minimising the risk of post-crash fire;
- Reviewing operations at smaller helidecks;
- Reviewing night operations;
- Raising the standards of pilot training.

Work in all of these areas has been ongoing, with significant progress being made in relation to minimising the risk of fire. The engagement of helicopter operators, manufacturers and Oil & Gas UK has been vital to this work.

Adopting a more consistent approach to safety

Following the SMS symposium held in Aberdeen during July 2014 and the identification of the top ten safety issues, suggestions for their mitigation and meaningful measures for performance, a member of the CAA Intelligence Team has been working closely with the three Aberdeen-based offshore helicopter operators to progress a collaborative project to raise the quality of the safety data collected and its subsequent analysis.

As part of the CAA's risk assessment and management strategy, we have used bowtie barrier risk modelling techniques. One strength of the barrier approach is as a qualitative tool which is adaptable to deliver practical solutions to the challenges of risk assessment in the dynamic environment of aviation operations. Moreover, the output of a bowtie can be shared with, and taken up more widely, by stakeholders as part of their SMS and risk mitigation strategies. As such, the CAA has developed 5 specific bowties as part of this work, which focus on:

- Helicopter approach to a fixed unmanned North Sea installation;
- Helicopter approach to a small North Sea vessel, with a loss of terrain/obstacle separation;

- Helicopter approach to a large North Sea vessel/mobile installation, with loss of terrain/obstacle separation;
- Helicopter approach to a fixed manned North Sea installation, with loss of terrain/obstacle separation;
- North Sea helicopter operating en-route with automation, with deviation from desired flight parameters.

The CAA's aim is to acquire further feedback of these initial bowties from front-line industry operational staff as a validation exercise before finally publishing the results. While these models were developed from the safety issues identified at the SMS symposium, it has become clear that there may be other topics which could also benefit from this process, which will be explored with operators as the subject matters arise. The bowtie models will be used to further develop our candidate Safety Performance Indicators (SPIs) with industry to facilitate the creation of an offshore helicopter sector risk picture.

The use of the bowties and SPIs has helped to develop and inform the EASA safety risk portfolio for the offshore sector; work is ongoing with EASA and industry bodies to discuss alignment of strategies. The EASA Helicopter Accident Data Collaboration and Analysis Group (HADCAG) was tasked to analyse safety data to support the strategic risk assessments; the group has provided information to the Safety Risk Portfolio (SRP), the SRP is supported by industry and Aviation Authorities.

Industry Auditing

Oil & Gas UK is also continuing with its project to harmonise procedures for flight safety auditing. The project aims to identify and agree best practice standards for such audits, so that instead of undergoing multiple audits with slightly different demands for each customer, helicopter operators will increasingly be asked to demonstrate how they meet common standards. The project has delivered a toolbox which is now fully operational and consists of audit schedules, a pre-audit questionnaire, audit templates and a feedback form. As feedback is received, the process and documentation will be reviewed to ensure it remains fit for purpose.

The new approach has been adopted by industry and Oil & Gas UK continue to work to encourage full uptake. The industry Management of Aviation Guidelines have also been revised and strengthened to reflect the new process and will be published during 2016.

Reviewing and reducing risks around helidecks

One of the longer term intentions of the Review was to improve safety on helidecks. In May 2015, we consulted with industry on the options available to the CAA to assume responsibility for certification. We received 20 responses to the consultation from a wide range of organisations, and a way forward was identified and proposed to the OHSAG for agreement.

The OHSAG was supportive, but the proposed scheme cannot be implemented without appropriate legal authority. This will likely take several years to establish due to the particular legislation change process. In the meantime, we plan to enhance our oversight of helidecks using existing CAA resources and work towards the desired final solution in collaboration with HCA.

Minimising the risk of post-crash fire

The Review endorsed our long-held position that post-crash fire, which presents a major risk for helicopter safety and occupant survivability, is a reasonably foreseeable event following a helicopter accident on a helideck. Helicopter operators had previously raised their concerns that the fire-fighting provisions at a significant number of helidecks located on Normally Unattended Installations (NUIs) were insufficient to address a crash with fire.

As mentioned in the report, the CAA had published an enhanced requirement for fire fighting facilities at NUIs in CAP 437 but this had met with little progress. Significant debate has since taken place between regulators, helicopter operators and the oil and gas industry to resolve what additional standards and equipment are necessary and should be applied for NUIs. To assist and bring some independence and fresh thinking on this issue, the CAA commissioned Cranfield University to undertake a detailed review of the case for and against improved fire-fighting systems on NUIs. Their independent Cranfield University report stated that “OGUK, the aircraft operators, BALPA, HCA, HSE and CAA must work together to agree a way forward. The discussion should focus on how the reasonably foreseeable event of a helicopter on fire on a NUI helideck can be mitigated against.”

To move matters forward, we conducted a bow-tie risk assessment that was generated in collaboration with industry and produced a working paper for OHSAG consideration which focused on the 3 key items. The key items related to: engine failure accountability during take-off and landing; crash resistant fuel systems; and the availability of automated helideck fire fighting facilities in relation to the frequency of operations to the helideck. This has generated further debate and review with industry and a revised plan has been drafted to provide an achievable and proportionate solution bearing in mind all the relevant constraints.

The way ahead includes the following:

- All new build unattended helidecks must have automated helideck fire fighting facilities as detailed in CAP 437.
- Current NUIs:

  A safety case provided by aircraft operators that describes in detail the operation (number of flights / day / night operations), aircraft types (including certification standards and configuration), fire fighting provisions, etc, to manage and minimise

risk. In the absence of an acceptable safety case the following will form the basis for mandatory application.

a) For any decks which do not comply with the requirements for the installation of an automated fire-fighting system, it is proposed to apply an annual limit for landings when the helideck is unattended to constrain overall exposure. In addition, operations to such decks should not take place at night unless a circle and H helideck lighting system compliant with CAP 437 Appendix C is fitted.

b) When helidecks without an automated fire-fighting system are attended by personnel trained in the use of the fire-fighting equipment that is available, operations may continue until a cut-off date which will be set following industry consultation.

c) From the cut-off date, however, the fire-fighting facilities must meet or exceed the Rescue and Fire Fighting Service (RFFS) provisions of the minimum ICAO Annex 14 Volume II surface level standards for H1 or H2 helicopters as applicable and as referred to in CAP 789.

d) It is proposed that helidecks without an automated fire-fighting system that do not upgrade to the level stated in c) above by the cut-off date will be subject to an annual limit for landings.

To ensure evenness, the means of implementing the determined safety measures will most likely be through an Operational Directive applicable to all operations conducted on the UK Continental Shelf.

Raising the standards of pilot training

The Review identified a number of areas where pilot training could be further improved, with the aim of reducing the number of accidents and near accidents that occur as a result of Human Factors.

We have examined the output of our review into the safety of large UK commercial air transport aeroplane operations for relevance and applicability to the offshore environment, and we have integrated this work into a CAA joint fixed and rotary wing group in order that common issues affecting both communities can be assessed and resolved in an efficient and joined up manner. A further joint fixed and rotary wing group has also been initiated at EASA to discuss moving towards Evidence Based Training (EBT) and the CAA will contribute to this work programme.

We have also reviewed our examiner assessment protocols to include specific competencies so that industry senior examiners can identify trends in common failings through their company Safety Management Systems and take appropriate and timely interventions.

The training of Flight Crews for the offshore role and establishment of Standard Operating Procedures against the manufacturers' operating philosophy is now underpinned by the publication of the first Flight Crew Operating Manuals (FCOM). Whilst this has been slow to develop across all manufacturers, its introduction sees a significant safety enhancement. EASA is actively supporting such initiatives and has encouraged the manufacturers through the Operational Suitability Data (OSD) process.

Pilots' interaction with automation and complex flight displays remains challenging and has given rise to the CAA chaired Helicopter Automation Work Group. This collaborative industry/regulator group has collated an active issues list which identifies a number of key areas including important disparities between aeroplane and helicopter certification material where the latter would benefit from additional detail. This means manufacturer innovation directly translates into training needs as pilots move between a variety of flight display layouts and systems. EASA has also specifically identified section 2X.1302 of the Certification Requirements for human factors and this is foreseen in its rulemaking inventory.

Pilot AOC training programmes have been modified to take account of instrument scan techniques on complex electronic flight displays. Likewise, the role of the monitoring pilot has been reviewed and implemented by AOCs taking into account extant CAA material written for airline operations. Recent CAA work has seen a review of these training programmes to assess their effectiveness.

Operator policy rightly identifies the most appropriate use of automation, but pilots must be able to readily revert to manual instrument flying skills when required. The review of revised operator training indicated that AOCs are specifically addressing this need in the flight simulator setting.

The introduction of Operational Suitability Data (OSD) by EASA for the newer types and aircraft still in production has now seen a more interactive use by AOCs who have modified training programmes to take account of those training areas needing special emphasis. The CAA and EASA actively support the Automation Work Group; this group has also identified a need for the OSD to be a live document reflecting ATO and operator feedback through Safety Management Systems.

Flight Data Monitoring (FDM)

It had been anticipated that the helicopter operators' Flight Data Monitoring (FDM) programmes would provide further objective information on operational issues to obtain a better understanding of the factors which underlie operational cause accidents. This proved not to be the case and scope for improvement of the current, voluntary FDM programmes has been identified. The CAA will seek to improve the intelligence generated from FDM by working with the industry to improve their programmes. This will be realised in the form of guidance on best practice to support the new European Air Operations

Regulations for offshore operations (SPA.HOFO) which will take effect from mid-2018 and which mandate FDM for large CAT helicopters.

The CAA proposes to commence preparations for the mandate by working with the UK helicopter operators and EASA to produce this best practice guidance material for offshore Helicopter FDM (HFDM). The objective will be to assist operators to consolidate and enhance their existing HFDM programmes. In particular, the following will be investigated:

- new or revised ‘events’ or ‘measurements’ to monitor for adherence to company Standard Operating Procedures (SOPs);
- the introduction of HFDM-based Safety Performance Indicators (SPIs);
- the use of HFDM to support Evidence-Based Training (EBT).

Chapter 3
Airworthiness

The Review pinpointed a number of opportunities for short and medium term actions to reduce risks around maintenance processes and standards. Immediate steps were taken to conduct further research or to formally review existing certification standards.

We have continued to work closely with EASA; since the publication of the Review and the Progress report we have met on a regular basis to discuss progress on the actions and recommendations, which will continue beyond closure of the actions and recommendations.

Understanding technical failures and failure alerts

One of the considerations made during the Review is that ditching in hostile waters around the UK can be a risk to passengers. A ditching may be required should a significant technical failure occur, which identifies a “Land immediately” action to be carried out by the crew. Technical failures should be minimised through high helicopter certification design standards and good maintenance practices. Technical failures cannot, however, be entirely eliminated and every opportunity should be taken to minimise false warnings that may result in unnecessary ditching of the helicopter.

We have worked together with the helicopter operators to establish the frequency of false engine fire warnings/alerts. EASA and the Federal Aviation Administration (FAA) have reviewed the data provided by the CAA, and the Helicopter Type Certificate holders have taken specific actions to ensure the improved reliability of these systems. The CAA fully supports EASA in its commitment to the monitoring of reported occurrences to assess the need for evaluation and continuous improvement and evolution of standards and practices.

We will continue to work with the UK helicopter operators to ensure that any occurrences reporting a trend of unreliable fire warning systems and any other safety issues are brought to the attention of the EASA, especially those that could lead to a “Land immediately”. In the review, the CAA proposed that there could be benefits from developing an Extended-range Twin-engine Operational Performance Standard (ETOPS) approach for helicopters to improve system reliability ETOPS for those helicopter systems which could lead to a “Land immediately”. Constructive conversations have taken place with EASA on this potential area for safety performance improvement. As a result, EASA looked at whether helicopters operating offshore over a sea hostile environment could benefit from an improved diversion capability and considered feasibility of applying some of the main principles used for Extended Range Operations (EROPS) approval of large commercial fixed wing aircraft. The conclusion of this EASA review, considering helicopter design, was that it should be possible to identify systems similar to those of ETOPS

Significant Systems for fixed wing aircraft. This approach would allow the manufacturer (TC Holder) to substantiate a minimum time period for these systems to continue operating in the event of a malfunction, thus providing sufficient time to make a safe landing.

As a result of EASA's analysis performed on ETOPS and in reviewing occurrence data, EASA considers that airworthiness action to improve helicopter safety could be best managed by addressing each of the identified systems individually through dedicated requirements that improve reliability, as for example is currently being done for loss of oil under RMT.0608.

The CAA acknowledges this as a good start and will continue to offer support to EASA in developing this further.

Critical parts

The Review recommended several changes to the way that critical parts are identified, classified, and how their performance is monitored in-service. EASA has reviewed these recommendations and listened closely to the CAA's concerns. Our ambition is to afford Large Commercial Offshore Helicopters the same, or at least, comparable levels of integrity as that required by the EASA and the FAA for aircraft engines fitted to Large Commercial Fixed Wing aircraft. EASA has made some progress in this area by issuing a number of Certification Memorandum, which provide complementary information and guidance for demonstrating compliance during helicopter certification. These Memoranda do not introduce any new certification requirements but seek to ensure robust application of existing requirements throughout the life of the rotorcraft. It is acknowledged that earlier improvements to the fatigue and damage tolerance requirements applicable to all critical parts have been implemented on rotorcraft certificated in recent years. These improvements, in time, should demonstrate tangible improvements in safety performance.

CAA is keen to ensure that the attributes of EASA Certification Specifications of CS-E[4] are considered as part of assessing further enhancements to the rotorcraft Critical Part requirements in order that we can obtain the highest levels of product integrity and minimise technical malfunctions potentially leading to hazardous or catastrophic failure The EASA memo changes do not fully address all the differences between current specification standards and CS-E. The CAA also fully understands that harmonisation with the FAA is an important issue to ensure as far as possible a common standard and a level

[4] CS-E is the EASA Certification Specification for aircraft engines and it defines the safety and reliability requirements for engines to be used in civil aircraft. In respect of Critical Parts, CS-E includes well developed requirements for the design, test, reliability, integrity, identification, maintenance and modification of these parts. The requirements have been evolved over many years in response to service experience. These requirements drive detailed planning for manufacturing methods and controls, component lifing and life limit assumptions, monitoring of life and condition in service, and re-evaluation of service life in response to service experience. This approach has resulted in significant improvements in the reliability and integrity of modern jet engines.

safety playing field. The CAA has recommended that EASA carry out an independent review of Critical Parts, assessing the design, manufacture and maintenance aspects by looking closely at current industry practice/performance, comparing this with the minimum certification standards, CS-E, and assess gaps / differences and identify any areas for improvement and or standardisation.

To ensure that the status of critical parts is raised, the CAA issued an Information Notice (IN-2016/026) in March 2016 to ensure that staff who work in helicopter continuing airworthiness organisations are aware of these parts and the procedures to be followed on the types they work on. This notice will be directed to UK Part M, 145 and 147 organisations. This will cover initial, type specific and continuation training.

Ensuring Vibration Health Monitoring (VHM) is applied consistently

We have reviewed CAA guidance material (CAP 753) and have made amendments to reflect the EASA Certification Memorandum CM-DASA-001, which clarifies the terminology and the alert generation systems to ensure consistency.

We have carried out a series of focussed audits of offshore helicopter operators' VHM systems to ensure that the necessary standards are obtained. We have also provided specific training to CAA Airworthiness Surveyors within the Airworthiness Rotorcraft Sector Team on VHM to improve their technical knowledge as part of upskilling for surveillance and oversight.

Since the Review was carried out, HeliOffshore has been formed and has produced a HUMS Best Practice Guidance which draws upon the in-service experience of a number of experts and Helicopter Operators and should assist other countries in applying VHM. The material within this guide complements CAP 753.

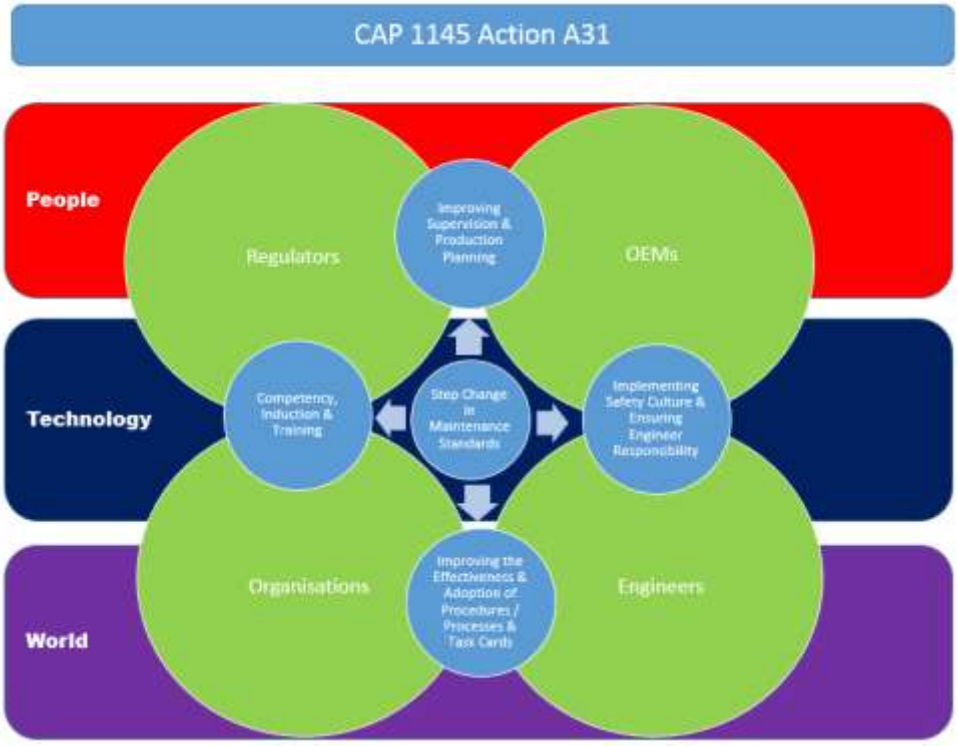
Continuing Airworthiness

Step Change in maintenance standards

Following publication of CAP 1145, the CAA Airworthiness Senior Management met with the Heads of Engineering of the three offshore operators in Aberdeen to initiate discussions on how to launch the A31 initiative and form a Maintenance Standards Improvement Team (MSIT). It was agreed that, as the maintenance engineering issues are fundamentally common across Airworthiness, the team should include representation from the large commercial fixed wing aircraft maintenance community. It was believed that both sectors could learn from each others' experience, and that this ultimately could result in wider and more long lasting benefits (British Airways and Monarch were actively involved in supporting the MSIT). EASA, the Original Equipment Manufacturers (OEMs) and the

Confidential Human Factors Incident Reporting Programme (CHIRP) were invited to join the A31 MSIT team to provide input, challenge and independence.

Through workshops and sub team meetings, the MSIT agreed that the team should focus as far as possible on four key areas that are supported by a larger framework as shown below:



Four main communities (Regulators, OEMs, Organisations and Engineers/workforce) are key to improving maintenance standards, and significant performance improvements require each to be ambitious and make improvements and changes with lasting effect.

Regulators

The CAA is implementing a Performance Based Regulation (PBR) approach, which in Airworthiness has already significantly changed the oversight process, moving away from more traditional survey/inspection to being more targeted by agreeing the key themes and improvement areas based upon sector risk pictures. We are applying resource to risk and making more time available for the more complex and safety significant maintenance organisations, spending more time in the hangar and on the ‘shop floor’, being more visible and available to observe and understand the underlying issues. PBR also allows us to spend more time in preparation, gathering intelligence, as well as participating in Safety Action Groups (SAGs) and Reliability meetings. By doing this we are able to be more engaged with Engineering and ensure that we are having the right conversations with Key post holders.

The CAA has been working very closely with EASA in ensuring that all parties are better informed of emerging service difficulty issues. In this way, maintenance error issues that

frequently occur, particularly when these are across the sector and internationally, can be escalated in an attempt to seek design changes as opposed to short term re-training and procedural/process changes that in themselves are not sufficiently resilient to the pressures associated with the typical line and base maintenance environment.

Original Equipment Manufacturers (OEMs)

OEMs can harness new technology by innovation in their new designs, product improvements and maintenance practices to minimise maintenance and improve reliability and performance. Where such improvements can be accomplished, they should be implemented as far as possible on a voluntary basis, as rulemaking and significant safety improvements can be protracted through the Part 21.101 Changed Product Rule[5]. We have seen some OEMs become closer to maintainers by providing staff on-site acting as mentors and advisors, as well as addressing supply chain bottlenecks that can lead to technical delays or unnecessary component swapping/robberies. Some operators have Power by the Hour (PBH) or similar agreements with the OEM or other providers, which can affect the spares supply chain.

Organisations

Maintenance Organisations can embrace modern techniques used in other sectors such as lean techniques. Although these techniques originated in manufacturing, they are starting to emerge in aircraft and component maintenance to make the processes more effective and support the engineers and mechanics with tools and materials and thereby minimising distractions and breaks in task.

The safety culture of an organisation is set by the key post holders and leadership team. Organisations that embrace safety culture audits and similar assessment methods to benchmark and monitor their continuous improvement have an opportunity to improve safety, the safety culture and performance.

Taking a different approach to Quality Assurance by empowering Engineering to take more responsibility and introduce new independent techniques such as Line Operations Safety Audits (LOSA) to assess what actually happens. This can enable audits to take place in a non-confrontational and anonymous manner.

[5] Changed Product Rule: This was developed as an international collaboration between EASA, FAA and Transport Canada. The objective of the rule was to move away from the old approach where the applicable certification requirements were based on those that dated back to the original approval of the type, and to the presumption that any new change ought to meet the latest requirements, subject to specified criteria. In principle, all significant changes to a product should be certified to the latest amendment level of the applicable requirements, unless the applicant can demonstrate that reversion to an earlier standard can be justified against the criteria defined in the regulation.

By making Production Planning a reality and not a burden, applying better techniques to assess the actual versus forecast manpower requirements, accounting for casualty (unplanned / unscheduled incidents) and ageing systems as necessary, means that engineers and mechanics have the best opportunity to complete tasks on time and to a consistently high standard.

We have supported the Government-funded trailblazer maintenance engineer apprenticeship schemes as we recognise that skills shortages across this and other UK engineering sectors is vital for the future success of the aviation industry in the UK.

Engineers

Engineers should take responsibility for their actions and behaviours; an engineering licence is issued in recognition of education, understanding and competence and, as such, is a privilege. It is important that engineers are empowered by their organisations to make decisions and that they have the right support, systems, tooling and infrastructure to perform their craft. The CAA recognises the need to work with maintenance organisations and engineers to ensure that we are aligned in our understanding of the risks and emerging issues. The CAA will look at restoring communications similar to the Airworthiness Notices and receiving feedback either directly or through industry bodies on key issues and challenges.

Review of processes that define when strip reports[6] are required

The CAA has been working with a number of major helicopter maintenance providers and OEMs to ensure a common understanding of why UK maintainers have apparently struggled to receive strip reports designed to better inform them about the performance of their helicopter operations. The CAA has progressed this through the Technical workstream of the Offshore Helicopter Safety Action Group. The CAA has reviewed the OEM processes, with regard to strip reports on request. The CAA has confirmed through the Offshore UK Part M/145 Accountable Managers and Engineering Directors that they are still not all satisfied that all of the OEMs are fully addressing this issue.

Further meetings have been arranged with the relevant operators and this will include OEMs at a later stage with support from EASA as necessary.

Review of tail rotor failures

The offshore review included a section on tail rotor failures (TRF). The review highlighted an issue of the potential for a TRF to result in a ditching, and action A24 was included for

[6] Strip Report is a common term used for a request, made by an operator to a maintenance organisation or OEM, to provide a report of the investigation carried out during the repair of a specific failed item. This may include descriptions and photographs of the condition of any failed or worn components.

the CAA to review CAA Paper 2003/1 (Helicopter Tail Rotor Failures) to determine how well the recommendations have been taken forward and to assess if further action is necessary.

To address this action, a small CAA team was formed. The team leader had significant dialogue with all of the Helicopter OEMs (for current offshore types), offshore operators and some simulator manufacturers.

The results of the review indicated that there have been some improvements in reducing the likelihood or the consequence of a TRF since the issue of CAA Paper 2003/1[7]. Overall, however, there has not been significant progress in taking forward the recommendations of CAA Paper 2003/1. In the decade since the report was issued, there have been no accidents involving failure of the tail rotor or its drive system in the UK offshore sector, although there has been one incident (S-92 G-CHCK 2007) which could have had serious consequences due to high vibrations, and an incident in Norway involving an S-92 which had a Tail Rotor Control Failure due to a failure of a pitch change rod bearing; the aircraft made a successful recovery. This was less than could have occurred from simple statistical prediction.

The responses from the OEMs and Operators indicate that there are continuing advances in VHM technology and use. In particular, Advanced Anomaly Detection is being introduced for transmission VHM which may improve prevention of Tail Rotor Drive Failures (TRDFs). Early research into extending VHM to tail rotors themselves produced mixed results (see CAA Paper 2012/01).

The recommendations of CAA Paper 2003/1 are generally considered by CAA to still be valid, although the applicability of the failure simulation results to current offshore helicopters cannot be easily determined and a recommendation for further work is made for the EASA to work with the OEMs to carry out a detailed work assessment.

The design requirements relating to rotor blades and drive system have not changed since CAA Paper 2003/1 was issued other than an addition to AC 29.1585 in 2006. There has been no progress on the proposed EASA rulemaking activity RMT.0123. EASA's position is that their Safety Risk Portfolio (SRP) for the offshore activity has reviewed safety issues, fatal and non-fatal accidents over the last 15 years; tail rotor failure has not been ranked in the top priority list given no accident data evidence and as such is unlikely to be a top priority in the short term.

Notwithstanding the lower rank of these failures within the EASA SRP, CAA believes that there is scope for further improvement and recommendations are made in this respect, both for design requirement activity and for research into technology, which further improve the survivability and could possibly be fitted to current helicopters relatively easily. These design and research recommendations are for EASA to consider.

[7] CAA Paper 2003/1 Helicopter Tail Rotor Failures, Issued November 2003. Briefed to EASA June 2006.

Human Factor Errors

Technical malfunction and system reliability is the area where we are striving to make improvements in order to minimise the possibility of in flight technical issues that can increase pilot workload. The review highlighted that approximately 80% of all reports are due to technical malfunction associated with the design or production reliability, not maintenance. The Human Factor Maintenance issues are important, but, in context, only account for 20% of occurrences.

The Review of Human Factors Maintenance Error has now been published in the CAA report Aircraft Maintenance Incident Analysis (CAP 1367). This CAP provides a review of 5 years of data from the CAA MOR system and the Confidential Human factors Incident Reporting Programme (CHIRP)[8]/ UK Maintenance Error Management System (UKMEMS)[9] database of investigations.

This review provides useful information for any engineering organisation or operator wishing to look at potential safety risks and develop safety strategies to address them.

The review indicates that there is no significant change in reported maintenance error events. To address these issues, there are a number of action areas for the CAA to address:

The CAA should work with operators/organisations to provide guidance on how to identify best practice to identify and reduce the likelihood of errors occurring and the impact on aircraft safety.

That maintenance staff are fully aware of their responsibilities.

There is also a recommendation made to industry that Organisations should ensure that all of their staff should be made aware of and discuss relevant areas of this report during their continuation training or briefing sessions that focus on the above actions. They should review their procedures, working practices and highlight any occurrences where contributory factors have resulted in an installation error.

The CAA has already agreed with CHIRP that a further review will be carried out. CHIRP has already reviewed one year's data and we will produce a follow on report in 2016/17.

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[8] CHIRP: The UK Confidential Reporting Programme for Aviation and Maritime. The aim of CHIRP is to contribute to the enhancement of aviation safety in the UK and maritime safety worldwide, by providing a totally independent, confidential (not anonymous) reporting system for all individuals employed in or associated with these industries.

[9] UKMEMS: CHIRP collates the completed reports from participating UK organisations, disidentifying them and producing a consolidated database for use by participants. In this way, individual organisations can compare their own experiences with the wider UK industry.

Chapter 4

Improving knowledge and facilitating change

We continue to work with helicopter operators, manufacturers and the oil and gas industry to improve the quality and depth of information available about different aspects of offshore helicopter operations. This information is being used as a precursor to introducing Performance Based Regulation (PBR); we have begun work to identify a risk picture for offshore helicopter operations to enable this.

We will continue to support and promote actions to improve knowledge. As well as research projects, the commitment to ensure that information about offshore helicopter operations is tracked more systematically and that safety reporting data is viewed in greater depth continues. The new Regulation (EU) 376/2014 on Reporting, Analysis and Follow-up of Occurrences in Civil Aviation came into force on 15 November 2015. The regulation provides a significant enhancement of the previous Directive 2003/42/EC on occurrence reporting, and introduces specific requirements for follow up and analysis of occurrence reports. The regulation also includes the implementation of Just Culture, which ensures protection of information and informants (particularly between organisations and NAAs).

We have also studied the Norwegian occurrence reporting system to help identify opportunities to improve occurrence reporting in the sector in the UK. The study found that there are no clear reasons as to why there is a statistical difference between the number of safety occurrence reports filed in Norway and the UK. Although it is difficult to measure, it is possible that offshore reporting culture may play some part in this difference. As part of our ongoing work we will continually monitor UK occurrence reporting rates to identify any changes as a result of our projects. We will also compare the safety reporting data again in 2017 and report on our findings.

As part of the EASA Safety Risk Management (SRM) process, the Helicopter Accident Data Collaboration and Analysis Group (HADCAG), has completed the review of offshore accidents, initiated through Recommendation R1, and the results were published in the EASA Annual Safety Review 2014. An Offshore Helicopter Safety Risk Portfolio (SRP) has been established and will be reviewed in the future as more intelligence is gained.

Chapter 5
Next steps

This report has examined progress to August 2016 against the actions and recommendations of the Review. While the majority of the original actions and recommendations have been completed, the scope of some of them has expanded based on our findings from them, and we have been concentrating on building the evidence base to inform further action. These have resulted in a number of longer term ongoing workstreams being developed, which will be tracked through our internal processes.

We are committed to ensuring that any outcomes from these ongoing workstreams will be published externally where required. This will include publishing the results of our proposal to assume responsibility for the certification of UK helidecks and the next steps for us to take following the review of offshore communication and handling.

We will continue to be involved with the development of the future offshore helicopter operations approval regulation that was instigated by EASA. The publication of EASA Opinion 04/2015, detailing the proposed Specific Approval was delayed to allow inclusion of several aspects arising from the Review and the safety actions mandated by the UK Safety Directive. Working with EASA, the Norwegian and other affected Member States, improvements to the final regulation have been developed and agreed which address our safety concerns. In addition, further work has been performed to develop the acceptable means of compliance (AMC) and guidance material (GM) for the new rules. The new regulation requiring a Specific Approval for Offshore Operations (SAP.HOFO) was published in Commission Regulation (EU) 2016/1199 in July 2016 and will come into effect from 1 July 2018.

We are working with the emerging offshore helicopter sector supporting the renewable energy industry and helping to ensure that the lessons learned from the oil and gas sector experience can be incorporated at the outset. Excellent liaison and collaboration has been achieved between the industries, both nationally and internationally, and great strides are being made to establish effective and safe operations.

We are keen that the existing momentum built over the time since the review should continue. The working relationships established between helicopter operators, regulators, manufacturers, oil and gas industry and employee entities will continue to lead to further safety improvements and the continued growth of a strong safety culture across the offshore industry. This will require continued and significant investment by the industry.

As mentioned in the January 2015 progress report, the ability of the industry to change rapidly and address pressing issues has been amply demonstrated. We must all now continue to focus on the continuous improvement so that the likelihood of accidents and incidents occurring continues to decrease.

APPENDIX A

Progress at a glance

Actions greyed out were marked as complete at January 2015.

Actions

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A01	The CAA will establish and lead a new offshore operations safety forum to work for a substantial improvement in the safety of helicopter operations on the UK continental shelf.	Q3/2014	Complete		OHSAG established – See Improving knowledge and facilitating change, CAP 1243 www.caa.co.uk/cap1243
A02	The CAA will accelerate its work with industry to develop and apply Safety Performance Indicators to improve the effectiveness of helicopter operators' Flight Data Monitoring programmes.	Q3/2014	Complete		Bowtie models have been created and developed with operators and will be further developed into Safety Performance Indicators. Following completion of the work with industry, we have identified further work in relation to FDM and oversight processes. We will develop further bowties with industry which will be published on the CAA website – See Adopting a more consistent approach to safety, page 12.

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A03	The CAA will analyse lower risk occurrences (i.e. serious incidents and incidents) for the main areas of risk, technical and external cause occurrences in particular, in order to increase the 'resolution' of the analysis. This analysis will take the form of a rolling annual review of the last five years of occurrence reports.	Q3/2014	Complete		Detailed analysis presented at SMS Symposium, July 2014 – See Adopting a more consistent approach to safety CAP 1243 www.caa.co.uk/cap1243
A04	The CAA will work with the helicopter operators via the newly established Helicopter Flight Data Monitoring (FDM) User Group to obtain further objective information on operational issues from the FDM programme.	Q4/2014	Complete		The helicopter operators' FDM programmes did not provide the additional insight that had been hoped for. The CAA will seek to improve the intelligence generated by FDM by working with the industry to improve their programmes. This will be realised in the form of guidance on best practice to support the EASA SPA.HOFO mandate for FDM - See Flight Data Monitoring, page 16.
A05	With effect from 01 June 2014, the CAA will prohibit helicopter operators from conducting offshore flights, except in response to an offshore emergency, if the sea state at the offshore location that the helicopter is operating to/from exceeds sea state 6 in order to ensure a good prospect of recovery of survivors.	01-Jun-14	Complete		Prohibition in force – See Improving passengers' chances of rescue CAP 1243 www.caa.co.uk/cap1243

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A06	With effect from 01 September 2014, the CAA will prohibit helicopter operators from conducting offshore flights, except in response to an offshore emergency, if the sea state at the offshore location that the helicopter is operating to/from exceeds the certificated ditching performance of the helicopter.	01-Sep-14	Complete		Prohibition in force – See Reducing the risk of capsize in a ditching, CAP 1243 www.caa.co.uk/cap1243
A07	With effect from 01 June 2014, the CAA will require helicopter operators to amend their operational procedures to ensure that Emergency Floatation Systems are armed for all overwater departures and arrivals	01-Jun-14	Complete		Requirement in effect – See Improving passengers' chances of escape CAP 1243 www.caa.co.uk/cap1243
A08	With effect from 01 September 2014, the CAA will prohibit the occupation of passenger seats not adjacent to push-out window emergency exits during offshore helicopter operations, except in response to an offshore emergency, unless the consequences of capsize are mitigated by at least one of the following: a) All passengers on offshore flights wearing Emergency Breathing Systems that meet Category 'A' of the specification detailed in CAP 1034 in order to increase underwater survival time; b) Fitment of the side-floating helicopter scheme in order to remove the time pressure to escape.	01-Sep-14	Complete		Action complete, but effectively superseded by progress on A10 – See New EBS for all passengers CAP 1243 www.caa.co.uk/cap1243

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A09	With effect from 01 April 2015, the CAA will prohibit helicopter operators from carrying passengers on offshore flights, except in response to an offshore emergency, whose body size, including required safety and survival equipment, is incompatible with push-out window emergency exit size.	01-Apr-15	Complete		Scheme agreed with industry and implemented – See Passenger size vs window size, page 9.
A10	With effect from January 2015, the CAA will prohibit helicopter operators from conducting offshore helicopter operations, except in response to an offshore emergency, unless all occupants wear Emergency Breathing Systems that meet Category 'A' of the specification detailed in CAP 1034 in order to increase underwater survival time. This restriction will not apply when the helicopter is equipped with the side-floating helicopter scheme.	01-Jan-15 01 -Apr-16	Complete Complete for flight crew		Oil and gas industry brought effective date for passengers forward to 1 September 2015. All passengers now wear EBS – See New EBS for all passengers CAP 1243 www.caa.co.uk/cap1243; action completed in respect of flight crew - See page 10.
A11	The CAA will organise and chair an operator symposium on Safety Management to identify generic hazards, mitigations and Safety Performance Indicators for offshore operations.	Q2/2014	Complete		Symposium took place 2 July 2014 – See Adopting a more consistent approach to safety CAP 1243 www.caa.co.uk/cap1243

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A12	The CAA will review whether operations should continue at helidecks where the overall dimensions and/or loading values as notified for the helideck are insufficient to accommodate the helicopter types in use and take the necessary action.	Q3/2014	Complete		Review completed – See Reviewing operations at smaller helidecks CAP 1243 www.caa.co.uk/cap1243
A13	The CAA intends to assume responsibility for the certification of UK helidecks and will consult with industry to achieve this.	Q1/2015	Industry Consultation Complete. Scheme developed; awaiting changes to legislation.		The consultation (CAP 1295) was published on the CAA website in May 2015. Responses received to the end of July 2015 reviewed and scheme developed and proposed to the OHSAG. Pending changes to the legislation. See page 13.
A14	The CAA will review the conditions applicable to the issue of offshore 'exposure' approvals with a view to making them appropriate to the intended types of operation.	Q3/2014	Complete		Current processes have been reviewed and updated using the knowledge gained from the NUI fire fighting work. Approvals are now issued on a case by case basis instead of 'blanket' approvals. See page 14.
A15	The CAA will commission a report to review offshore communication, handling and flight monitoring procedures from an air traffic control perspective and act on its outcomes.	Q4/2014	Complete		The report to review offshore communication was delivered in February 2015. Complexities of the actions required are being addressed to assess next steps and will be progressed during 2016.

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A16	The CAA will, with industry, review the instrument flying training element for all EFIS-equipped offshore helicopter type rating courses to be satisfied that candidates have a firm understanding of the displays and techniques required for basic instrument flight. The CAA will propose to EASA any necessary improvements to the syllabus requirements.	Q4/2014	Complete		Reviewed with industry (also through Joint Operators Review (JOR) /HeliOffshore) by formal inspection of operators' training requirements. The CAA, in conjunction with HeliOffshore and other industry support, has formed the Automation workgroup which has taken this on by reviewing current automation training requirements and licensing requirements.
A17	The CAA will review all helicopter AOC recurrent training programmes to ensure that basic instrument flight skills are maintained so that crews can readily deal with manual flight if required.	Q2/2014	Complete		Review of recurrent training programmes complete; findings shared with helicopter operators, who are continuing to review their programmes - See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243
A18	The CAA will review the requirement for instructor tutor training and, if appropriate, make proposals to EASA to incorporate within Part-Aircrew.	Q4/2014	Complete		Proposals made to EASA – See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A19	The CAA will examine the output of its review into the safety of large UK commercial air transport aeroplane operations for relevance and applicability to ensure that any appropriate safety initiatives have been extended to the offshore helicopter environment.		Complete		In order to ensure that common issues affecting both fixed wing and rotary wing are dealt with in a joined up way, the CAA has integrated the workstream looking at standards documents and the subsequent workstreams. Large transport aeroplanes have, for some time, been moving towards Evidence Based Training (EBT) (part of the review) and this is now a joint fixed wing and rotary wing project with EASA that CAA is supporting.
A20	The CAA will amend its examiner assessment protocols (CAA Standards Document 24) to require specific 'de-identified' candidate performance indicators so that any trends in common failings are visible for proactive attention.		Complete		Standards document 69 now includes specific competencies so that examiners of examiners can identify such trends using company management systems.
A21	The CAA will review the pilot recency requirements for helideck operations that have been incorporated into the draft requirements for the EASA Ops Specific Approval for Offshore Helicopter Operations and require operators to implement them to an agreed schedule.		Complete		Material proposed to EASA by the CAA has been included in EASA Opinion 4/2015 and will be included in Part-HOFO.

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A22	The CAA will review helicopter operators' safety cases for night operations to bow decks to assess operator procedures and mitigations and determine whether such operations should continue.		Complete		Industry has stopped night landings to CAT 3 decks through the Helideck Limitations List published by the HCA.
A23	The CAA will continue to develop its working relationship with EASA, in particular in the areas of sharing airworthiness information and the management of operator in-service issues. This will be achieved by periodic meetings and reviews with the appropriate EASA and CAA technical staff.		Complete		Following an initial meeting to discuss the actions and recommendations of the Review, regular meetings have continued around specific topics, as illustrated throughout this report. EASA also supports Tech OHSAG.
A24	The CAA will review CAA Paper 2003/1 (Helicopter Tail Rotor Failures) to determine how well the recommendations have been taken forward and to assess if further action is necessary. The conclusions of this review will be discussed with EASA.	Q3/2014	Complete		Review completed, report has 7 recommendations to EASA. EASA has been sent the report and have now passed it to the European Helicopter Safety Team (EHEST) for consideration, in order for discussions to commence regarding their acceptance or otherwise.
A25	The CAA will review the human performance aspects of flight crew responses to engine bay fire warnings, specifically within the offshore operations environment.	Q3/2014	Complete		Review completed. Discussions with manufacturers and helicopter operators underway - See Understanding technical failures and failure alerts CAP 1243 www.caa.co.uk/cap1243

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A26	CAA Airworthiness will meet with offshore operators periodically to compare the trends of MORs with operator in-service difficulty / reliability data to ensure that the complete risk picture is captured and addressed, and that the desired outcomes are being achieved.	Q2/2014	Complete		Initial meetings with helicopter operators held; regular meetings now scheduled. See Improving knowledge and facilitating change CAP 1243 www.caa.co.uk/cap1243
A27	The CAA will focus on Vibration Health Monitoring (VHM) download procedures, system/component reliability, the handling of VHM alerts and defects during audits of UK offshore operators.	Q2/2014	Complete		VHM audits have been carried out and specific improvements are being taken forward - See Ensuring Vibration Health Monitoring is applied consistently CAP 1243 www.caa.co.uk/cap1243
A28	The CAA will review CAP 753 to clarify alert generation and management, to ensure it is consistent and a system of amber/red warning thresholds is established to allow maintenance staff to identify the severity of the alert.	Q4/2014	Complete		CAP 753 has been reviewed and updated in December 2015 to include the clarification. www.caa.co.uk/CAP753

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A29	The CAA will work with operators and their contracted engine and component maintainers to review processes that define when strip reports are required and determine necessary improvements to assure these are provided and thus ensure that potential safety information is not lost.	Q2/2014	Complete		The CAA has written to all Accountable Managers who have confirmed that processes have been reviewed and improvements to the strip report process have been made. Operators have confirmed they are not fully satisfied with the changes in the OEM practices such that further meetings have been arranged with the relevant operators and this may include OEMs at a later stage and escalation to EASA as the Competent Authority for Design. - See page 22.
A30	The CAA will carry out a further review of Human Factors Maintenance Error data referred to in this report and publish the results to seek improvements in this important area.	Q4/2014	Complete		The review into Human Factor Maintenance Error data was completed and the results published in January 2016. www.caa.co.uk/cap1367
A31	The CAA will form an Offshore Maintenance Standards Improvement Team with the offshore helicopter operators with the objective of reviewing the findings at Annex F to the CAA Strategic Review of the Safety of Offshore Helicopter Operations and making proposals to achieve a step change in maintenance standards.	Q3/2014. Report Q1/2015	Complete		Team formed, comprehensive review carried out and report detailing the conclusions and next steps are going to be published.

Action	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
A32	The CAA will: · promote and support the implementation of the results of the research on helideck lighting, operations to moving helidecks, Differential GPS (DGPS)-guided offshore approaches and Helicopter Terrain Awareness Warning Systems (HTAWS); · seek to ensure funding for the research on operations to moving helidecks, DGPS-guided offshore approaches and helicopter terrain awareness warning systems to allow timely progress to completion and, once completed, promote and support the implementation of the results.	Ongoing	Ongoing		• Retrofit of new helideck lighting in progress with a compliance date of 31 March 2018. • In-service trials of new Helideck Monitoring System (HMS) for operations to moving decks underway. Expecting new HMS standard to be incorporated in next update to CAP 437 early 2017. • Progress of DGPS-guided approaches pending joint industry initiative. • Initial work on HTAWS warning envelopes complete, flight simulator trials completed Q2 2016; work on warning form/format underway, due to be completed end 2016; work on HTAWS specification to be completed by end 2016. • Work with the offshore industry to promote and support the implementation of the results of research and to ensure funding is ongoing via the OHSAG.

Recommendations

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R01	It is recommended that the EASA leads the development of a management system that provides a structured review of all accident and serious incident reports and recommendations of helicopters operating offshore or events which could have led to a ditching if the helicopter had been over water. This should be done in collaboration with other North Sea NAAs and the CAA to ensure a cohesive assessment of both accident causes (looking for trends) and remedies (looking for suitability and effectiveness) in order to prevent the segregated nature of accident reviews and ensure there is continuity to the safety reviews.		Complete		The EASA has established the Helicopter Accident Data Collaboration and Analysis Group (HADCAG), which takes its membership from relevant national authorities, operators, manufacturers and other associations. The tasks of the HADCAG include reviewing the analysis of all safety data (including the causes and contributory factors from accidents and serious incidents) to support the strategic risk assessments that form the basis of the risk portfolios.
R02	It is recommended that the EASA involve NAAs annually in a forum to agree and exchange information on the performance of safety actions taken in line with accident and serious incident investigation recommendations and potential other improvements that could be adopted, where appropriate.		Complete		Two forum events held to date (April 2014, November 2014). Further meetings scheduled. We will request EASA to look again at the content and frequency of these events to accelerate progress.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R03	It is recommended that the EASA introduces procedures to monitor and track the efficiency and reliability of maintenance interventions when these are used during the certification activity to assure the safety target of the rotorcraft.		Complete		The EASA published two Certification Memorandums (CM-S-007 and CM-RTS-002) introducing post certification actions to verify the continued integrity of critical parts and guidance for development of time between overhaul for rotorcraft gearboxes.
R04	It is recommended that the EASA ensures that the Type Certificate Holder completes a design review following a failure or malfunction of a component or system on any other similar feature on that aircraft type or any other type in their product line and defines appropriate corrective actions as deemed necessary.		Complete		The EASA considers that this is adequately addressed under existing continuing airworthiness processes and procedures and, as such, does not propose any further changes. Note; CAA has requested that EASA review the effectiveness of this decision by sampling as part of their auditing to confirm their assumptions.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R05	CAA expects that offshore helicopter operators will address the following key items from the EASA RMT.0120 (27 & 29.008) draft NPA without delay: • Fitment of the side-floating helicopter scheme. • Implementation of automatic arming/disarming of Emergency Floatation Equipment. • Installation of hand holds next to all push-out window emergency exits. • Standardisation of push-out window emergency exit operation/marking/lighting across all offshore helicopter types. • Ensure that external life rafts can be released by survivors in the sea in all foreseeable helicopter floating attitudes. • Ensure that all life jacket/immersion suit combinations are capable of self-righting	As Required	Delayed		Currently no specific activity in this area at HeliOffshore, Oil & Gas UK or Step Change in Safety - See longer term improvements, page 11. We encourage operators to assess the need for taking up some or all of these measures as part of their SMS, and the oil & gas industry to consider introducing them by contractual requirement.
R06	It is recommended that the EASA Helicopter Ditching and Survivability RMT.0120 consider making safety and survival training for offshore passengers a requirement.	Q4/2016	On track		Under consideration, pending discussion with industry and participating authorities.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R07	The CAA expects that OPITO will review and enhance its safety and survival training standards with regard to the fidelity and frequency of training provided.	Q4/2014	Revised delivery date	Q1/2017	OPITO working group formed autumn 2014 to perform review of industry training standard. Initial focus has been training for the new Category A EBS. The remainder of the syllabus has yet to be addressed.
R08	The CAA expects the oil and gas industry to incorporate the fire-fighting provisions detailed in CAP 437 (Standards for Offshore Helicopter Landing Areas) for Normally Unattended Installations without further delay.	Q3/2014	Ongoing		Proposals offering an alternative means of mitigating the risk have been put to OHSAG and agreed in principle. See page 13.
R09	The CAA expects the offshore helicopter operators to apply the risk-reduction methodology detailed in CAP 437 (Standards for Offshore Helicopter Landing Areas) for operations to Normally Unattended Installations to ensure that the foreseeable event of a crash with fire is appropriately mitigated.		Ongoing		As above.
R10	It is recommended that offshore helicopter operators identify a set of ‘best practice’ standard procedures and engage with their customers to agree how these may be incorporated into contractual requirements.	Q1/2015	Revised delivery date	Q4/2016	Oil & Gas UK is leading on this, supported by OGP ASC, HeliOffshore (the organisation formed following the outcomes of the JOR) and the CAA.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R11	The CAA expects that the oil and gas industry will review its audit and inspection practices to harmonise and pool audit schemes to reduce the impact on helicopter operators following the principles described in the Oil & Gas UK Guidelines for the Management of Aviation Operations.	Q1/2015	Revised delivery date	Q4/2016	Oil & Gas UK is leading on this. An initial toolbox has been delivered and is being used. See page 13.
R12	It is recommended that the EASA require helicopter manufacturers, in conjunction with the major operators of the type and NAAs, to review their recommended training material so that pilots are better prepared for operating modern highly complex helicopters.		Complete		The EASA consider that this is covered within the Operational Suitability Data (OSD), which was introduced in February 2014 - See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243
R13	It is recommended that Approved Training Organisations (ATOs) and helicopter AOC holders adopt the aircraft manufacturers' operating philosophies and recommended practices, where available, within their type syllabi and current training and checking programmes with particular emphasis on automation. This information should also be reflected in instructor guidance so that specific learning points for the automated systems are addressed in a standard manner.	Q3/2014	On track – with HeliOffshore	Q4/2016	Manufacturers and helicopter operators are working together on this. Airbus Helicopters has now produced a Flight Crew Operating Manual (FCOM) for the EC225 and other manufacturers have plans to introduce FCOMs starting with newer models - See Raising the standards of pilot training, page 15.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R14	It is recommended that Approved Training Organisations and helicopter AOC holders review their type rating syllabi and recurrent training programmes to ensure that Standard Operating Procedures and monitoring pilot techniques are included at all appropriate stages of the type rating course, operator conversion courses and recurrent training/checking.	Q3/2014	Complete		ATOs and AOC holders have reviewed their syllabi and are making any necessary changes - See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243
R15	It is recommended that Approved Training Organisations and helicopter AOC holders review their training syllabi to ensure that the correct use and emphasis upon Standard Operating Procedures is impressed upon crews throughout all stages of flight and simulator training.	Q4/2014	Complete		ATOs and AOC holders have reviewed their syllabi and are making any necessary changes - See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243
R16	It is recommended that Approved Training Organisations and helicopter AOC holders address with aircraft manufacturers any shortfall in the Operational Suitability Data training syllabi for those destined to operate the type offshore.	Q1/2015	Complete		Manufacturers and helicopter operators are working together on this and will continue to do so under the new OSD requirements - See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243
R17	It is recommended that AOC holders, in conjunction with the CAA, develop an Alternative Means of Compliance to introduce the option of Alternative Training and Qualification Programme, as permitted for aeroplanes in accordance with ORO.FC.A.245.	Q1/2015	Complete		This is now being undertaken by the EASA, in accordance with 4 year rulemaking programme.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R18	It is recommended that Approved Training Organisations (ATOs) work with AOC holders to ensure that their Synthetic Flying Instructors have current operational knowledge of the type(s) on which they instruct.	Q4/2014	Complete		Helicopter operators have confirmed that this is already standard procedure - See Raising the standards of pilot training CAP 1243 www.caa.co.uk/cap1243
R19	It is recommended that Approved Training Organisations (ATOs) and helicopter AOC holders establish a requirement for training record narratives.	Q3/2014	Complete		This is in development with ATOs and AOCs.
R20	It is recommended that the EASA / Type Certificate Holder confirm the number of false engine fire warnings on offshore helicopters, investigate the reasons for them and determine what actions to take to address this important safety issue.		Complete		EASA has published a number of service bulletins to ensure actions are taken to reduce the number of false engine fire warnings.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R21	It is recommended that the helicopter Type Certificate Holder identify all major components or systems that lead to a 'Land immediately' condition to ensure themselves that the actual reliability data available from the operators is validating the assumptions made at the time of certification. This review should be overseen by the regulator for the State of Design.	Q1/2015	Revised delivery date	Q4/2016	We have provided clarification to the Type Certificate holders (Airbus Helicopters, Agusta Westland and Sikorsky) on the background to this recommendation. To address this recommendation, the Type Certificate Holders need to contact the relevant regulator for the state of design (EASA and FAA as necessary). CAA discussed this issue at a meeting with the EASA in February 2016. EASA had not been contacted by any of the Type Certificate Holders to discuss this recommendation. It was intended that this item would link in to the EASA recommendation R25 which has been closed by the EASA. The CAA feel that there is a benefit in identifying the systems that lead to a 'Land immediately'. These systems could then have the improved system reliability elements and reliability target monitoring from the ETOPS requirements.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R22	It is recommended that the EASA initiate a rulemaking task to adopt the critical parts life monitoring and assessment requirements of Certification Specifications for Engines (CS-E) for large transport rotorcraft, currently subject to CS-29, including retrospective application. This should cover at least for the following areas: i. Residual stress assessments ii. Vibratory stress measurements iii. Manufacturing plan iv. Laboratory examination of time expired part		Complete		The EASA has reviewed CS-29 and CS-E to cover the areas recommended. The EASA review has established that the existing rules ensure that critical parts are monitored and controlled throughout their service life and there is no requirement for the initiation of a Rulemaking Task. The CAA has recommended that EASA carry out an independent review of Critical Parts, assessing the design, manufacture and maintenance aspects by looking closely at current industry practice, comparing this with the minimum certification standards, CS-E, and assess differences and identify any areas for improvement and or standardisation.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R23	It is recommended that the EASA revise CS-29.602 for large transport rotorcraft intended to operate over hostile sea conditions for extended periods of time, to ensure the failure mode effects and criticality analysis process used to identify critical parts recognises that a safe ditching may not always be possible.		Complete		The EASA consider that the recommendation would not yield a measurable increase in safety based on the accidents and incidents considered in the report. Nonetheless, in the wider context of offshore operations, the EASA will continue to evaluate whether additional airworthiness requirements may be of benefit. See R25.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R24	It is recommended that the EASA provide additional guidance material to improve standardisation in approach to the classification of critical parts to minimise inconsistencies in the instructions for continuing airworthiness and, where appropriate, to require revisions to existing Instructions for Continued Airworthiness.	Q2/2015	Rejected by EASA		The EASA reviewed the current guidance material, which did not highlight any standardisation issue and have issued new guidance through certification memo CM-S-007.The CAA has recommended that EASA carry out an independent review of Critical Parts, assessing the design, manufacture and maintenance aspects by looking closely at current industry practice, comparing this with the minimum certification standards, CS-E, and assess differences and identify any areas for improvement and or standardisation. To raise the awareness and knowledge of this at the operator / maintainer level, the CAA have issued IN2016/026 Rotorcraft – Critical Parts Awareness and Training, which has been directed at the continuing airworthiness organisations within the UK.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R25	It is recommended that the EASA consider developing requirements that could be applied to helicopters which carry out Offshore Operations in hazardous environments in a similar fashion to those used for aeroplane Extended Operations and All Weather Operations.		Complete		The EASA evaluated the potential benefits of developing requirements that could be applied to helicopters carrying out offshore operations in hostile environments, similarly to those used for aeroplane Extended Operations and All Weather Operations, concluding that Extended-range Twin-engine Operation Performance Standards (ETOPS) could be applied to helicopter design. However, the EASA considers that a review of service experience does not justify a rulemaking task at this time. The evaluation was sent to the UK CAA in September 2015.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R26	It is recommended that the EASA establish a forum for discussion for best practice and developments on Vibration Health Monitoring (VHM). This forum should include NAAs, operators and VHM manufacturers. The CAA expects that this could be achieved by the end of 2014.		Rejected by EASA		The EASA consider that several groups already exist to address this, such as the Society of Automotive Engineers (SAE), HM-1 Integrated Vehicle Health Management Committee in which the EASA is involved, and other initiatives by Type Certificate Holders. The EASA believes that any new forum would be best sponsored by the manufacturers, helicopter operators and in association with the EHEST, and major highlights could be presented for a wider audience during the EASA Rotorcraft Symposium.
R27	It is recommended that the EASA review AMC 29.1465 to clarify alert generation and management, to ensure it is consistent and a system of amber/red warning thresholds is established to allow maintenance staff to identify the severity of the alert.		Complete		An EASA Certification Memorandum (CM) has been published to address this, drawing on input from helicopter operators at a meeting in August 2014. The CM provides guidance regarding prioritisation of alerts and allows standardisation of the use of colours in relation to urgency and importance of subsequent investigation and associated maintenance action.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R28	It is recommended that the UK Met Office and the helicopter operators fully implement the triggered lightning forecasting system, subject to satisfactory performance during the present in-service trials.		Complete		The Met Office triggered lightning forecasting system effectively fully implemented; “trial” caveat removed from displays from September 2015. Further refinements introduced for winter 2015/16 ‘season’ aimed at reducing/minimising operational impact as follows: • Rainfall rate threshold for high strike risk areas reduced from 10mm/hr to 6mm/hr to increase stability of forecasts. • Daily cold air breakout forecasts added to provide advance notification of high risk episodes. • Lightning risk forecast updates to be synchronised with wave height forecasts to reduce impact on operations. • Operational guidance modified to allow down grading of RED areas to AMBER provided overflight at OAT ≤ -10°C is possible/acceptable.

Rec.	Description	Delivery date (as set in the Review)	Status	Revised delivery date (if appropriate)	Details
R29	It is recommended that the offshore oil and gas industry, helicopter operators, helicopter manufacturers and regulators: • continue to support the helicopter safety research programme • establish a less labour intensive, more regularised arrangement between participating organisations for the funding of research projects • establish via Oil & Gas UK a faster and more focused approach to implementation of successful research projects. This should be in addition to and in advance of the enhancement of the aviation rules and guidance material.		Complete		Ongoing as part of normal HSRMC meetings. Good support continues from all parties for the Helicopter Safety Research Management Committee (HSRMC). Funding and implementation remains challenging.