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FOCUS is a quarterly subscription journal devoted to the promotion of best practises in aviation safety. It includes articles, either original or reprinted from other sources, related to safety issues throughout all areas of air transport operations. Besides providing information on safety related matters, **FOCUS** aims to promote debate and improve networking within the industry. It must be emphasised that **FOCUS** is not intended as a substitute for regulatory information or company publications and procedures.

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Front Cover Picture: *Victor-Lima-Lima (OO-VLL) one of VLM's 12 Fokker 50 aircraft, seen sporting the new colour scheme, climbing gracefully away after a take-off from London City Airport.*

Tales of Mystery and Imagination

by Dai Whittingham, Chief Executive UKFSC

When I wrote my last editorial for FOCUS, the world had yet to hear of MH370 but it has since grabbed attention in a way that no other accident has done in living memory. Our Chairman discusses some of the issues in his regular column in this issue and draws attention to some of the likely impacts on the industry. Though ICAO had already changed associated requirements in the wake of AF447, we should applaud the efforts EASA has made in accelerating proposed changes to flight recorders and location devices, not least because it shows that the regulator can be responsive and adaptable when circumstances demand. But we should also remember that knee-jerk reactions can easily result in poor legislation with unwelcome and unintended consequences.

So why is MH370 so special? Part of the interest stems from the fact that, other than a few exchanges of data with satellites and some now discredited location signals, there is no trace of the aircraft or its passengers and crew. It has become the Marie Celeste for our generation, albeit this time the ship is missing as well as its occupants. With AF447 there was at least some floating debris to provide concrete evidence of the accident and its approximate location; without this, I think the prospects of recovering the flight recorder and CVR would have been remote and the accident would still be unexplained. The reasons for the loss of MH370 could well remain a mystery if the wreckage is not located or is inaccessible because of the ocean depth; speculation has been rife since the aircraft was lost and there will be nothing to stop it. Hollywood is already well down the track of film production and several books have been written despite the almost total absence of known facts after the aircraft took off. The proliferation of 'experts' has also been impressive by any standard, perhaps matched only by the implausibility and complexity of some of the more exotic theories available on the internet.

The danger here is not so much the probability of a catastrophic platform failure recurring elsewhere (because the B-777 has an excellent safety record) but rather the prospects of needless and onerous regulation based on supposition. History is littered with laws and regulations written in response to a single event, normally to satisfy political considerations in the form of 'something must be done'.

News that passengers may have travelled on false passports added further fuel to the terrorism fire despite security agencies rapidly concluding that those concerned were simply illegal migrants; more stringent pre-flight security checks will surely follow in some parts of the world, though they are unlikely to be applied globally. Powerful voices have already been raised suggesting that a second armoured flight deck door should be installed to permit crews to visit the toilet without compromising security: the main proponent of this move (in the USA) has yet to outline how the modifications would be funded, to what timescale, and whether the requirement would extend to other users of US airspace. There has also been no discussion or acknowledgement of the argument that the locked flight deck door has had a detrimental impact on crew communication and coordination, a factor that may eventually have a far greater impact on safety than on security.

In the days immediately following the disappearance of MH370, I was asked by a TV journalist if I thought airline crews should be screened for stability and mental health issues. I pointed out to him that his question pre-supposed the crew was somehow involved in deliberate action to prevent the flight reaching its destination when there was no evidence whatsoever to show whether events were safety or security-related. The mental health of flight crew should be of concern to everyone but MH370 should not become the catalyst for ill-considered or hastily imposed medical standards in an area where attitudes and diagnoses can differ wildly and where there are no easily measurable absolutes.

Where proper clinical diagnoses can be made then of course there should be licensing limitations - I don't want a paranoid schizophrenic at the controls of my aircraft any more than you do. On the other hand, I would not want to see the best pilot in the world prevented from operating purely because his character doesn't fit societal norms. In this context it is interesting that MH370's captain has already been demonized in the media for having built himself a simulator (part-task trainer) – obviously a sign of sinister intent rather than a sign of someone taking every opportunity to practice and improve his professional skills! That said, there have been a handful of accidents where suicide by one of the crew was the only plausible explanation for deliberate control inputs, though none has featured flight of the duration seen with MH370. If the flight recorders are not recovered, crew action will have to remain on the list of possible causes and the industry can therefore expect pressure to adopt screening programmes whether these are needed or not.

Extending the mental health question into the area of soft skills, we are not always as good with behaviours – good, bad, or desired - as perhaps we should be. At the top end of most major businesses, coaching is commonly used as a tool for developing the right behaviours for managers to help them get the best out of themselves and others, and performance management is seen as a core skill. Pilots are now all required to undergo CRM training and yet we continue to see accidents where non-flying pilots have failed to intervene effectively or in time to prevent disaster. So have we got the behavioural issues right? Do all captains understand that an important part of their job is to develop the skills of the man or woman in the other seat? Do we train them in how to do that, or (handling ability aside) do we simply require them to demonstrate the managerial and decision-making aspects of command before awarding a 4th stripe? And who trains the trainers? Where are the courses on how to instruct? The ability to impart knowledge is a key skill if you are to train successfully, increasingly so as course content and duration is pared down to the absolute minimum for commercial reasons.

We are all pretty good at working out what went wrong after the event, though we won't necessarily have learned from the experience. Operators all have safety offices working away at safety data, analysing ASRs and FDM events etc, but none of us spend significant time considering what went right, what we did well and why things worked as well as they did – i.e. what positives can we take from what we have just done. All pilots will recall their training and the post-flight or simulator debriefs that were an essential part of the process. The question now is why any form of debriefing is such a rarity. I accept there is very limited time between short-haul sectors (and I think we are close to the point where commercial pressures drive operational errors on that front) but there has to be scope for proper performance feedback even if it doesn't cover all aspects of the sector or day.

There is one major airline in the USA that insists its captains conduct a structured debrief after every leg, and it provides a template for them to follow. The template includes mention of behaviours and follows the conventional bath-tub approach – start with the positives, cover the negatives, reinforce the positives. The every leg scenario will not suit all, but there is nothing to stop partial debriefing at suitable moments, especially when you are reinforcing positive behaviours. "That was a well-handled departure, Knuckles, I liked the way you planned ahead and told me what you were thinking, and how you managed the cabin crew information." If it is not a positive observation, leave it until after you have landed, but don't just walk away from it. "It seemed a bit rushed to me. Was there anything you would have done differently? Try doing ... next time." It doesn't have to take long.

Included in every consideration of behaviour must be the ability to say 'No'. Pilots are regularly placed under pressure to achieve the operational task, depart on time, land on time in the right place etc. These pressures can become acute where business or private operations are involved. High net worth individuals tend to be used to getting what they want when they want it, and they will not necessarily understand the existential risk they impose on themselves and others when they insist on flying despite poor weather, crew fatigue or unserviceabilities. The difficulty for people operating in this environment is that their sensible refusal to fly becomes either a business opportunity for someone less scrupulous (or operating to a different nation's rules), or it leads to loss of employment, or both. Pressure does not have to be applied by the operator or customer, all that matters is that pressure is perceived by the crew, who have the final decision on whether to operate. And if they decide to fly, it can lead quickly to loss of life.

The CAA recently issued a Safety Notice (SN-2014/006) giving guidance on operating minima for private and aerial work helicopter operations; the background for this can be inferred from AAIB Special Bulletin S3-20014. The Safety Notice includes the following consideration of human factors:

"Aircraft commanders are ultimately responsible for the safe conduct of the flight and should develop and exercise their own expertise over all matters concerning the safety of the proposed flight. In addition to their own judgement concerning aviation matters, pilots must quickly learn to resist any undue pressure from persons who may not have adequate aviation knowledge or whose decisions are based on criteria that are not compatible with flight safety. In turn, aircraft owners and passengers should be clear that it will always be necessary to respect the judgement and flight safety decisions made by the aircraft commander."

It is sound advice and deserves wide publicity.

Lost at Sea

by Capt Chris Brady, easyJet

If you told any member of the public and possibly most people in aviation, if a wide-bodied airliner could disappear without trace and not be found after months of intensive searching they would not believe you. Yet with MH370 and AF447 this has happened twice in five years. These days air travel is so commonplace that it is easy to forget that most of the earth's surface is water and much of the land is either sparsely populated or uninhabited.

Even if the airliner is never found and we learn nothing more about this event, it has already raised enough questions to highlight areas in which improvements can be made. In no particular order:

1. GPS tracking of all aircraft. Whether the transponder fails or is switched off intentionally, there should be an independent system sending real-time position data in the unlikely event that the aircraft disappears.

2. Increase the duration of the FDR/CVR locater from the present 30 day guaranteed minimum.

3. Increase the underwater range of the FDR/CVR locater signal. The present underwater signal range is approximately 2000m, yet the ocean floor can be as deep as 6000m.

4. Post event SAR cooperation. There is a suspicion that some countries were initially reluctant to share radar data that could have helped narrow the search area.

5. Fund the building of a more capable search autonomous underwater vehicle (like Bluefin-21 or Remus 6000 that were used in these events) that can reach the deepest parts of the ocean floor.

6. Passenger background checks. Passports are most rigorously checked at the airport of arrival for immigration purposes. If the same level of rigor was conducted at the airport of departure the identity of the passengers could be assured and denied travel if deemed to be a security risk.

7. Crew profiling. This is already done to some extent at various stages of crews careers such as during initial or recurrent training or whilst undergoing medical renewals. Perhaps operators and colleagues should be more proactive in spotting changes in behaviour and giving the necessary assistance.

Of course there are difficulties in implementing these ideas; having systems that cannot be disabled in-flight could lead to a fire risk if the equipment malfunctioned and could not be switched off; more rigorous passenger checks will be expensive and unpopular; crew profiling may have limited effectiveness; deep-sea submarines are expensive and on the limits of technology. But none of the problems are insurmountable.

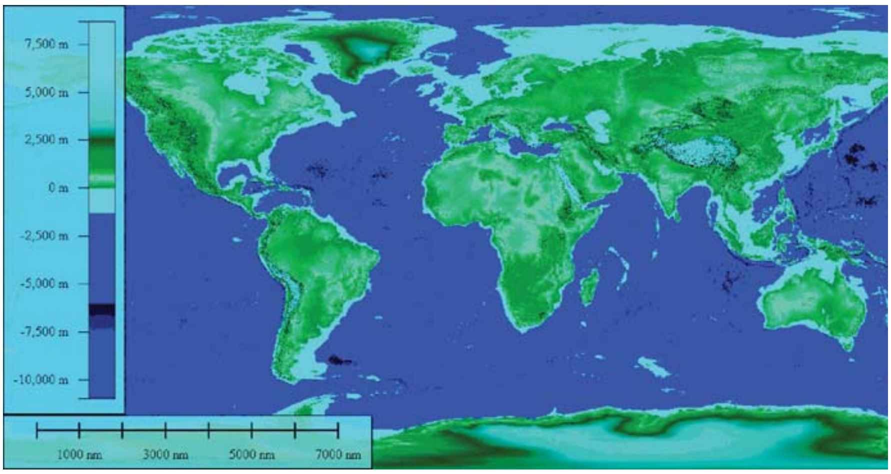
Probably the most important priority for this investigation is the recovery of the CVR and FDR until these are found we will not know whether this accident falls into the safety or security category.

ICAO has already amended Annex 6 on FDR/CVR and location devices in response to AF447 and EASA published NPA 2013-26 (flight recorders and underwater location devices) in December last year on compliance with Annex 6. Interestingly this NPA estimates that for aeroplanes of EASA Member State operators, the proportion of magnetic tape FDRs for which all the data cannot be recovered is around 35%, and the proportion of magnetic tape CVRs for which the quality of the recording is insufficient is around 24%. So even if the FDR/CVR are recovered we may not be able to solve the puzzle.

In brief, the expected new standards are expected to be:

- FDR – Mandated pre-flight checks and obsolete recording media to be replaced with solid-state media by 2019.
- CVR – Mandated protection procedures to be included in Flight Ops Manuals; Minimum 2 hour recorders to be retrofitted to all commercial air transport aircraft by 2019; CVRs manufactured from 2019 must have 15 hours recording time.
- Underwater Location Devices – Must be able to transmit for 90 days by 2020. Large commercial air transport aircraft built after 2005 to be retrofitted by 2019 with a long-range (8.8KHz) ULD or other means to locate the point of impact to within 6nm.

In the end, like most things in life, it comes down to the politicians and rulemakers deciding if the difficulty and expense of such measures can be justified for such a low rate of events. Sadly I predict a slow rate of progress on some of these measures only possibly being given a kick-start if, god forbid, another MH370 or AF447 occurs.



World Bathymetry Plot showing the majority of ocean depths to be between 1,300m and 6,000m occasionally over 10,000m. The Bluefin-21 used in the MH370 search has a depth rating of 4,500m.

Source: The General Bathymetric Chart of the Oceans (GEBCO), One Minute Grid, version 2.0, http://www.gebco.net.

Watch out - Things go Whizz and Bang in Here!!
Aberporth Danger Area Complex EGD201 and EGD202

by NATS

MOD Aberporth is a busy, fully instrumented, weapons test and evaluation Range. The Range's Danger Area Complex (EGD201 A-E) is established over some 6,500km2 of Cardigan Bay, from sea level to unlimited height. The Range has been in existence since 1939 and it is currently operated by QinetiQ on behalf of UK MOD under what is known as the Long Term Partnering Agreement (LTPA). The purpose of the LTPA is to deliver defence test, evaluation and training support services to ensure air launched weapon systems, associated sub-systems and UAVs are safe and fit for purpose, as any visitor to the LTPA website (www.ltpa.co.uk) can find out. A more recent addition to the Aberporth Range complex (EGD202 A-C) stretches overland from the western edge of the Sennybridge Range (EGD203) westwards to the west coast of Wales. All these areas are no doubt familiar with many aviators as they are published and feature on all airspace charts.

NATS is contracted to QinetiQ for the provision of all Air Traffic Control Services within these Danger Areas and ATSOCAS (Air Traffic Services Outside Controlled Air Space) in the adjacent Class G airspace. Aberporth Air Traffic Control (ATC) provides a Danger Area Activity Information Service (DAAIS), Danger Area Crossing Service (DACS) and ATSOCAS when open. The Air Traffic Controllers are, therefore, both licenced by the CAA (Civil Aviation Authority) and approved to provide Air Control in the Ranges by the MOD.

Working closely with other ATC units providing radar services, NATS Aberporth provide ATC services to Civil and Military Aircraft outside the Ranges; and a bespoke service to multiple aircraft within the Range, including various types of Unmanned Aerial Vehicles (UAVs) and even surface vessels. This bespoke service enables the MOD to conduct Air to Air, Air to Surface, Surface to Air and Surface to Surface weapons testing and evaluation, in a safe and highly controlled environment.

NATS can also provide other non-Range airspace users with ATSOCAS over most of Wales, outwith any Controlled Airspace and all non-Aberporth Danger Areas.

Recently (late 2012), both Danger Area complexes began operating under the "Flexible Use of Airspace"; changing the way in which the danger area activity was promulgated. Previously the D201 Complex was notified as permanently active, now its activity is subject to daily NOTAM action and disseminated accordingly to all airspace users. Generally it is open 0900-1600 local, Mon-Fri, but checking NOTAMs is still vitally important as these hours do change depending on the trials being carried out.

Danger area activity is sometimes termed in several different ways, at Aberporth we use the standard terms of "Active" and "Not Active". Active, means that the danger area is currently up and running, with ATS personnel available for a DACS, DAAIS or ATSOCAS; Not Active, means that the danger area is closed and ATS, DAAIS or DACS may be available.

Infringements

Given the nature of the activities that occur within our danger areas, infringements have a significant impact on our operations and remain one of our biggest safety concerns; consequently, they remain at the forefront of our priorities as we continually try to prevent them.

Within the last 12 months the Range has reported 16 infringements, this figure does not include the potential infringements that we have managed to prevent using techniques described below.

Unfortunately, we can't reduce this number alone, we do need airspace users to work with us and be mindful of the impact infringements have, and consider different ways of operating their aircraft close to the danger area boundaries.

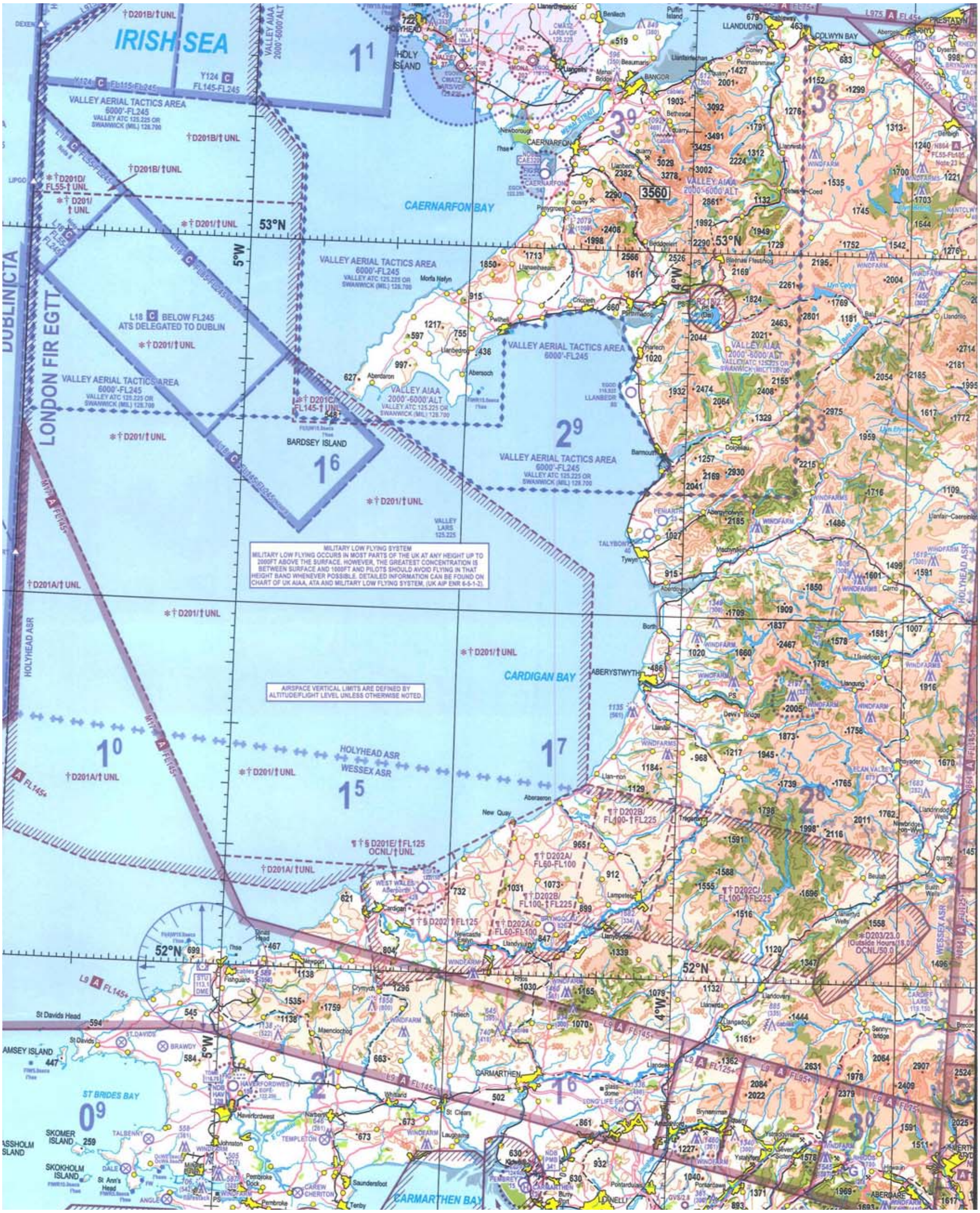
So how do we prevent Infringements?

Range Air Controllers actively monitor the Range boundaries during NOTAM'd periods of danger area activity and by using proactive and defensive controlling techniques; we try to prevent infringements before they ever become actual reportable events, this is achieved by calling adjacent units for co-ordination, blind transmissions and other defensive controlling techniques. These actions alone capture a lot of the potential infringements long before they might have happened.

We also actively promote the danger areas in the wider aviation community, through safety evenings and seminars at the local flying clubs and aerodromes whose operations are adjacent to or within our operating areas. During these visits we actively pass on information to occasional airspace users, who find the information very educational and a useful addition to their general aviation awareness.

For Pilots who operate within our operational area, we would expect them to be aware of the danger area complexes through comprehensive briefing, being aware of their exact position at all times and requesting an ATSOCAS service from one of the radar units who operate in the area within which they are flying.

However, this isn't always the case; as historic data shows that even with today's modern glass cockpits with GPS systems and software, and radar ATSOCAS available, pilots (both Military and Civil) are unfortunately still infringing the danger areas.


IRISH SEA
CAERNARFON BAY
CARDIGAN BAY
ST BRIDES BAY
CARMARTHEN BAY
LONDON FIR EGTT
DUBLIN CTA
53°N
52°N
5°W
4°W
VALLEY AERIAL TACTICS AREA
6000'-FL245
VALLEY ATC 125.225 OR SWANWICK (MIL) 128.700
L18 C BELOW FL245
ATS DELEGATED TO DUBLIN
VALLEY AIAA
2000'-6000'ALT
BARDSEY ISLAND
HOLY ISLAND
HOLYHEAD
CAERNARFON
BANGOR
LLANDUDNO
COLWYN BAY
ABERYSTWYTH
CARMARTHEN
HOLYHEAD ASR
WESSEX ASR
MILITARY LOW FLYING SYSTEM
MILITARY LOW FLYING OCCURS IN MOST PARTS OF THE UK AT ANY HEIGHT UP TO 2000FT ABOVE THE SURFACE. HOWEVER, THE GREATEST CONCENTRATION IS BETWEEN SURFACE AND 1000FT AND PILOTS SHOULD AVOID FLYING IN THAT HEIGHT BAND WHENEVER POSSIBLE. DETAILED INFORMATION CAN BE FOUND ON CHART OF UK AIAA, ATA AND MILITARY LOW FLYING SYSTEM. (UK AIP ENR 6-5-1-2).
AIRSPACE VERTICAL LIMITS ARE DEFINED BY ALTITUDE/FLIGHT LEVEL UNLESS OTHERWISE NOTED
3560

The team at Aberporth are always keen to promote the ATSOCAS that they can provide outside the danger area complexes and encourage any pilot to call for a service, even if it is just to let Aberporth know that they are operating in the area.

We would encourage private pilots especially to call, as the whole of Wales can be very busy with military low level traffic and we can advise if any known traffic is near their intended flight path. When flight planning a route close to our danger area boundaries, please don't hesitate to call ahead to discuss your plans with ATC. The number for Aberporth is listed below.

What happens when an aircraft infringes an active danger area?

Unfortunately some aircraft do infringe the danger areas, mandatory reporting action is carried out for all danger area infringements but that is not the only action we carry out. All infringements are thoroughly investigated, and any recommendations made are acted upon in a timely manner. The impact on the actual operation of the Range is summarised below.

In the event that an infringement does occur during a live firing trial, Aberporth immediately carry out stringent safety "Stop Actions", to ensure that the trial is made safe. These "Stop Actions" are built into every trial and are one of the most important parts of every trial safety case. The safety of Range assets, surface vessels and other airspace users is paramount. Avoiding Action is given if required to participating manned aircraft or UAVs.

The impact of stopping a trial due to an infringement can also have an effect on the operations at the Range. The trial team have to reset and start again to set up the trial in order to achieve its objectives. This could involve simply vectoring the fighter and target or it could involve aborting the trial because the fighter jet or target may not be able to continue the trial due to fuel constraints.

Another major impact is the financial cost to the Range and its trial sponsors. Some weapons development involves some very costly equipment as well as state of the art prototype weapons. These could be lost due to a trial being aborted because of an infringement, which of course is something we strive to minimise.

Crossing the Danger Area

Pilots are sometimes confused over whether or not they can cross a danger area whenever it is active and what follows is some information about what services Range Air Control at Aberporth can offer them whilst flying over Wales and Cardigan Bay.

Can you cross an active danger area?

The danger area can be crossed when there is no trial activity or when specific non-firing trial activity is taking place. So depending on the nature of the Range activity it may be possible to allow aircraft to cross or enter the danger areas. Each aircraft will be advised as such at the time that the request to enter or cross is made.

Having positively identified the crossing aircraft and provided an Air Traffic Service, a crossing clearance will then be issued. This clearance may also be requested under certain conditions from another Air Traffic Control Radar Unit (ATCRU) e.g. RAF Valley or London Military.

Outwith any trial activity the DA may well still be classed as "Active", this means that the danger area is open but trials are not taking place. A Range Air Controller will always be present whenever any part of the Ranges is notified as active, and will be able to provide a DACS, DAAIS or ATSOCAS.

Summing up

We hope you have found this short article interesting and that your knowledge of our operations within D201/202 has increased, along with your understanding of the impact of an infringement.

We also hope that the next time you're flying over Wales you take into consideration the services available from the Range Air Controllers at Aberporth; we will be very happy to hear from you. Accordingly, we have listed below some contact details which we hope you make use of, if planning a trip close to our danger area boundaries.

"Aberporth Radar" ATSOCAS Frequency VHF 119.65 MHz or UHF 338.925 MHz

Aberporth Range Air Control - 01239 813219

www.nats.aero

www.aberporth.qinetiq.com

The Only Way is Up

Chris Long considers what the future might hold for the industry

For most people in the aviation training industry, the key benchmarks and predictions come from the major global players of ICAO, IATA and, of course, the aircraft manufacturers. Both Airbus and Boeing apply considerable resources to research and publish comprehensive forecasts of future demand, and for those in the industry who don't have the means to carry out as complete a survey, these are a critical source of information with which to do their own planning. But all too often the headlines imply that the burgeoning new aircraft sales are the sole source of training demand.

Patently that is not the complete picture, so it is worth listening to others who are in the workplace who are directly involved in either providing the training tools or delivering training across the range of disciplines.

Mature Markets

There is general agreement that within the USA and Europe there is either flatline training demand or, at best, slow growth. However, that does not mean that there is no training requirement. The sheer scale of both of those markets means that there is a significant on-going training need, and whilst there is a pent up demand for new equipment and training systems, at the moment there is only very limited cash available.

Not only is recurrent training on the existing large fleets an essential task, but, in the USA at least, as a result of airline mergers and fleet rationalisation, there is a strong market to convert crews to different aircraft types. Because these are generally legacy airframes, there is already a well-established training infrastructure available; the drive therefore is to use existing platforms more efficiently. The fact that this form of training involves older aircraft types, and has to take place in an environment of tight financial constraints, has resulted in a rapidly increasing use of recycled aircraft parts to provide, for instance, actual fuselage sections and over-wing exits to build very effective but (relatively) low cost cabin crew training tools. Similarly the use of recycled cockpits to serve as a base for more sophisticated training aids, up to full flight simulators, may not have the glamour of the high-end devices, but can be very attractive when costs are compared.

Reinvigorating some of the earlier generation of training tools with updated software and capability also has its place. This market has been around for some time, but recently seems to be gaining traction as airlines and training providers continually search for less costly solutions.

In the ab-initio pilot training market there has been a huge impact on demand, catnot of the airlines, but of a generation of potential new entrants in these mature markets, where the consequences of the 1500 hour rule in the USA, and the high cost of entry into the industry has drastically reduced student entries.

Developing Markets

The real excitement is generated by the growth of the industry away from those baseline markets. In many ways the Gulf airlines should perhaps no longer be regarded as part of the developing markets – it is true that they are still expanding, but many of them are now well and truly established. There is certainly further significant growth predicted there if the huge aircraft orders are anything to go by, but that expansion is based on growing an existing infrastructure. One challenge to the smaller players in penetrating this market is that, frequently, the involvement of local partners and the requirement for local control is a legal imperative. When your company is not big in international terms, finding such influential partners can be a challenge and has perhaps slowed the opening of this market to the smaller provider.

Now that the centre of gravity of the aviation industry has been recognised as moving away from the traditional bases, the forward planning has moved with it, and not only to Asia. Eyes are turning to South America and Africa as expanding markets where there is not only increasing demand but, where critically, the other essential element for development – funding, is being made available as the resources of these regions are becoming fully exploited. Ethiopia is a classic example of this.

Where these new markets are really exciting is where there is either limited or expanding infrastructure. This is where the majority of new aircraft sales take place, and therefore where training tools appropriate for the latest generation of aircraft are needed. The opportunities for companies with the vision and will to present their offerings are still growing, not just in tandem with the newly-delivered western-built aircraft, but also to support the likes of China, Russia and Japan who are determined to build up their indigenous aircraft manufacturing capability.

Return to Instructors

Whilst the use of technology to enhance training is essential, one ingredient of training which is regaining importance is that of the instructor. Now that the generation which has been brought up using online training and e-learning of whatever type has been in service, there has often been a noticeable shortfall in retained knowledge later on in their careers. Those with hands-on experience of delivering training on a more modest scale are noticing that the refresher courses, or those courses notionally building on earlier qualifications, sometimes reveal a fundamental lack of understanding of basic principles. The view offered by such training providers is that whilst a quick multi-choice exam completed immediately after a course of online study will usually yield competent results, the lack of interaction with an instructor means that essential understanding, as opposed to rote learning, can result in basic principles not being absorbed. This makes application of that knowledge later on in operation or during additional training problematic.

The answer, they say, is to have good instructors involved throughout the learning process. The key, as ever, is to use the appropriate technology in the right context. One interesting observation is that with the increasing use of, for instance, iPads, there is little differentiation between a purely leisure activity driven through the iPad, and the serious work of study. Consequently the average human finds it challenging to differentiate between that knowledge which must be retained and that which is for fleeting amusement. This was not a comment delivered through the rigour of academic study, but rather the view of an experienced professional, but it is certainly worth thinking about.

Overall Optimism

As expected, the global training industry has variation in both level of demand from a regional perspective and type-specific training. The important lesson is that there are many reasons for optimism; in spite of local flatlining in growth, the overall picture is one of increasing expansion.

No industry is free from the consequences of some form of global slowdown, but at the moment the only way is up.

Reprinted with kind permission of CAT Magazine Issue 3, 2013.

Don't get tied up in knots with your safety risks

by Laura Holman, Bowtie Programme Manager, UK CAA

Recognising the existence of a specific risk to a given activity is all very well, but truly understanding the nature of that risk is clearly the only sensible mitigation strategy. For anyone involved in any form of safety management activity, however, comprehending the often complex chain of cause and effect, is easier said than done. Commercial air transport, as we know, is about as complicated as an industry gets, meaning the safety risks are correspondingly complex. All of which is why the UK Civil Aviation Authority (CAA) launched an innovative collaboration with industry, to not only identify the current safety risks facing commercial aviation, but to allow organisations to test their level of exposure to those very risks.

Working with airlines, airports, air navigation service providers, maintenance organisations and ground service suppliers, the CAA has developed a series of risk models, allowing organisations to analyse their current risk controls and assess their exposure to the relevant causal factors. These models highlight a number of specific safety scenarios, which organisations and regulators can use as part of their own safety management systems (SMS).

There are 24 risk models in total, covering scenarios such as an aircraft loading error leading to a loss of control; a runway incursion resulting in a ground collision; and, a cargo compartment fire. They consider human, technical and environmental factors within the scenarios. Each model can be treated as a self contained template for any organisation exposed to that particular risk to use to demonstrate the effectiveness of their risk controls. By adopting the model as a template which can be tailored according to their own operations, an organisation can feed the model straight into their own SMS.

These models are known as 'bowties'. Following their successful use in numerous other industries there is an increasing and large scale interest in the concept within the global aviation industry, from both safety regulators and operators.

A bowtie model offers a very effective visual representation of a specific risk. It provides an opportunity to identify and assess the key safety barriers either in place or lacking between a safety event and an unsafe outcome. Different elements build up a risk picture which revolves around a particular hazard and a 'top event'. On either side of the top event are the threats (a possible direct cause for the top event) and the consequences (results of the top event directly ending in loss or damage).

Realizing the potential impact that the bowtie model could have on the highly complex business of aviation safety, the CAA, began engaging widely with organisations throughout the UK commercial sector to develop the model. Operators such as British Airways, easyJet, Heathrow Airport Limited, NATS and KLM UK Engineering all contributed extensively to the work.

All of the template bowties, along with guidance material on their use, and an explanation of the methodology employed, are available on the CAA's website (www.caa.co.uk/bowtie). Advice is also given on how an organisation can create their own unique bowtie, should none of the CAA templates fit their particular operation.

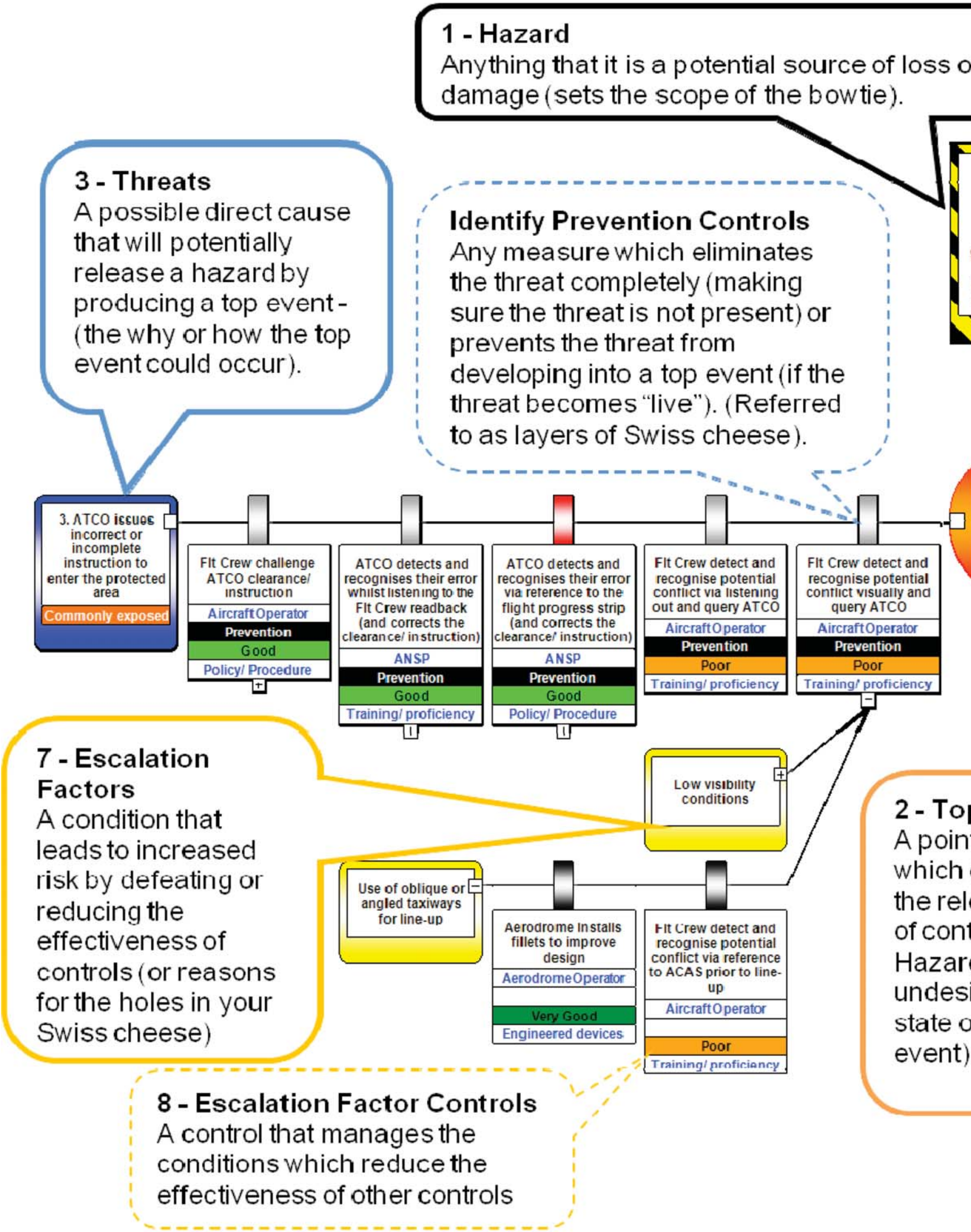
Feedback from operators who use the models will be vital, and is therefore being actively encouraged by the CAA. This input will be shared across the industry, further enhancing knowledge and understanding of aviation safety risks. A joint CAA-industry Bowtie User Group will capture all the comments and reactions from bowtie users and collate and feed them back into existing working groups and then disseminated as appropriate.

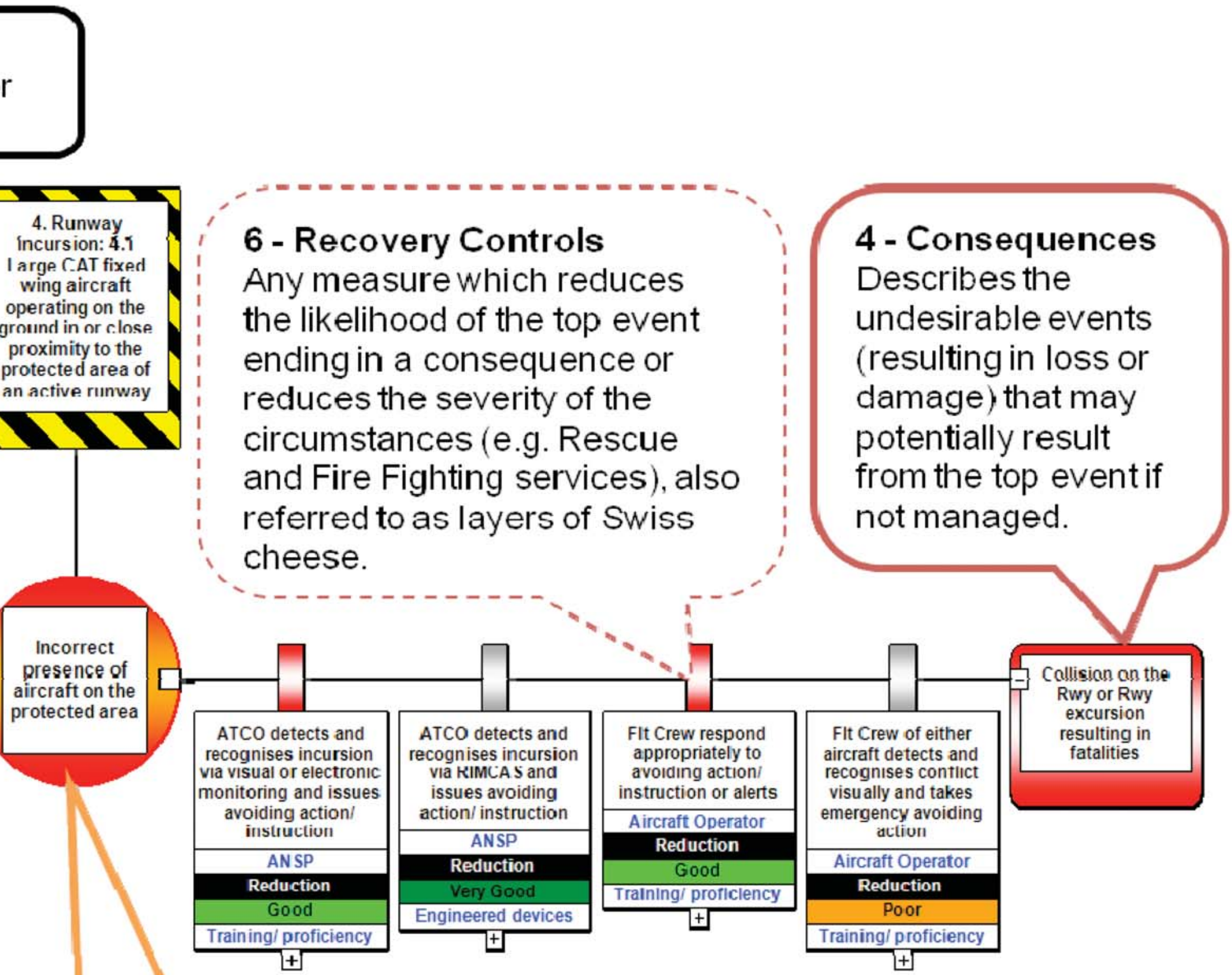
Mark Swan, Director of Safety and Airspace Regulation at the CAA, said: "These bowtie risk models are very much part of our proactive and collaborative work with industry to help organisations identify any actions that might be required to improve risk mitigations and, ultimately, prevent accidents through a better understanding of root causes. They are an integral part of our performance based oversight which aims to identify and understand the major risks to UK passengers, allowing us to focus our resources where they can have the best effect."

The risk model scenarios are largely based on the CAA's existing 'significant seven' safety outcomes - which were developed several years ago following analysis of global fatal accidents and high-risk occurrences involving large UK commercial air transport aeroplanes and include in-flight loss of control, runway incursions and controlled flight into terrain. The key enhancement to the 'significant seven' through these models is the greater focus on root causes that can lead to these outcomes.

The aviation industry's use of the models will ultimately provide the CAA with more sophisticated data and safety performance indicators, allowing an overview of safety risks across the whole UK aviation system to be taken, which will help inform future initiatives. If the UK aviation industry is to maintain its enviable safety record, collaboration between the CAA and industry is of the utmost importance. Only then can we together understand the current specific safety risks facing commercial air transport and develop targeted strategies to ensure today's risks do not become tomorrow's accidents.

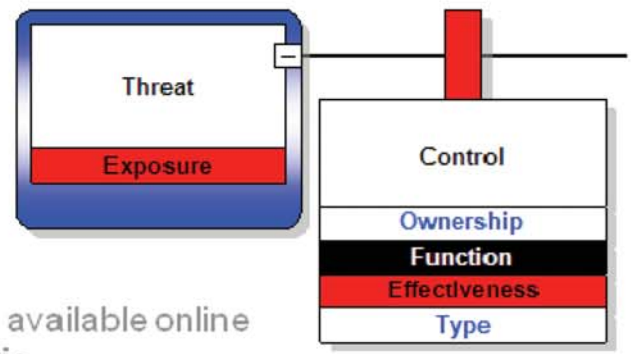
Bowtie Barrier Risk Models – The Key Elements





This bowtie is an example from the CAA's bowtie template project (www.caa.co.uk/bowtie). Models were produced by CAA staff and industry specialists representing all stakeholders within industry.

For demonstration purposes this model has been reduced but the bowtie information has been classified as shown on the above model. Note: effectiveness and exposure are coloured coded. Each classification shows:



Further information is available online www.caa.co.uk/bowtie.

B737 CFIT Accident – Resolute Bay, Canada

by Dai Whittingham, Chief Executive, UKFSC

On 20 August 2011, a B737-210C combi aircraft, C-CNWN, was being flown in daylight from Yellowknife, Northwest Territories (CYZF), to Resolute Bay, Nanavut (CYRB). Resolute Bay lies at 74.43°N; at the time of the accident magnetic variation was 28°W. During its approach the aircraft struck a hill about 1nm east of the runway, killing 8 passengers and all 4 crew; 3 passengers survived[1].

The Event

The IFR charter flight was planned to take 2 hours with the Captain, who had almost 13,000 hours total and 5,200 on type, as designated PF. The FO, who had previously held a command on the ATR-42, had 4,900 hours, of which only 103 were on type and all in the last 90 days.

The accident aircraft was fitted with 3 VHF/NAV receivers, ADF and twin Trimble TNL-800 GPS; the GPS was certified for non-precision approaches and provided information to the autopilot and HSIs but not to the flight directors. The main compass system was a Sperry C-11B which allowed operation either as a free directional gyro or in slaved mode; the DG mode is required in Canadian Northern Domestic Airspace because of proximity to the magnetic North Pole and its effects on magnetic compass reliability. The autopilot could be coupled to either the GPS or VHF NAV system but if uncoupled from GPS the annunciator would remain showing (lit) 'A/P ON GPS' until the autopilot select switch was set to OFF. The GPWS was an older Sundstrand variant based on 1970s technology. The system uses information from the captain's radio altimeter to determine height above terrain. Tolerances are reduced when the aircraft is in the landing configuration to prevent nuisance warnings. The aircraft was due to be fitted with an EGPWS at its next check.

During the initial climb to FL310 the crew received information on the deteriorating weather at CYRB but, after discussion with the despatcher, they jointly agreed to continue to destination. About 25 minutes before their planned arrival the crew programmed their GPS for MUSAT, an intermediate waypoint on the RNAV RWY 35 TRUE approach for CYRB, with the aim of transitioning to an ILS/DME approach.

At 1631 UTC the crew made contact with CYRB, were passed the airfield details and instructed to report 10nm finals for RWY 35T (MUSAT). The crew initiated the 'in-range' checklist at 1632, completing it at 1637 before they started to configure the aircraft for approach and initiated the landing checklist. Just prior to MUSAT the aircraft was 600ft above the GP at 184kts and rolled out tracking approximately 350T, 3o right of the MUSAT-threshold track of 347T. The crew called 10nm finals and were instructed to call 3nm finals; the ATC instruction was repeated on crew request and acknowledged by the FO. Weather prior to the approach was 170/8, 5+ miles visibility in light drizzle with overcast at 700 ft. The cloud base had reduced to 300 ft by the time of the accident.

At this stage in the approach there was a 2-minute in-cockpit discussion about aircraft navigation, with the FO making 5 separate statements about lateral displacement from desired track. The Captain responded with 2 statements to the effect that the AP appeared to be tracking correctly. The FO then commented on the track deviation shown by the GPS and then pointed out they were only using the flight director, not auto approach; shortly after this, he asked the Captain to confirm that they were showing full deflection on the localiser. The Captain agreed but questioned why this should be the case because they were on the localiser; the FO said they were not centred but the Captain replied that the localiser had been captured.

The FO stated his disagreement with the Captain's belief the localiser was captured, reminded him of the hill to the right of the runway and said that the GPS was also showing displacement to the right. At 1640:30 the FO voiced his opinion that they should abandon the approach and solve the navigational problem but the Captain indicated his intention to continue as planned, which the FO acknowledged. The aircraft was passing 1000ft AAL and the speed was V_{APP} +44kt.

At 1641:30 the crew reported 3nm finals and were cleared to land; the FO pointed out that they were still not configured and the Captain called for Flaps 25. The landing checklist was still incomplete. The Captain then over-rode the beginning of two statements by the FO, calling for Flaps 35 and then Flaps 40. At 1641.46 the FO called the Captain by his first name and stated "I don't like this." This statement was followed immediately by a GPWS warning of "Sink Rate" and 2 seconds later by a further GPWS warning of "Minimums", at which stage the FO called "Go around". Approximately 1 second later, and after a further "Minimums" warning, the

Captain called "Go-around thrust" 0.6 seconds before the aircraft impacted terrain about 1nm east of the midpoint of the runway at 170ft AAL. The first GPWS warning occurred only 4 seconds before impact.

The landing gear and engines separated on initial impact and the aircraft followed a ballistic trajectory for a further 600 ft before the second ground contact, whereon it broke up and caught fire. The belly of the centre fuselage was partially torn off, consistent with the wreckage dragging on the ground before coming to rest. The floor of the passenger cabin completely separated from the fuselage and was extensively broken up. A section of floor containing the 4 left-side rows of passenger seats came to rest 372 m (1222 feet) from the initial impact, between the aft and centre fuselage sections; all the survivors came from this area of the cabin. They were seriously injured but were sufficiently mobile to assist each other to the edge of the debris field and clear of the fire and smoke, where they awaited rescue.

The Investigation

The investigation looked in detail at the compass systems in its analysis and determined that the heading reference was in error by -8° during the initial descent and drifted further to at least -17° during the final approach. It was surmised that the Captain probably made a Control Wheel Steering input that caused the autopilot to revert to MAN/ HDG HOLD from VOR/LOC capture, and that this change was not detected by the crew. The effect of the large compass error would have been to confuse the crew as to their intercept angle and subsequent track. To add to the confusion, the flight directors were also believed to have reverted to AUTO APP intercept mode as the aircraft diverged from the localiser. Of note, the CYRB approach plates and aerodrome chart indicated 4 different magnetic variation values.

The engineering investigation found 2 Airworthiness Directives (AD) applicable to the aircraft. AD 2004-19-10 required inspection of the horizontal stabilizer outer and inner pivot hinge pins for corrosion or cracking. Failure of the outer and inner hinge pins could allow the pins to migrate out of the joint and result in intermittent movement of the horizontal stabilizer structure and consequent loss of controllability of the aircraft. Not all the inspection tasks had been completed by the operator.

AD 2006-12-23 required inspection of the elevator tab trailing-edge free play – this AD allowed for a certain amount of free play, but if the inspection revealed free play in excess of the allowed tolerance a repair was required before further flight. Logbooks showed 2 open deferred maintenance items for free play in excess of the AD limits; the maintenance action should not have been deferred. However, there were no anomalies entered into the aircraft logbooks that would indicate difficulties with the controllability of the aircraft. Similarly, there were no indications of pitch control problems identified in the flight data recorder (FDR) for the occurrence flight. The maintenance deficiencies were therefore determined not to have contributed to the accident.

The investigation also examined the human factors element of this accident in an attempt to understand why the pilots had markedly divergent mental models and why they had become effectively task-saturated. In addition to the full-scale localiser deflection the approach itself was unstable for speed (though this was apparently un-noticed by both pilots) and the aircraft was not configured for landing at the stable approach gate. Any one of these factors should have been sufficient to prompt a go-around. The FO, having determined that a go-around was required, was unable to persuade the Captain to break off the approach; the investigation found that there were deficiencies in the operator's CRM training programme and as a result this crew's CRM was ineffective. Interviews with the operator's other pilots revealed a general view that co-pilots could not demand a go-around in the event of a fully deflected localiser indication. Procedural drift was also apparent and had been undetected by the operator's supervisory activities – an FDM programme was in place but was in transition to a new provider and no analysis was being undertaken.

A number of safety actions ensued, and the company undertook work to standardise SOPs, especially call-outs, across its fleet. Operating and crew training manuals have been extensively amended and the company's CRM programme has been extended, there have been changes to its maintenance regime, and detailed guidance has been given to crews on the requirements for, and means of, checking compasses at higher latitudes. In addition, the Board recommended that Transport Canada required all operators to monitor and reduce the incidence of unstable approaches.

If in doubt, there's no doubt...go around!

[1] Source: Transportation Safety Board of Canada Aviation Investigation Report A11H0002, Boeing 737-210C, C-GNWN, 20 August 2011. http://www.tsb.gc.ca/eng/rapports-reports/aviation/2011/a11h0002/a11h0002.asp

Onwards and Upwards for Helicopter Training

Chuck Weirauch explores the helicopter simulation and training industry and provides an update on recent progress

Picture: Frasca's Sikorsky S-92 Full Flight Simulator. Image credit: Frasca International.

With commercial helicopter sales now anticipated to increase significantly in just about every major world market, and in China at an annual double digit rate, for example, it would only follow that the number of helicopter simulator sales would increase as well. The Global Helicopter Simulators Market 2014-2018 published by Sandler Research forecasts that this market will grow at an annual rate of 2.80 percent over the period 2014-2018.

According to this report, one of the key factors contributing to this market growth is the growing demand for commercial helicopter aircraft, as well as an increasing demand for full flight simulators. But the flip side to all this good news is that, just like with the commercial fixed-wing market, there is a looming shortage of helicopter pilots. Recently Matt Zuccaro, President of the Helicopter Association International (HAI), warned there is a real chance that the industry could face a shortage of qualified pilots and mechanics in just a few years.

While helicopter training device providers are gearing up to meet the challenges of a growing market, a major goal for them is to constantly improve the replication of the flight performance of newer and increasingly capable and sophisticated helicopters equipped with the latest in avionics and instrumentation. To gain an insight into some of the latest developments, technologies and trends, CAT solicited comments from several leaders in this industry.

More Accurate Performance Replication

For John Frasca, president of Frasca International, a high-quality data package is essential to accurately replicate aircraft performance. OEMs often have data packages, but they can leave a lot to be desired, since sometimes they are based on pre-production aircraft and sometimes data is missing. To eliminate such discrepancies, Frasca has flight-tested a number of helicopters and collected comprehensive data packages to support up to Level D FFS's. The next critical step is to develop the aero models, a bigger effort than the flight test, and a helicopter model and far more complex than that of a fixed-wing aircraft.

Motion cueing breaks into two areas, vibration effects and acceleration effects, Frasca explained. Vibration is improved with the incorporation of independent vibration platforms, but both are very dependent on the data package and aero models, he added. According to Nidal Sammur, FlightSafety International's director of Engineering for Simulation, motion cueing is one of the most challenging areas of flight simulation because it is physically impossible to completely replicate this aspect of the aircraft environment. Even so, carefully crafted motion cueing can be a major contributor to creating an immersive simulation experience.

Sammur explained that FlightSafety has developed new enhanced motion cueing for fixed-wing full flight simulators and is currently deploying the technology on those new devices. The new cueing relies on objective frequency-domain testing methods to quantify system performance. According to Sammur, the enhanced motion cueing for helicopter devices will be deployed in 2014.

"Our customers will see the same or greater enhancements in performance for helicopters as we are seeing for the fixed-wing devices," he said.

According to Marc Hilaire, CAE's VP for Technology and Innovation, the company puts an emphasis on the rotor model, validating the dynamic response of CAE's Object-Oriented Blade Element Rotor Model flight test data in both time and frequency domains throughout the flight envelope to maximize the accuracy of aircraft handling qualities. To improve motion cueing, the newest advancements on CAE's simulators include the use of electric vibration platforms, electric motion systems, and electric cockpit servos. These new electrical actuation systems bring the benefits of greater fidelity, higher bandwidth cues, and lower operational cost.

For the AgustaWestland team of Captain Leonardo Mecca, Head of Training, Francesco Pasqualetto, director of Training and Helicopter Support Systems, along with Regional Business manager Jon Sackett, the main current technology advantage has been the availability of good-quality commercial-off-the-shelf (COTS) products, which the company has been able to integrate successfully into its flight simulator solutions to produce high-fidelity products.

That team also reported that by combining such products with AgustaWestland's own flight test and engineering data, the company has been able to produce devices to the standards required by the civil regulatory authorities. The multinational helicopter design and manufacturing company has also found that the new generation of electrical motion systems allow for significant reductions in maintenance and facility costs, while providing comparable performance standards to the traditional hydraulic motion systems.

Better Visuals and Terrain

According to Mecca, Pasqualetto and Sackett, the use of flight simulation in helicopter flight training is becoming a must today for any part of training, even when flying VFR only. Modern visual systems are benefiting from continually improving update rates and resolution, with the ability to model more realistic scenarios and weather effects relevant to customers operations in fields such as oil and gas platforms, accident scenes and city landing platforms with associated hazards.

To provide the highest quality visuals, AgustaWestland has been taking advantages of COTS solutions for direct projection visuals that have received regulatory authority acceptance at the highest levels of certification. This means that pilots flying the company's helicopter simulators experience very realistic height perception at low levels, making the simulator much more useful for training down to ground levels for difficult tasks. These tasks include such flight elements as confined area landings and the simulation of emergencies close to the ground.

FlightSafety International's general manager of Visual Systems John Hester pointed out that increased field of view (FOV) with cross-cockpit viewing is dramatically improving the acceptance of simulator training. Helicopter cockpits generally have significantly more wind screen area than fixed wing aircraft, so greater FOV is extremely important as pilots need this extended viewing for many critical maneuvers such as hover/land. Then both the physical aspects and manufacturing resources, along with the ability to eliminate distortions as the FOV increases is paramount to creating a realistic environment, he explained. FlightSafety has accomplished both of these and more with its mirror CrewView display.

Another major factor for enhancing out-the-window views in helicopter simulators besides increasing FOVs, is the development of higher resolution and more detailed terrain databases. According to Hilaire, CAE is seeing demand for higher resolution database content simultaneously covering larger training areas. Relying solely on satellite imagery becomes cost prohibitive under these conditions, so the company's "Motif" DB production technique has been a key factor in meeting recent program requirements, he said. Motif procedurally generates high resolution imagery suitable for both low and high level flight, with the company delivering Motif for country-sized areas.

Frasca is also now frequently delivering country-size databases with high-resolution imagery. This capability is possible with the company's Vision Global image generator, which can handle virtually unlimited database sizes. Managing the data licenses when using commercially available data is becoming a part of the effort of providing such extensive databases, Frasca pointed out.

Training Trends

According to Hilaire, worker transport to offshore oil and gas facilities is the helicopter world's version of the commercial airline business. Helicopter services and support companies offer scheduled service in large capacity helicopters and operate point to point in often difficult weather conditions. It is in this oil and gas transport domain that CAE sees the most significant and growing use of simulation training.

"There seems to be an effort towards putting training where the pilots are," Frasca said. "Training centers are being announced all over the world. Simulation is being identified by OEM's much earlier in the aircraft development programs. And overall, the goal seems to be to have the training programs in place concurrently with aircraft deliveries," Frasca continued.

According to the AgustaWestland team, the major change from the company's perspective has been the acceptance of flight simulation by the regulators, with EASA allowing a Level D FFS to be used for the majority of a type rating, and the FAA allowing for zero-flight time conversion for such a device. Most recently, the company's customers are asking not only for instrument training, where the recognized credit towards the live helicopter from all Authorities stands as 100 percent, but also for more mission-

Picture: Modern visual systems are benefiting from continually improving update rates and resolution, with the ability to model more realistic scenarios and weather effects. Image credit: AgustaWestland.

orientated and multi-crew training to improve crew co-operation in the cockpit. Customers are also looking for courses and systems more tailored towards their operating procedures in their operating environment.

Dave Welch, director of the FlightSafety International Lafayette Learning Center in Lafayette, LA, said that more and more countries around the world are requiring pilots to attend simulation training if the simulator exists. An even larger issue is that FlightSafety's customers require their pilots to undergo simulation training as part of their qualification. They have realized the importance of simulation training in protecting their people and assets, and in controlling their costs. The customer is demanding scene models in the area where they will operate, Welch added.

In addition, Level D fidelity and scene detail is enabling more mission-oriented training tasks, such as confined area landings, realistic accident scenes, offshore platform operations, pinnacle landings, and NVG training. These more realistic training mission scenarios extrapolate to the real world, Welch noted.

More Simulation Acceptance

While flight schools and instructor pilots were reluctant in the past to employ helicopter FTDs and full flight simulators into their training curricula because they felt that those trainers did not replicate aircraft performance accurately enough, the consensus of the CAT sources for this article is that this trend has been largely reversed. In fact, they see even more growth in the use of simulators for flight training in the future.

"As technology advances and more high-fidelity simulators are deployed globally, we are definitely seeing both increased acceptance and adoption of simulation training," Hilaire said. "The key to continuing – and even accelerating – the growth trend on the civil side is to bring that efficiency and safety mindset to bear while leveraging technology to enhance realism and improve training experience and capability while decreasing costs by deploying training assets locally."

"Advanced cockpits are a significant force pushing the use of simulation," Frasca said. "The high cost of operating the aircraft, but perhaps more importantly the limited availability of aircraft for training, also encourages the use of simulation. Helicopters are a huge capital investment, with owners wanting them earning revenue every single day. These benefits of simulation have always existed. Obviously there is an increase in formal safety programs. Frequently these programs identify increased use of simulation as a strategy."

The AgustaWestland team feels that regulation will remain a key factor driving customers towards simulation, supported by technological advances that continue to enhance realism and drive down cost. However, the industry is already approaching the stage where concerns are being raised about ensuring that pilots have sufficient time in the aircraft, and this will limit the extent to which simulation can take over. Another aspect will be to extend training into the full-crew environment to extend the multi-crew training to further enhance performance. Here, more low-cost solutions are emerging from gaming technology that could help to drive this forward, the team predicts.

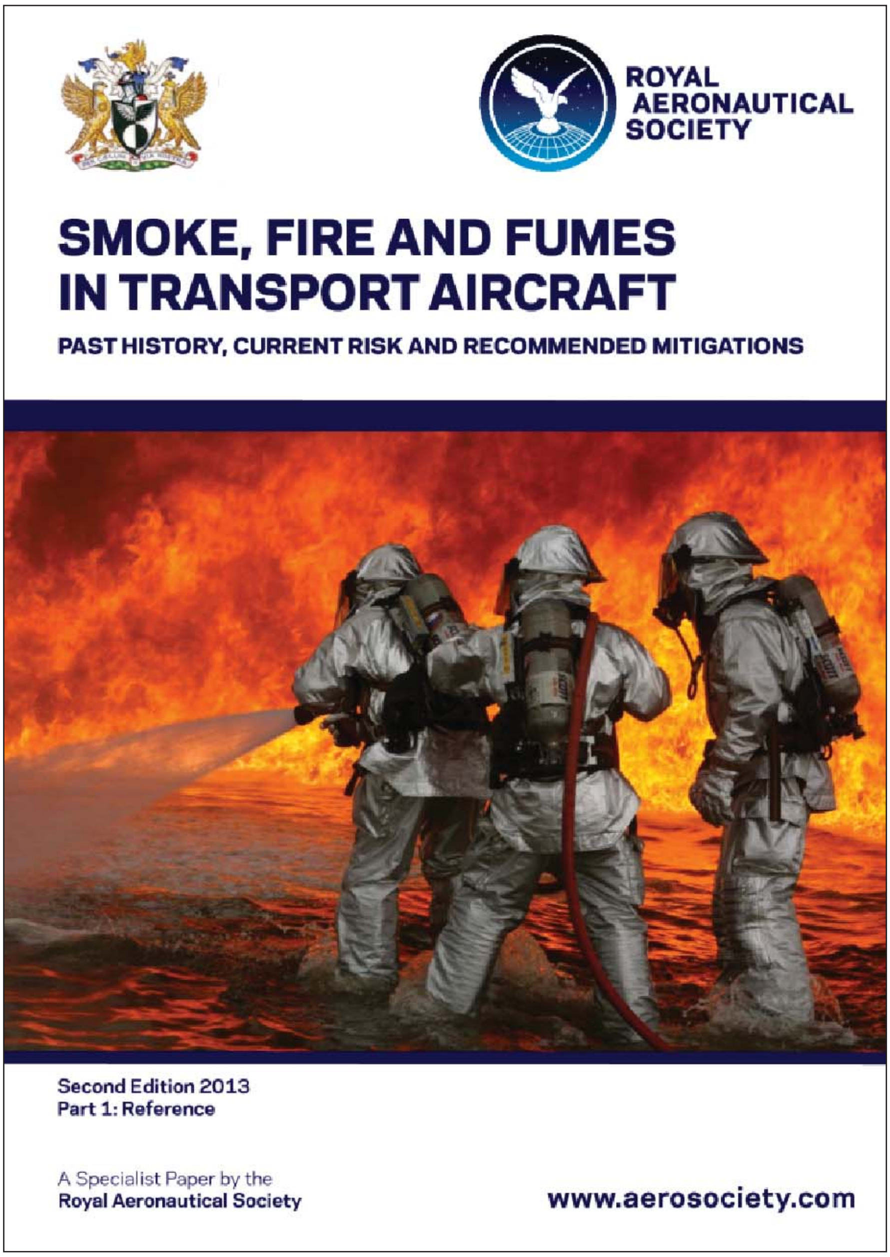
"More and more there is both the expectation and the requirement for simulation training around the globe both from regulators and customers," Welch summed up. "We are also seeing part 135 operators evaluating training programs with the goal of moving more training from the aircraft to the simulator."

Reprinted with kind permission of CAT Magazine Issue 1, 2014.

Fire in the air?

by Dai Whittingham, Chief Executive, UKFSC

One of the many theories surrounding the loss of MH370 is that the aircraft suffered an on-board fire that either incapacitated the crew via fumes or a subsequent decompression. There is plenty of advice available for crews, most notably in 'SAFITA', the RAeS specialist paper on the subject[1], and SKYbrary[2]. Almost all of it has one central tenet, namely the need to get the aircraft on the ground (or onto water) as soon as possible. The accident most often linked to this lesson is Swiss Air Flight 111[3].



On September 2, 1998, a Boeing/McDonnell Douglas MD-11, departed John F. Kennedy (JFK) International Airport, New York at 2018 eastern daylight savings time (0018 Universal Coordinated Time [UTC]), on a flight to Geneva, Switzerland. The flight included 215 passengers, and a crew of two pilots and twelve flight attendants. Approximately one hour into the flight, the pilots detected an unusual smell. Fourteen minutes later the pilots declared an emergency. Six minutes after the declared emergency, Flight 111 impacted the ocean about five nautical miles southwest of Peggy's Cove, Nova Scotia, Canada. The aircraft was destroyed and there were no survivors. When the crew first indicated a problem they were only 56 miles from Halifax; at 30 miles from the threshold the crew opted to stop descent at an intermediate altitude while the cabin was prepared for landing and then requested a suitable area for fuel dumping, after which the aircraft headed away from Halifax. Just 10 minutes later the aircraft was in the water.

A similar chain of events can be found in the Dubai UPS B-747 accident of 3 September 2010. Within 5 minutes of the first alarm the flight deck had filled with smoke and 2 minutes later the captain's oxygen supply hose had burned through and he left the flight deck to attempt to reach an emergency supply; he did not return. The aircraft crashed in Dubai when control was lost 30 minutes after the initial main deck fire warning.

Fire suspected? Mask up, 100% oxygen with overpressure, goggles or smoke hoods on, plan for an immediate descent and landing. Fire confirmed? LAND AS SOON AS POSSIBLE. If that means ditching, so be it - some or all of you may survive a ditching, but surviving an uncontrolled impact with terrain or water is highly unlikely.

1 http://aerosociety.com/Assets/Docs/Publications/SpecialistPapers/SAFITA__2013.pdf
2 http://www.skybrary.aero/index.php/In-Flight_Fire:_Guidance_for_Flight_Crews
3 http://lessonslearned.faa.gov/ll_main.cfm?TabID=3&LLID=22&LLTypeID=2

iFACTS in UK ATC: Facts for Pilots

What is iFACTS?

iFACTS (interim Future Area Control Tools) is an electronic system which is used by controllers working in **London Area Control airspace**. It is not in use in London Terminal Control (generally airspace below FL200) or Scottish Control airspace.

What does it do?

iFACTS uses several sources of information to construct an accurate prediction (up to 18 minutes ahead) of the flight trajectories of aircraft in its area of interest. If it calculates that your aircraft will come into conflict with another aircraft or that separation might be compromised, it alerts the controller. It also records the clearances issued by controllers.

How does it do it?

iFACTS has several sources of information to help it. These include:

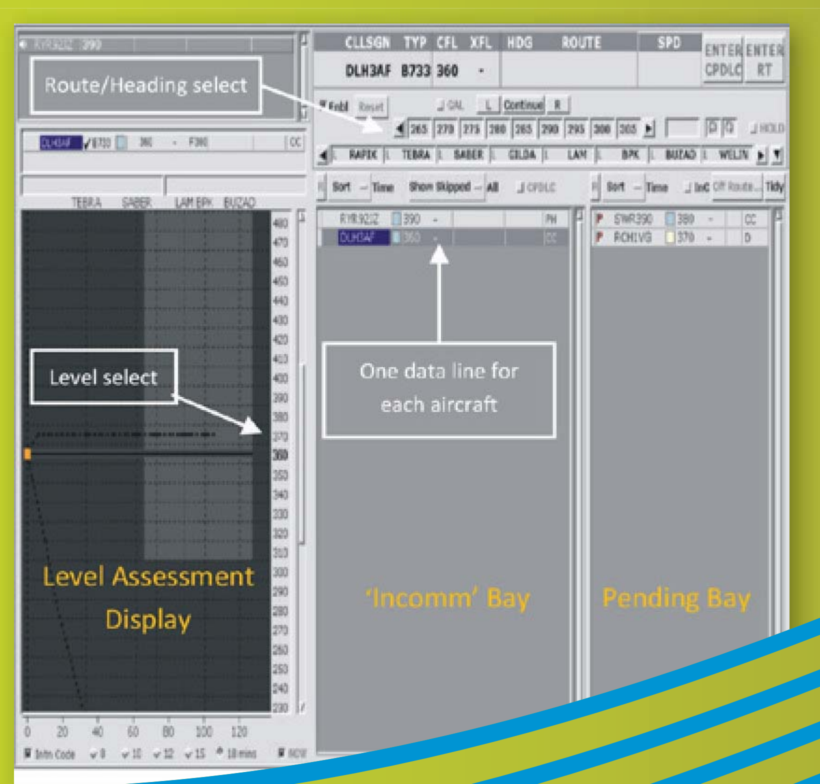
- Airspace sectorisation
- Aircraft type performance modelling
- Forecast meteorological information (uploaded every 4 hours)
- Flight plan route or Cleared route
- Radar data (Level, G/S Track)
- Controller entered clearances (Level, Heading, Speed, Route)

What does the controller see?

The paper strips you might know that controllers used to have for recording data have now gone. They have been replaced by an electronic display which shows the aircraft they are talking to and those about to enter their sector.

It is also used to enter clearances.

It looks like this



NATS

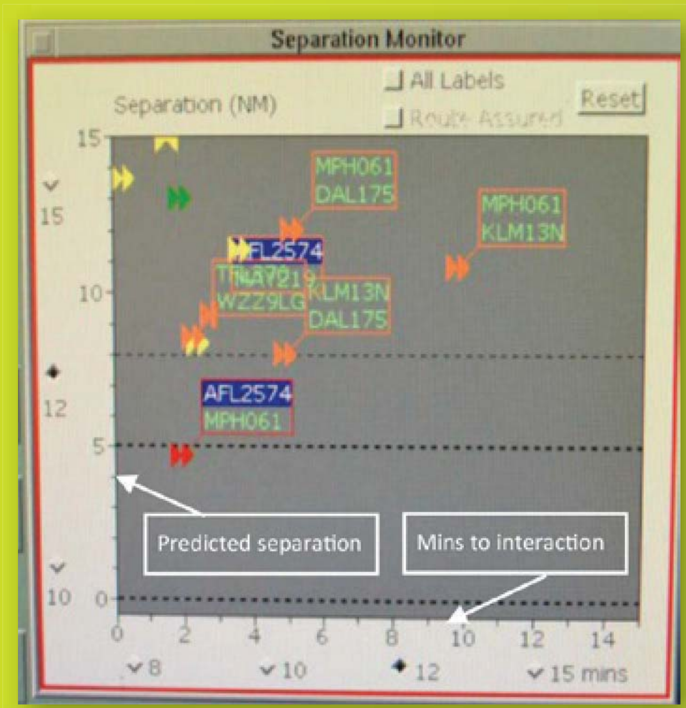
What happens in iFACTS?

iFACTS uses all the data to assess the closest predicted point of approach of any other aircraft along an aircraft's trajectory. As the flights progress and new clearances are issued and recorded in the system, these predictions are updated. If iFACTS detects that any aircraft may come within 15nm of each other at the same level it will provide an 'alert' to the controller.

What do the alerts look like?

All alerts are displayed on the Separation Monitor.

It looks like this



Each triangle on the picture above represents an aircraft and the alerts vary in severity from Green (separation assured) to Red (separation predicted to be lost). The closer they are to the bottom left of the Separation Monitor, the more severe they are and the sooner they will happen. Controllers decide how to resolve any conflicts.

What's in it for me?

Accurate conflict prediction means the airspace can be operated more efficiently by the controller. Capacity and safety are increased, meaning less likelihood of delays, level restrictions or extended routings. It can offer improved vertical flight profiles and may result in more direct routes. Fuel burn and getting home earlier may all benefit!

What might I do differently?

Climb and descent instructions may include a vertical speed restriction to allow continuous climb or descent in busy airspace instead of step climbs or descents.

Headings and Track Made Good are monitored very closely by iFACTS. If you report the exact heading when asked (not rounded to the nearest 5 degrees), this helps to maintain accuracy. When on 'own navigation' in class A/B/C Airspace, do not deviate from the track without checking with ATC first

Where can I find out more?

Visit the NATS website:
www.customer.nats.co.uk

NATS

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