

HUMAN FACTORS REVIEW

Phase Two Report

Presented by

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23 December 2011

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ABBREVIATIONS AND ACRONYMS

AMC	Acceptance Means of Compliance
ANSP	Air Navigation Service Provider
AOC	Air Operator Certificate
ATM	Air Traffic Management
ATO	Approved Training Organisation
ATQP	Alternative Training and Qualification Programme
CAA	Civil Aviation Authority
CAP	Civil Air Publication
CHIRP	Confidential Human Factors Incident Reporting Programme
CRM	Crew Resource Management
CS	Certification Standard
EASA	European Aviation Safety Agency
ECCAIRS	European Coordination Centre for Accident and Incident Reporting Systems
EHFAG	European Human Factors Advisory Group
ESP	Enhancing Safety Performance
EU	European Union
FAA	Federal Aviation Administration
FCL	Flight Crew Licensing
FDM	Flight Data Monitoring
FO	First Officer
FRM	Fatigue Risk Management
FTL	Flight Time Limitation
GA	General Aviation
GHOST	Ground Handling Operational Safety Team
GM	Guidance Material
HF	Human Factors
HFO	Human Factors Opportunity
HMG	Her Majesty's Government
HMI	Human Machine Interface
HSE	Health & Safety Executive
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IOSA	IATA Operational Safety Audit
LOFT	Line Oriented Flight Training
LOSA	Line Operations Safety Audit
MAA	Military Aviation Authority
MEDA	Maintenance Error Decision Aid
MOR	Mandatory Occurrence Reporting
MPL	Multi-Crew Pilot Licence
NAA	National Aviation Authority
Ops	Operations
QC	Queen's Counsel
RBO	Risk-based Oversight
SMS	Safety Management System
SR2	Strategic Review of Safety Regulation
SRG	Safety Regulation Group

SSP	State Safety Plan
TEM	Threat Error Management
TRI	Type Rating Instructor
TRTO	Type Rating Training Organisation
UKAB	United Kingdom Airprox Board
UKHFAB	United Kingdom Human Factors Advisory Board
UCE	Unit Competency Examiner
WTL	Working Time Limitation

EXECUTIVE SUMMARY

The UK has an enviable safety record of which the industry is rightly proud. However, there is no doubt that civil aviation in the UK and in many other parts of the world continues to face unprecedented operational, economic and environmental pressures. The need to improve aviation safety in a proportionate and effective way is one of the great challenges faced by the CAA and our partners in the aviation community.

The CAA has published a comprehensive Safety Plan http://www.caa.co.uk/docs/978/CAA_Safety_Plan_2011.pdf outlining the specific core safety concerns that both the CAA and industry are seeking to address, including Human Factors (HF) issues.

This report presents an overview of HF in UK civil aviation today and is the result of work undertaken by the UK Civil Aviation Authority with input from a cross-section of UK industry stakeholders. The eight statements and thirteen opportunities expressed provide a foundation from which the CAA, in partnership with UK industry, can develop a comprehensive and coordinated strategy for HF in UK civil aviation.

Development of a co-ordinated approach and strategy would enable industry to understand better the risks and agree the steps necessary to address these, with the objective of maintaining the UK's excellent safety record. By developing this common approach within Safety Management Systems (SMS), it will assist in promoting an open and just safety culture.

One key aim should be the sharing of HF data between industry and the CAA in working together to enhance safety performance.

Specific issues addressed in the report include: developing HF in the Aerodrome community, embracing third party contractor HF capability, preserving and developing Crew Resource Management (CRM), formalising HF training within engineering, and encouraging General Aviation to consider the benefits of HF. Several issues are applicable across several sectors including: fatigue, stress, communication and the targeting of regulatory oversight capacity.

Finally, the report identifies a set of guiding principles for developing an HF strategy for aviation. Ultimately, a package of practical and sustainable tools and guidance will be developed to drive continuous safety performance improvement through a more integrated approach to HF.

HUMAN FACTORS REVIEW - PHASE TWO REPORT

References:

- A. Document CAA/EC/GSS/HF/933 dated 28 September 2010 (Comprehensive Review of Human Factors in UK Civil Aviation - Terms of Reference).
- B. Document CAA/EC/GSS/HF/945 dated 17 June 2011 (HF Review Phase One - Quick Look Report Second Edition).

1.0 INTRODUCTION.

1.1 Phase Two of the Human Factors (HF) Review set out to test and validate the input received during Phase One, which was summarised and expressed by way of common themes at Reference B. This report articulates a [non-prioritised] series of 'Statements' and 'Opportunities' that the Review Team¹ must address in establishing appropriate courses of action (Phase Three of the Review). It also identifies a set of guiding principles that will be applied to the drafting of a strategy for HF in UK civil aviation [the Strategy].

1.2 Important! The content of this report represents the generally agreed state of HF within UK aviation, reflecting the views of industry and the CAA. By the nature of the quality and consensus of the feedback received, the report may point to areas of need (the What), but it does not attempt to provide solutions (the How); such activity will be the focus of Phase Three of the Review. Accordingly, the Review remains 'live' in the sense that further clarification, disagreement or support can be introduced at any time. Readers who have not been directly involved with the Phase Two validation work and who wish to contribute are invited to contact the Review Team. There will be opportunities to comment on the draft Strategy, both informally during its preparation and during the formal CAA external consultation period early in 2012.

1.3 This document should be read in conjunction with the References. Specific community/domain² concerns and feedback are made explicit, where appropriate, to further refine and balance the reader's overall appreciation of HF maturity within UK civil aviation.

1.4 Working Definition. For the purposes of the Review, Human Factors is defined as³ (see Figure 1):

“Anything that affects human performance.”

2.0 METHODOLOGY.

2.1 Within resource constraints, the most efficient means of validation was sought. Limited HF data is available and so access to a wide section of qualified opinion and experience was achieved to justify and objectively assess a consensual picture of HF. Those entities whose senior safety and training personnel offered qualified opinion and observation during Phase Two is at Annex A.

¹ HF Review Team includes: Review Team Leader, HF Review Seconded, HF Champions and Members of the UK Human Factors Advisory Board (UKHFAB) designate.

² These terms refer to identifiable operational disciplines such as Flight Operations, Air Traffic Control, Engineering, Aerodromes, etc. Further segmentation may also be applied, for example: Pilots and Cabin Crew within Flight Operations.

³ Grateful thanks to LMQ Limited for freely sharing this simplified definition of HF.

Human Factors is:

“Anything that affects human performance.”

Source: CAA Working Definition

Figure 1 – Human Factors Definition

2.2 In testing and validating the Phase One findings, further clarity and context was brought to the common themes, together with the ability to dismiss or confirm some of the more contentious feedback. All feedback in this report has been dis-identified to ensure that the open and honest discussions held with the Review Team during Phase Two are respected and may continue.

3.0 SCOPE.

3.1 Feedback is arranged in the same way as that presented at Reference B, insofar as it refers to elements of the Aviation Safety System⁴. The common themes give prominence to topics such as operations, training and fatigue, although other associated factors are also in-scope. These include; the environment, systems, technology, job design and procedures, which will be applied and developed in context during Phase Three. A consolidated feedback summary is at Appendix 1⁵. Further background evidence captured from many informal conversations across industry, but not formally recorded, has been considered.

3.2 The open feedback expressed during Phase Two was consistent with that of Phase One, providing the Review Team with a high degree of confidence that an accurate picture of HF across the industry had emerged. Phase Two discussions with respondents were more focussed and deliberate in considering the detail; thus specificity, legitimacy and balance have been introduced.

4.0 COMMENT AND ANALYSIS.

4.1 **Policy.** Industry and the Regulator want a more integrated approach to HF under a single safety [systems] philosophy. This approach should offer a simple, commonly understood framework and language that supports the development of Safety Management Systems⁶. This should be risk-based and done with due regard for the cost implication, balanced against the safety benefits.

4.1.1 Adopting a more coherent HF policy must preserve and develop existing good practice, while taking account of the differing social, organisational and safety cultures that are present within the European Union (EU). Responsible entities that focus on mitigating the risk of unwanted safety outcomes should continue to do so in a way that develops specific HF programmes, based on the nature of operations and the risk that such operations pose to them the overall safety system.

4.1.2 There was broad agreement that third party providers of services (for example in the ground handling environment), should be embraced within a more integrated approach.

⁴ Includes, but not limited to, strategy, policy, regulation, governance, training, assurance, standards, risk, design & manufacture, research, analysis and communication.

⁵ Entries may have relevance in more than one element of the aviation safety system, and are treated accordingly throughout the report.

⁶ For example: Definitions, Just Culture, Threat Error Management, Reporting Taxonomy and Investigation processes.

Statement 1 – Ensure business has the flexibility to meet its specific HF and cultural needs.

Opportunity 1 – An integrated approach to HF with a common framework embedded within the SMS environment.

Opportunity 2 – Develop practical community/domain-specific HF programmes, based on existing good practice/standards.

Opportunity 3 – Embrace third party providers in HF programmes.

4.2 **Strategy.** No central SRG-wide HF Strategy currently exists. Accordingly, no comment is made under this sub-heading, as it is the purpose of the Review to produce one. Any feedback listed under 'Strategy' at Appendix 1 has been incorporated elsewhere in this report.

4.3 **Regulation.** Further regulation would not generally be welcomed by industry; indeed, it is Her Majesty's Government (HMG) and EU policy to reduce the burden of regulation where possible⁷. While many in the industry demonstrate clear investment in HF programmes throughout the economic cycle, there are some that find this a challenge, potentially failing to address properly human performance as a significant risk to the aviation safety system.

4.3.1 There is general agreement that the CRM accreditation scheme has contributed to demonstrable and sustained benefits to aviation safety in the cockpit and cabin environments for over a decade, based upon a framework of competencies and standards. The UK should work to maintain and develop its CRM capability in the face of future EU rulemaking.

4.3.2 Any future regulation would need to be a proportionate balance of hard and soft rules, commensurate with the risk and addressing clear safety objectives. Flexibility and focus within a regulatory environment of collaborative trust and transparency should prevail over prescription and obligation. Thus any hard regulation should be broad and non-constraining, supported by good quality guidance and oversight.

4.3.3 Although the example of CRM is referred to, the position on regulation applies to all HF opportunities expressed in this report.

Statement 2 – Regulation for HF must be carefully considered and introduced only where justified to enhance aviation safety performance without being overly prescriptive.

Opportunity 4 – Preserve and develop CRM maturity within Flight Operations.

4.4 **Governance.** There is an expectation that the Review will deliver the opportunity for continuous improvement in HF within civil aviation. The formation of the UK Human Factors Advisory Board (UKHFAB) designate, as an authoritative governance body to guide and shape a future HF Strategy was announced at Reference B. At the time of this report, the UKHFAB has sat

⁷ See the "Better Regulation Framework" of the Department of Business, Innovation and Skills, available at <http://www.bis.gov.uk/policies/bre/better-regulation-framework>.

on four occasions. To date, its primary focus has been to assist with validation work, acting to facilitate two-way communication between the Review Team and a wide professional audience.

4.4.1 In mirroring the work of the UKHFAB, the CAA HF Champions have been engaged as part of the Review Team on a range of issues from publications, data and research to internal communication and training. Effective governance is required to achieve a coherent strategy for HF in the UK, not to say making a credible contribution to the development of HF within the EU. One outcome of the Review is to encourage appropriate attitudes, behaviours and processes to become a way of being, within the overall safety system, as a natural safety consideration.

4.4.2 In the aerodrome community/domain, there is a specific need to clarify the boundaries between various airside roles and responsibilities. For example, the three-way relationship between an aerodrome operator that issues a permit to a handling agent to work airside, and an airline operator that contracts with the same handling agent for the provision of ground services could be made more explicit with respect to the provision of HF training⁸.

Statement 3 – Formalise effective governance to underpin an HF Strategy.

Opportunity 5 – Clarify boundaries/synergies across Aerodrome activity within the existing Health & Safety Executive Memorandum of Understanding.

4.5 **Assurance.** Regulatory oversight of HF across the industry could be improved. However, this broad statement does not recognise the benefits to safety that established good practice delivers. Industry is clear that oversight improvements could be made and frameworks adapted to meet new and evolving safety threats⁹ and to encourage EU adoption of the same. The Unit Competency Examiner (UCE) scheme developed by NATS to involve Day-to-Day (D2D) observations¹⁰ and the Line Operations Safety Audit (LOSA) are examples of coal face assurance techniques that facilitate continuous improvement.

4.5.1 Performance-based assessment criteria, together with the development of practical tools in the SMS environment, would help regulators assess HF capability at the coal face more objectively and with greater confidence. Such assessment criteria should be consistent with community-specific competency frameworks.

4.5.2 All International Air Transport Association (IATA) members that were interviewed reported that the IATA Operational Safety Audit (IOSA) process was beneficial and that they would recommend it as part of a mix of the safety assurance activity.

4.5.3 Flight Time Limitation (FTL) and Working Time Limitation (WTL) are topical issues across industry, mainly between those who manage aviation and those who deliver productivity at the coal face. In some cases, particularly in smaller entities, the same individual manages and also delivers output. There are a number of reasons why effective FTL/WTL is desirable, as an essential component of the safety system, the more pressing of which (fatigue and stress) are discussed in Paragraph 4.13. All respondents agree that managers and individuals should have the necessary means to balance productivity and fatigue to achieve safe outcomes.

⁸ Within the terms of the Memorandum of Understanding (MOU) on the subject between the Health & Safety Executive and the CAA.

⁹ For example: so called 'system vulnerabilities', lack of command skills or the forced reduction of conscious cognitive capacity during emergencies through denuded (unpracticed) manual flying skills, or other 'loss of control' occurrences.

¹⁰ D2D involves the coaching, assessment and continuous improvement of individuals and Air Traffic Services in the UK with the focus on safety. The methodology is also now being adapted for use within airline operations.

Statement 4 – Ensure that the drafting and implementation of FTL/WTL achieves acceptable levels of risk with respect to human performance.

Opportunity 6 – Encourage continuous improvement of safety at the coal face through local HF performance assessment, together with more focused regulatory oversight of HF across all communities.

4.6 **Standards.**

4.6.1 Industry wants standards and Guidance Material (GM) for HF that are consistent with an integrated and coherent approach under a single [SMS] safety philosophy, both at an individual and organisational level. For the most part, feedback received has focussed on training standards, but the need to improve HF capability in addressing risk-based safety outcomes across the safety system involves all standards (including job design, component design, certification etc).

4.6.2 Training standards should be competency based¹¹ and aligned with training design proposals, performance based assessment criteria, SMS maturity indices and reported data formats. A generic HF competency framework could be developed, although communities themselves should be encouraged to establish domain-specific standards and apply them to particular roles.

4.6.3 The disparate standards for HF in the UK range from no formal standards (Aerodromes) and a general reference to the ICAO Document 8693 (HF Training Manual) in EU-Part-145, through to a more comprehensive set of standards for CRM (Standards Document 29 V4.0) or enhanced GM for engineers (CAP 716). In taking a more integrated approach, then consistency in HF data collection, investigation, analysis and training would be desirable.

4.6.4 Concern is also expressed regarding the variability of HF instructors, which is further evidenced by recent research into pilot lifestyle¹², where opinion was obtained directly from aircrew.

4.6.5 In another example, the effectiveness of recurrent training being achieved at the coal face within the engineering community/domain is questioned. The EU-Part 145 requirement for HF recurrent training places responsibility for the content¹³, standard and relevance of that training with the Approval Holder not the training provider. However, the Review Team is in possession of a number of HF course certificates generated by independent training providers, where individuals have undertaken training as a pre-requisite to being considered for a work placement by an employment agency, but where the approval holder has had little or no input to or visibility of the knowledge transfer achieved. The application of the current rules for recurrent HF training across the engineering community may require attention.

Opportunity 7 – Build on existing good practice to develop a common approach to HF training in all communities/domains, based on consistent competency-based standards.

¹¹ Competency-based training standards should articulate different levels of expected practical HF knowledge, skills and attitudes.

¹² Bennett S, *The Pilot Lifestyle: a sociological study of the commercial pilot's work and home life*, (2011), pp165-167, Institute of Lifelong Learning (Vaughan Paper 47), University of Leicester.

¹³ The only reference provided for HF standards in EU-Part 145 is the ICAO HF Handbook.

4.7 **Risk.** Most studies of significant incidents and accidents, together with Mandatory Occurrence Report (MOR) data, show that the majority involve HF. A better understanding of HF would help organisations and individuals to manage specific and cumulative risks effectively and to direct resources and target behaviours that set the right safety culture.

4.7.1 The CAA/Industry look¹⁴ into prominent threats (the Significant Seven) identified HF as a risk in all cases. Many influences, including training and employment models provide a solid pillar for human performance in preserving the integrity of the safety system. In line with a multi-systems approach, the development and use of predictive leading indicators for HF would contribute to achieving positive safety outcomes.

Statement 5 – HF programmes must reflect an appropriate cost/benefit, with effective leadership applied to establish cultural adoption.

Opportunity 8 – Explore the development and use of leading indicators in mitigating HF risks to the safety system.

4.8 **Training.** Reference to HF training has already been made on a number of occasions in this report. However, there are some further specific points worthy of note.

4.8.1 Historically, regulation has driven training programmes towards a 'tick box'¹⁵ approach and needs to adapt to the changing skill sets required in the industry. A great deal of feedback has suggested that the right individuals with the right skills need to be involved in delivering HF training and that they require active senior leadership and management support.

4.8.2 The current draft of The European Aviation Safety Agency (EASA) Part Ops and Part FCL obliges initial and recurrent CRM training, but does not explicitly authorise/mandate a competency-based accreditation scheme to ensure training delivery standards. Industry wants to preserve the level of maturity that UK has achieved in CRM and the opportunity that a similar approach presents to other communities/domains, although the practical challenges of this are acknowledged. All communities report that more focus on practical relevance is required in recurrent HF training. This is particularly apparent within the aerodrome environment where the boundaries between operational safety and occupational health merge. Team Resource Management (TRM) is encouraged by EUROCONTROL for use within the Air Traffic Management environment. The Alternative Training and Qualification Programme (ATQP), Multi-Crew Pilot Licence (MPL) and Line Oriented Flight Training (LOFT) programmes are recognised as good practice in setting the direction for targeted Flight Crew training.

4.8.3 The development of competency-based standards, performance-based assessment criteria and the embracing of HF training providers by approval holders could improve the practical effect of HF recurrent training at the coal face. However, the Review also recognises the good quality training and leadership being demonstrated by established, reputable training organisations, consultancy firms and approval holders.

4.8.4 The Review Team is grateful for the opportunity that Phase Two presented to clarify the various actors and activities engaged in GA within the UK. The majority, with or without an Air Operator Certificate (AOC), act in good faith with the Regulator to deliver the highest possible levels of safety, particularly in the corporate and business sectors. Equally, there are those that struggle to meet basic compliance. The size and financial condition of such entities often dictates

¹⁴ CAA Paper 2011/03 'Significant Seven' Task Force Reports dates March 2011.

¹⁵ In this context taken to mean of little perceived value (uninspiring, boring and/or irrelevant to specific need).

the degree of investment in HF programmes. The leisure GA community is particularly vulnerable, where the risks to individuals and the safety system as a whole require proportionate regulation and practical training. Access to good quality GM is essential. A sensible balance between cost and access must be struck, and Phase Three will look at innovative ways of achieving this, while maintaining flexibility and relevance in application.

4.8.5 The UK approach to HF training is consistent with ICAO Document 8693, albeit variable in application and maturity.

Statement 6 – Understand how market behavior might influence the provision of HF training.

Opportunity 9 – Consider a common approach to HF instructor training and encourage the right people to deliver such training.

Opportunity 10 – Recognise the differing characteristics of the General Aviation community within the HF Strategy.

4.9 **Design & Manufacture.** EU Certification Standards (CS) and Acceptable Means of Compliance (AMC) (for example: 'installed systems for use by aircrews'¹⁶, which provides standards to help mitigate design-related pilot error), could be further developed to standardise cockpit design. However, from a commercial perspective, each manufacturer may hold their cockpit design and operating philosophy to be the most appropriate. It is likely that manufacturers will continue to evolve cockpit design and operating philosophies in a way that meets effective certification standards while seeking competitive advantage. However, more could be done during design and flight test to reflect typical human performance¹⁷. No matter how robust designs and operating philosophies are perceived or justified, it is the omni-present vulnerability of human performance at the coal face that will ultimately demonstrate their effectiveness.

4.9.1 It is recognised, however, that The Human Machine Interface (HMI) is not a perfect environment, as evidenced by a number of accidents and serious incidents where pilots, engineers and others have not behaved in a way that equipment design and/or operating philosophy expected. These so called 'system vulnerabilities' may lurk for long periods undetected. The Review Team identified at least one major piece of research, underway at the Federal Aviation Administration (FAA), which seeks to evidence these latent threats in the operating environment¹⁸. These observations are equally valid for HF certification standards, design and manufacture within all communities/domains. For example, HMI within the Flight Operations and ATM environments enjoys a great deal of attention, whereas ground equipment in the ramp environment is less mature.

4.9.2 The general sentiment expressed suggests that proactive collaboration between industry, regulators, HF experts and manufacturers should continue.

Opportunity 11 – Encourage proactive collaboration in design to continuously improve maintainability and operability.

¹⁶ CS 25 Article 1302

¹⁷ For example; the 'Base Ten' tool being developed by the Royal Aeronautical Society Human Factors Group: Engineering (HFG:E) is a design tool that seeks to contribute to the maintainability of aircraft.

¹⁸Flight Crew Operational Use of Flight Path Management Systems: Report of the Performance-Based Operations Aviation Rulemaking Committee (PARC)/Commercial Aviation Safety Team (CAST) Flight Deck Automation Working Group.

4.10 **Research.** Some of the most consensual feedback centred on the coordination of resources dedicated to HF research. Often such research is constrained to relatively inexpensive undergraduate studies and theses, although limited examples of more cooperative academic engagement with universities were noted. Effective HF governance could do more to coordinate and promote research priorities and funding in understanding human performance in the contemporary and future contexts. The opportunity exists to identify research from HF data that answers specific questions or tests specific hypotheses on topics of critical safety importance. All communities/domains should be included.

4.11 **Reporting & Analysis.** Industry wants the ability to share meaningful HF data more easily.

4.11.1 The current MOR system has served all communities well to date, but it could identify more of the 'why' in addition to the 'what'. Specialist HF advice and a consistent investigative methodology¹⁹ would help increase the fidelity of HF data being captured and analysed. Daniel E Maurino supported this observation over a decade ago *“Human factors knowledge has been applied successfully by accident investigators in numerous cases, but its contribution to the accident investigation process and development of effective accident prevention strategies has yet to reach its potential.”*²⁰

4.11.2 The need to access hi-fidelity data and specialist HF advice is also keenly felt within other reporting programmes such as the Confidential Human Factors Incident Reporting Programme (CHIRP), the United Kingdom Airprox Board (UKAB) and the Whistleblower Scheme.

4.11.3 Without specialist assistance, it is likely that the person involved in an occurrence, where human performance was a factor, would be unlikely to report their own performance, attitude and behaviour in sufficient detail to be subsequently useful for interpretation and analysis. Indeed, it could be argued that, if they had the capability to do so, they may possess sufficient insight to have avoided the occurrence in the first place - justification alone for effective HF recurrent training! The European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS) product provides a common taxonomy and database framework and will soon be used in the UK to hold MOR data. In addition, a taxonomy for HF has been developed by the CAST-ICAO Common Taxonomy Team, which is likely to be adopted by ECCAIRS, thereby providing a means of capturing meaningful HF data internationally. The virtuous circle that translates after-the-fact incident data into predictive leading indicators and proactive interventions could become more effective.

Statement 7 – There is a pressing need to identify, prioritise and coordinate relevant HF research.

Opportunity 12 – Encourage more efficient collection, investigation, analysis and sharing of meaningful HF data, together with the provision of specialist HF advice.

4.12 **Communication.** All communities/domains would like the Regulator to better inform and be better informed with respect to HF. Options to be developed during Phase Three will take account of the *Statements* and *Opportunities* highlighted in this report.

¹⁹ For example MEDA or ICAO Document 9803 (LOSA)

²⁰ Maurino D, *Full integration of human factors knowledge in investigation process would further enhance safety*, (Apr 2008), pp14-15, ICAO Journal, Montreal.

Opportunity 13 – Encourage innovative and effective communications channels and media for HF between the regulator and industry/domain, particularly regarding the provision of guidance and training resource.

4.13 **Other.** Lifestyle and socio economic influences are closely associated with the FTL/WTL debate and worthy of further balanced consideration in the HF context.

4.13.1 A great deal of feedback was received during the early part of Phase One, mainly anecdotally, about pilot and cabin crew concerns over fatigue and the pressure they feel to run schedules on time. Conversely, those managing the business insist that fatigue is not a new problem and that industry is good at dealing with it. The Review Team was also aware of a regular stream of enquiries to SRG regarding the application of FTL/WTL rules²¹.

4.13.2 Regulations alone are never enough and individual choice and lifestyle must sensibly reflect the reality of working within today's aviation industry if stress and fatigue are not to be self-induced. Large commuting distances, in some cases abroad, are an example, where individuals may be rostered close to the minimum rest requirements and still choose to drive to/from work, or even commence a duty period, while fatigued. Short report times, off-airport car parking, security checks and fast turn rounds may also contribute to individual stress/fatigue levels.

4.13.3 Prior to the HF Review some operators were already introducing fatigue risk management (FRM) systems in conjunction with the Regulator. FRM is helping to identify potential pinch points and stresses within roster systems and operations that could be smoothed to mitigate the risk of fatigue. There are other factors within some current employment models that may promote additional fatigue through personal stress if not properly managed, such as debt, job security and leave.

Statement 8 – Understand the balance of economic and sociological influences that affect safety outcomes and how it can be managed.

5.0 APPLICABILITY.

5.1 The opportunities identified in this report will be considered with respect to the Rules, The Regulator and Industry.

6.0 GUIDING PRINCIPLES.

6.1 Throughout the Review to date, there has been overwhelming sentiment expressed that the drafting of an HF strategy must deliver a pragmatic next step for HF in combining industry needs, rule making and regulatory oversight. In the context of the HF *Statements* and *Opportunities* identified in this report, a set of guiding principles is established that will be applied to Phase Three (generation of options) and the drafting of the HF Strategy (see Figure 2):

²¹ In all cases, the CAA responded by advising the enquirer to approach their own organisation on what is an industrial relations matter. In any event, FTL/WTL schemes are open to different interpretation.

Guiding Principles:

Common understanding
Specific application
Integrated thinking
Relevant to need
Practical benefit
Demonstrate value

Source: CAA HF Review Phase Two

Figure 2 – Guiding Principles

7.0 CONCLUSION.

7.1 This report presents a view of current HF issues gathered from a wide range of industry experts across UK civil aviation today. It represents a coherent basis upon which to draft the first ever Strategy for HF that fits the EU context. A package of practical and sustainable measures will be sought during Phase Three to assist organisations and individuals to better assess risk and to enhance safety performance through a more integrated approach to HF.

7.2 Industry leaders, professional bodies, HF experts and practitioners from all communities/domains are invited to endorse the findings of this report and contribute to the next phase of the Review.

HF REVIEW PHASE TWO – CONSULTED ENTITIES

Airport Operators Association.	AOA
Baines Simmons.	
British Airways.	
British Business and General Aviation Association.	BBGA
British Helicopter Association.	BHA
Confidential Human Factors Incident Reporting Programme.	CHIRP
Crew Resource Management Advisory Panel.	CRMAP
CTC Aviation Services Limited.	CTC
DHL Aviation.	
European Aviation Safety Agency.	EASA
European Human Factors Advisory Group.	EHFAG
European Independent Maintenance Group.	EIMG
Federal Aviation Administration.	FAA
Flight Operations Liaison Group.	FOLG
Flight Safety International.	
FlyBe.	
General Aviation Safety Council.	GASCO
Global Air Training.	
Institute of Occupational Safety and Health.	IOSH
International Federation of Airworthiness.	IFA
LMQ Limited.	
Manchester Airport.	
Monarch Airlines.	
Oxford Aviation Academy.	

NATS	NATS
Thomas Cook Airlines.	
Thomson Airlines.	
UK Airprox Board.	UKAB
UK Human Factors Advisory Board.	UKHFAB
UK Maintenance Error Management System Group	UKMEMS

SUMMARY OF HUMAN FACTORS STATEMENTS AND OPPORTUNITIES

1. These HF Statements and Opportunities are presented as a non-prioritised list in the order they appear in the report. The reason for not attaching a priority at this stage of the Review is because of the likelihood of considerable dependency among the courses of action that a strategy for HF might wish to follow (the [Phase Three] 'how' that delivers the [Phase Two] 'what'). As the conclusion to this report states, "*A package of practical and sustainable measures will be sought during Phase Three to assist organisations and individuals to better assess risk and to enhance safety performance through a more integrated approach to HF.*"

Statement 1	Ensure business has the flexibility to meet its specific HF and cultural needs.
Statement 2	Regulation for HF must be carefully considered and introduced only where justified to enhance aviation safety performance without being overly prescriptive.
Statement 3	Formalise effective governance to underpin an HF Strategy.
Statement 4	Ensure that the drafting and implementation of FTL/WTL achieves acceptable levels of risk with respect to human performance.
Statement 5	HF programmes must reflect an appropriate cost/benefit, with effective leadership applied to establish cultural adoption.
Statement 6	Understand how market behavior might influence the provision of HF training.
Statement 7	There is a pressing need to identify, prioritise and coordinate relevant HF research.
Statement 8	Understand the balance of economic and sociological influences that affect safety outcomes and how it can be managed.
Opportunity 1	An integrated approach to HF with a common framework embedded within the SMS environment.
Opportunity 2	Develop practical community/domain-specific HF programmes, based on existing good practice/standards.
Opportunity 3	Embrace third party providers in HF programmes.
Opportunity 4	Preserve and develop CRM maturity within Flight Operations.
Opportunity 5	Clarify boundaries/synergies across Aerodrome activity within the existing Health & Safety executive Memorandum of Understanding.

Opportunity 6	Encourage continuous improvement of safety at the coal face through local HF performance assessment, together with more focused regulatory oversight of HF across all communities.
Opportunity 7	Build on existing good practice to develop a common approach to HF training in all communities/domains, based on consistent competency-based standards.
Opportunity 8	Explore the development and use of leading indicators in mitigating HF risks to the safety system.
Opportunity 9	Consider a common approach to HF instructor training and encourage the right people to deliver such training.
Opportunity 10	Recognise the differing characteristics of the General Aviation community within the HF Strategy.
Opportunity 11	Encourage proactive collaboration in design to continuously improve maintainability and operability.
Opportunity 12	Encourage more efficient collection, investigation, analysis and sharing of meaningful HF data, together with the provision of specialist HF advice.
Opportunity 13	Encourage innovative and effective communications channels and media for HF between the regulator and industry/domain, particularly regarding the provision of guidance and training resource.

HUMAN FACTORS REVIEW PHASE TWO – CONSOLIDATED VALIDATION FEEDBACK

POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
<p>Third party organisations do not, but should, demonstrate an effective approach to HF (without having to rely on commercial contractual obligations or additional resource input from approval holder - for example: baggage, catering, fuel, maintenance etc). The Review is welcome and want to see HF CRM evolve and mature before it defeats itself. Open the windows and let some fresh air in. The only qualification is passion and experience so why not select the right people for the role.</p>	<p>Agree principle of adapting the best of what the CRM experience has delivered over the last decade and exposing these benefits to other aviation communities. Under a single safety philosophy, safety culture <u>is</u> HF and needs to be nurtured.</p>	<p>As an industry leader, we would be prepared to see appropriate regulation for a pan-aviation HF recurrent training initiative on the basis that corporate investment in safety happens anyway. We would design and deliver HF/CRM education and awareness initiatives whether there was regulation or not. Such regulation would need to guarantee that higher standards than those commonly held as a benchmark by EASA (for example UK CRM) could be enforced by a competent authority (UK CAA).</p>		<p>Regulatory oversight of CRM could be improved. Other than for a CRMIE reval (no feedback), CAA FOI or Training Inspectors not seen at CRM session (at least not within the last 4 years). This may be a sign that we are trusted or simply that the CAA does not have sufficient resource to oversee HF programmes effectively.</p>	<p>Support the idea of a form of kitemark for HF excellence within a fully functioning and mature SMS that was based on risk (that is to say relevant and appropriate to our operation), which strived to enhance safety performance. This could be linked to a privilege to retain a senior examiner for HF in-house under a refreshed CRM scheme.</p>

POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
<p>ICAO is almost glacial in its treatment of HF and the CAA Review is welcome. Attempts to influence EASA in matters HF must allow for potential cultural barriers. Variations in language and culture provide distinctly different starting points across the EASA community and the ability to deliver consistent and accepted HF culture change must take this into account.</p>	<p>Don't bring a big stick to SMS. There needs to be an understanding that a one size fits all approach may not work and could result in a "tick box" approach to SMS implementation. SMS though cultural change that fits with an organizations size, shape and resource will be far more tangible than prescriptive and mechanical process.</p>	<p>Future resource commitment to HF, whether the result of hard/soft regulation or not, must be data and/or evidence driven. If proposed for HF recurrent training, it should be as soft as possible to allow the freedom to ensure relevance, but strong enough to ensure standards. It should be avoided if at all possible.</p>		<p>Consider the IATA IOSA audit to be a positive experience; there is nothing for engineers yet. FTL is difficult in mixed fleet short/long haul operations. Scheduling agreements are effective, but are expensive. They can quickly become restrictive practices which are brokered by the unions as life style and fatigue reduction mechanisms but are frequently used by the pilot community as a method to increase reward, i.e. payments for days off, selling leave. It not uncommon to receive a fatigue report from pilots who have sold their free days back to the Company. Used properly in conjunction with a good Fatigue Management System they can add value, but negotiating changes with the unions is notoriously difficult.</p>	
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
<p>Want the Review to preserve the ability to apply and develop HF within specific domains. Beware blunt introduction of new initiatives. Complexity means prescription is impossible.</p>	<p>Continuous improvement in every area of aviation is wholly supported.</p>	<p>Don't want layers of regulation, or further regulation, but agree that where such a requirement is evidenced (safety and cost benefit), then it would need to be soft enough for [SMS and HF] mature organisations to enjoy the flexibility to continue to address specific operational safety needs, while being hard enough to guarantee that higher standards than</p>		<p>HF within CAA generally improving but training inspectorate has some way to go - traditional approach needs to develop to better understand the link between technical performance and HF (the reasons).</p>	<p>Consider that cognitive performance training is an area of current relevance, together with more effective integration of technical and non-technical skills.</p>

		those commonly held as a benchmark by EASA (for example UK CRM) could be encouraged/enforced by a competent authority (UK CAA) where inappropriate behaviours towards HF were demonstrated. High level regulation, good quality guidance. Fear is that we will invent regulation by people who don't understand.			
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
Support the concept of earned autonomy and a relationship with the regulator based on trust.	Would like to see HF flattened out and broadened.	If pay to fly is generating young captains, then it is the regulatory line in the sand that permits it. The starring system could be validated more formally, perhaps with a new regulatory line in the sand if appropriate.	Regulator must push out HF as key message - needs more senior management horse power.	CAA does a superb regulatory job but its processes are highly inefficient. Cannot fail an LPC on CRM! - perhaps a more formal option for a training 'go around' after poor LPC HF performance should be introduced (rationale is the inexorable and somewhat immature link between non-tech performance, tech knowledge and skill).	Our [TRTO) FOI's knowledge of HF is excellent, but standards vary. The training of HF Facilitators could be improved. TRI training is not competency based or performance assessed, but rather based on assumed knowledge.
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
Want to see a balanced and practical application of HF to tackle the threats and risks that really matter to our operation (commonly held understanding,	Would welcome a move towards a commonly held language for HF across the aviation safety system.	Would prefer not to see more regulation, but would embrace it if the evidence justified this as the most appropriate approach - even if only temporary to assist in driving cultural adoption. Responsible operators that corporately invest in HF training would do so whether		The regulator doesn't know enough about HF in discharging its oversight at the coal face - industry is ahead in many instances.	

<p>specifically applied). Would, in principle, agree with the HF Review identifying good [HF] practice and to explore how the demonstrable benefits to aviation safety in one aviation sector could be made relevant and available to other sectors (for example, in adapting CRM and MEDA for use by the wider community). Would like to see an “umbrella approach” to HF under an integrated single safety philosophy. Would like to see airports run more along service lines to assist operators rather than being over focussed on exploiting passengers for commercial profit.</p>		<p>it was mandated by regulation or not . Such training is considered as an investment in the business.</p>			
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS

<p>Agree the principle of adapting the best of what the CRM experience has delivered over the last decade and exposing these benefits to other aviation communities. Under a single safety philosophy, safety culture <u>is</u> HF and needs to be nurtured. Third party organisations do not, but should, demonstrate an effective approach to HF (without having to rely on commercial contractual obligations or additional resource input from approval holder - for example: baggage, catering, fuel, maintenance etc). We welcome the Review and want to see HF CRM evolve from its current stagnant state. We need to select the right people for the training [facilitator] role.</p>	<p>Would welcome the freedom to develop and deliver CRM training that is commensurate with client safety culture and SMS maturity. Want to enhance safety performance for clients through continuous [novel] refreshing and improvement of HF(CRM) initiatives in tackling what really matters to them, based on a commonly- held understanding and framework – in fact, we [ATO] are doing this already.</p> <p>Agree that the NOTECHs behavioural markers instrument could be simply adapted to be relevant outside of CRM, as part of a commonly-held understanding and/or framework. Have already demonstrated success in doing so.</p>	<p>Would like to see broad, simple regulation from EASA (increased flexibility not lowering of standards) for a pan-aviation HF recurrent training/ education/awareness scheme on the basis that responsible clients would corporately invest in safety, and design and deliver the same, whether there was regulation or not - it is the other, less reliable players in the aviation sector, that, with such regulation, could be encouraged by the CAA to enhance safety performance through HF programmes. Such [hard and/or soft] regulation would need to guarantee that higher standards than those commonly held as a benchmark by EASA (for example UK CRM) could be enforced by a competent authority (UK CAA).</p>	<p>Would support the idea of a form of kitemark for HF excellence, which could apply to mature training organisations as well as businesses (clients) within a fully functioning and mature SMS, that was based on risk (that is to say training that was relevant and appropriate to the client), which strives to enhance safety performance.</p>	<p>Management of the CRM scheme could be more efficient with respect to timely reaccreditation. (required 12 week advance notice period with the CAA)</p>	<p>Regulatory oversight of CRM could be improved. Want to see the 5 day CRMI Core Course regulated once again and accredited as it was previously.</p>
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POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
	<p>CRM for single pilot operations is a 'black hole'. NOTECs could be adapted for wider application and benefit outside the cockpit. A kitemark for HF excellence could be a useful tool with which to preserve and encourage mature SMS, within a revised framework for HF (including CRM). We [TRTO] regard FlyBe as beacon airline for its management attitude to safety and the innovation it applies to daily safety observations (Day2Day project) as a means of seeking continuous improvement. Flybe has drawn on guidance from NATS (Safety Division) in developing this observation process.</p>	<p>A revised CAP 737 should include, <i>inter alia</i>, guidance on command course content, training of pilots in effective monitoring, automation protocols and pitfalls, and protocols for structured intervention in the cockpit. The UK must strive to preserve and promote its excellence in CRM structures, qualifications and processes in the face of any new pan-European HF regulation. Any consideration of regulation for HF recurrent training must recognise existing good practice.</p>	<p>A practical definition of HF is needed.</p>		<p>The acceptance and application of HF and CRM protocols amongst Examiners varies. The UK CAA process for the assessment of CRMI/CRMIE is efficient, challenging and thorough.</p>
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
<p>SMS should be focus of HF and other safety interventions.</p>		<p>Would prefer to see the pooling and sharing of knowledge as the springboard for enhancing safety performance rather than regulation.</p> <p>Would not want to see a separate standard for HF within the UK, which would introduce an different (extra)</p>			<p>Agree that development of the CRMI (Line) accreditation could be an effective means of developing TRI competence.</p> <p>Standards and standardisation of</p>

		layer of regulation to the EASA level playing field (whatever that turns out to be) and introduce unnecessary cost for UK operators.			HF (CRM) within the CAA are variable.
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
<p>We [UK] must not lag in our efforts to influence EASA.</p> <p>Would support progressive HF initiatives for third party contractors, but feel that regulation may be required if more effective coordination between operators, aerodromes and CAA via the GHOST cannot be achieved on a voluntary basis (principles of relevance, proportionality and cost/benefit apply here also).</p>	<p>Would support the vision of leveraging similar practical benefits that the CRM scheme has demonstrated over the past decade for the benefit of less [HF] developed areas of the aviation safety system.</p> <p>Agree that HF training/education/awareness should be broadened and made coherent across communities and within businesses.</p>	<p>Any developments in HF regulation should aim to simplify the requirements and promote the integration of HF into all elements of aircrew training and performance. To create a new set of regulatory procedures, even as guidance material, risks perpetuating the image of HF as a standalone discipline and undoing the work of recent years to move its image from academic "psycho-babble" to relevant practical principles. This seems to be the inevitable course for new initiatives. FRMS is another example - in the early stages the industry has to rely on the academics to provide the knowledge base and then slowly we learn to apply that in a practical and relevant way in our industry but in the meantime pilot perception has been biased towards seeing it as academic and unrealistic. The driving principle in determining HF training requirements should be maximising the impact in the flight deck.</p> <p>Agree in principle that those industry leaders who</p>		<p>FRMS and current culture of selling back days off bid for under scheduling agreements should cease - a bid for a day off under a scheduling agreement to limit fatigue and offer attractive terms and conditions of employment should not be able to be bargained away for commercial advantage at the expense of safety. With pilot rights to declare fatigue comes their equal responsibility to ensure that they avoid it (reference to excessive commuting, lifestyle, selling back days off).</p> <p>There is little or no regulatory oversight of HF training/education/awareness. Is this because of a lack of CAA resource, the fact that [airline] (as an example) is good at it, that other companies deserve greater attention, or that HF competence of CAA inspectors doesn't reflect modern real world requirements (reference to specific nature of [airline] operation, risk profile, recency of what is going on at the coal face, and/or the relevance of what such oversight affords,</p>	

		<p>corporately invest in safety would design, develop and deliver progressive HF training/education/awareness programmes, whether there was regulation or not.</p> <p>If regulation for broader recurrent HF training were to be considered, it would need to be soft enough for [SMS and HF] mature organisations to enjoy the flexibility to continue to address specific operational safety needs, while being hard enough to guarantee that higher standards than those commonly held as a [future] benchmark by EASA (for example UK CRM) could be encouraged/enforced by a competent authority (UK CAA) where inappropriate behaviours towards HF were demonstrated.</p> <p>The regulatory playing field is not level within or outside Europe. With demonstrable earned autonomy for responsible, mature behaviour, there is no reason why some anti-competitive regulatory practices should not be removed or made more efficient (for example, only two variations obtained in 10 years).</p>		<p>given the increasing need to integrate technical and non-technical HF).</p> <p>Would support in-flight/post-flight observations/reviews between all crew members as a means of continuous improvement, but would be keen to ensure the cost/benefit of doing so.</p>	
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS

	<p>Welcome the focus on merging technical and and non-technical skills at the coal face.</p> <p>A common framework is useful to enable communication and development of consistent data pools. Our concern is that organisations may be moving faster than the regulator in this regard therefore the opportunity for a common framework is already diminishing. We welcome the review of the current HF strategy and look forward to being involved in supporting the next steps.</p>	<p>Do not want to see more regulation or cost introduced to the business.</p> <p>Our experience of the EASA rules/regulations suggest that any new rules will be outcome based and “the operator shall demonstrate.....” etc. This allows the operator to tailor its activities in the most effective manner; we would expect any EASA rules relating to HF to follow a similar approach.</p>		<p>Support risk based oversight and welcome the opportunity to consult with representatives from the authority when considering our approach to emerging risks.</p>	<p>Do not accept that a “perceived” lowering of benchmark being set by EC through EASA would necessarily engender a lowering of CRM maturity standards in the UK. The case for HF is not simply driven by regulation. Flexibility enables the regulatory authorities to provide more attention and support to those operators who have not developed their HF approach as far as others.</p>
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
	<p>Welcome the Review and expect it to deliver a practical benefit to safety.</p> <p>Would like to see an approach to HF integrated within the business and across communities/domains.</p>	<p>Would not want to see more layers of regulation. If regulation were to be justified, we would want it to be as broad as necessary to enable us to continue to develop and implement HF programmes that address our specific needs.</p>			

		As an industry leader corporately investing in safety [large airline], we would develop and implement effective HF programmes whether there was regulation or not.			
POLICY	STRATEGY	REGULATION	GOVERNANCE	ASSURANCE	STANDARDS
<p>AWD - HF is <u>not</u> the problem, ignoring HF is.</p> <p>ATSD - Want standardization at aerodromes.</p> <p>FLT OPS - HF of groups is missing. For example, crowd control and multiple-crew decision making.</p> <p>FLT OPS - HF <u>is</u> a culture, driven, supported and nurtured by all.</p> <p>FLT OPS - HF needs to be mandatory, particularly during economic downturn.</p> <p>Priority is responsibility to fix what has gone wrong rather than seek blame.</p> <p>Want integrated</p>	<p>Maturity of HF and SMS, or lack of it, is commercially driven.</p> <p>AWD - SMS and HF seem to be moving forward separately.</p> <p>AWD - More attention to specific HF audit techniques training and SMS.</p> <p>AWD - Questions expressed are consistent. How do we come up with consistent answers?</p>	<p>AWD - Regulatory requirements placed on operators don't drive them to better HF, only more documentation.</p> <p>AWD - Where is maintenance staff FTL and FRMS equivalent?</p> <p>FLT OPS - FTL should be more flexible.</p> <p>FLT OPS - We must be realistic about what legislation can achieve. Oblige basic building blocks yes, but it won't always ensure robust [mature] implementation.</p>	<p>ATM - Stress needs to be kept to a minimum. Easy display interaction and unambiguous assimilation. It [safety] is going to get worse with shift of responsibility from ATCO to flight crew. With both ATC and flight crew role as monitors, what are the CAA doing about the implications?</p> <p>AWD - Accountable Managers should be more committed to HF.</p> <p>FLT OPS - How will decisions in the cockpit, supported by both crew, that subsequently turn out to be incorrect, be mitigated against in the HF</p>	<p>AWD - HF embraced in larger organisations but not so much in small ones.</p> <p>Workload is an issue. No time to review organisations' HF training or to judge if effective.</p> <p>Cross awareness of HF in maintenance by FOIs/IOs and of CRM by Surveyors would be a good thing.</p> <p>AWD - The first line of HF has gone insofar as the oral examination for Licenced Engineer is no more!</p> <p>ATSD - Where is the boundary on the ramp for error monitoring and enforcement; for example de-icing?</p>	<p>Need common standards to enable a common philosophy.</p>

<p>approach to use of business and regulatory oversight 'tools'.</p>			<p>environment?</p> <p>FLT OPS - Knowledge implies liability.</p> <p>CAA set up 145 HF but since taken foot off pedal. Must not be allowed to happen again.</p>		
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RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
	<p>Current management of the CRM scheme could be more efficient with respect to timely reaccreditation. Welcome freedom to develop and deliver CRM training that is commensurate with company safety culture and SMS maturity. Would welcome sampling, but don't want to be made to jump through hoops or suffer a compliance checking regulatory oversight regime. Want to enhance safety performance through continuous [novel]</p>			<p>Feedback from data analysis is essential to maintain relevance of HF schemes. Would support the wider adoption of something similar to our [airline] occurrence analysis process that involves managers, investigators and HF practitioners to identify meaningful HF data. We use HFACs and see a possibility of the MEDA approach being appropriate outside of maintenance. Support the principle of data collection based on prevalent human conditions, in order to</p>	<p>Would welcome a central [managed] repository for HF training/education/awareness material. Would be happy to share [airline] produced material. Pre-flight briefings/debriefings are an essential practical application of CRM. It may be desirable for cabin and aircrews to brief together, although this is not always operationally possible. The pre-flight briefing/debriefing</p>	

	<p>refreshing and improvement of HF(CRM) initiatives in tackling what really matters to us. Combined cabin/flight crew/ATC/AvMed CRM training is currently undertaken and would support this approach being encouraged more widely across the aviation safety system. Tagging two days CRM onto the end of a TRI course is paying lip service to HF and maybe one reason why standards of CRMs and CRMIEs are reported as variable. CRMI development schemes help avoid stagnation. Consider encouraging incentives to develop/vary HF maturity within an organisation (could be linked to kitemark concept and an annual industry HF award, together with opportunities to develop future examiners). The current scheme provides building blocks but is not now good enough for recurrent training.</p>			<p>provide a means of more easily sharing and interpreting HF causal factors (more of the Why in addition to the What).</p>	<p>could be extended to in-flight observation to assist with continuous improvement at the coal face, particularly on long haul flights.</p>	
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
The barriers to entry in today's aviation are no different than in	Want to see an integrated approach to HF training within the business and across			Want to see shared and aggregated safety data of higher fidelity with common parameters.		Ground incidents are an expensive irritation and

<p>the past. However, the bar has been lowered through the availability of well organised and structured Flying Training Organisations providing opportunity for those with motivation and funding to move more rapidly to achieve their career goals. Provided that airlines manage their selection and training processes rigorously and that dilution rates are controlled to ensure overall experience levels are maintained there should be no additional safety risk. The industry is very well versed in managing the peaks and troughs of pilot availability to match the commercial demands. The secret is to risk assess, select the best and train to the highest</p>	<p>communities. This is vital if we are to get an understanding of HF risk to all operational areas. The principles of the CRMI scheme could "absolutely" be applied pan aviation. It requires innovative delivery . CRMI selection is important. Volunteers are always more effective in the role. We include third party contractors in HF training. A pan-aviation HF scheme would be a welcome proposition, but practical implementation may be difficult.</p>					<p>would support moves to embrace the ground environment in progressive HF programmes. Ground Damage only rarely poses a direct safety threat. Serious Ground Damage is so obvious that it is very unlikely that the aircraft will become airborne. Minor ground damage, even if not captured before flight is normally managed by assessment, fly on clearance or remedial repair. Ground Operation incidents have another connotation in the loading, weight and balance risks. These need very close attention and the HF relating to this area are worthy of more work particularly as increasingly in the modern environment this work is outsourced. The</p>
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standards. Our experience of direct entry low experience pilots is good. They are highly motivated, quick learners and hard working.						management emphasis therefore moves to supplier oversight as opposed to direct management.
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
Ground safety is area of concern. Hold view that the LCC pilot recruitment model is not inherently dangerous but does rely on effective [HF] training.	Trainers need to be competent and credible in the role. MPL and ATQP has true value. Would prefer to retain the word 'training' rather than 'awareness' or 'education', because training infers competency, which can be assessed through performance.					
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
Pay to fly is natural commercial behaviour where regulatory minimum is a target for some. Acknowledge the possible risk of low experience being built into the Low Cost Carrier model in terms of Captaincy and FO performance in what should	Agree that standards of CRMIs are variable. Support constant reinforcement of HF (CRM) as a feature of pipeline training. 75% agree with the view that only pilots can teach CRM to pilots – it is effective facilitation skill that is important. It is possible to derive a core HF course for application beyond CRM.			AAIB don't serve the industry well in terms of dissemination of accident causes.		

<p>be a [fully] two pilot cockpit. The disbenefit of not investing in experience is the commercial risk of impact on reputation, market share value and other factors, in addition to a possible erosion of safety. Quality training therefore is the most significant safety defence.</p>						
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
<p>Appreciate the regulatory intent behind FRM, but also see that some operators (not [airline]) could seek to exploit it and in so doing erode safety.</p>			<p>We believe we have reached the boundaries of our knowledge in discovering solutions that would allow serious inroads into known HF issues. We are good at defining the problems but solutions appear elusive. If either the Authority or industry, collectively, can harness the academic knowledge and resource to further the cause then that would undoubtedly</p>			<p>Would welcome a national (foolproof) identity scheme for aircrews (pilots/cabin) to eliminate unnecessary delays and frustrations with airport security.</p>

			be helpful. Further regulation without well reasoned and established evidence would be risky			
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
	<p>Would support cross community HF training. Two days CRM at the end of a TRI course does not arm the TRI (hence later TRE) with the facilitation and debriefing skills necessary to enhance HF capability and maybe one reason why standards of CRMs and CRMIEs are reported as variable.</p>			<p>Feedback from data analysis is essential to maintain relevance of HF schemes. Would like easier access to aggregated data. There is not enough focus on HF in published occurrence reports. We understand the what, but not always the why! Is that because there are not enough HF experts/senior practitioners in investigation, or a lack of a commonly held language and means of reporting, or both? Would welcome a central [managed] repository for HF training/education/awareness material. We may be happy to share some [ATO] produced material under appropriate circumstances. Skybrary seems to be doing this quite well. The amount of material which we would be happy to share is of course limited by commercial</p>		

				considerations.		
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
	NOTECHs assessments are used to great effect by some operators to inform command and TRI/TRE selection. There is scope to more fully integrate CRM/HF issues into the TRI course.				A new production of JARTEL videos would be welcomed. Topics might include issues confronting single pilots eg in VLJs, pax pressure in a corporate GA environment, command and leadership, monitoring techniques, automation protocols and pitfalls, and structured intervention.	
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
Do not feel that any the UK additional regulation, over and above EASA, in the area of HF will necessarily decrease levels of risk in UK airspace.	The CRM scheme needs to progress in terms of relevance and simplicity.					
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
	The driving principle in determining HF training requirements should be maximising the impact at the coal face. I [Flight Crew Training Manager] think the drive to expand HF across					

	<p>other disciplines, ATC, maintenance ground handling etc is admirable but should be a separate initiative from refining aircrew HF training requirements. I am concerned that any resistance or teething troubles associated with this will undermine the now well-established methodology and crew buy-in for pilot CRM training.</p>					
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
	<p>Our observations of the CAA, suggest that HF is moving from a tick box exercise to practical application and this does not happen by accident (excuse the pun); of course any training can be improved.</p> <p>The right people should be involved in delivering HF training.</p> <p>Would support a cross-community approach to training, while retaining community-specific context.</p> <p>We support ATQP as taking Flight Crew training in the right</p>		<p>We have and continue to support research by academics as well as commissioning specific research for [large airline]. We have commissioned [UK University] to review our Safety Culture.</p>	<p>We are developing our HF data analysis which may or may not include the development of maturity indices in the short term.</p>		<p>Review feedback to date appears to be anecdotal and does not provide a holistic, balanced, objective view of how sociological changes may influence flight safety. Company Culture has a great influence over/impact upon positive safety outcomes.</p>

	direction.					
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
We are proud of our stable employment record with few premature resignations, but agree that the rate of premature retirements/resignations could be considered a leading indicator of stress within the safety system.	<p>Would support a Pan-European framework for HF that encouraged the raising of HF capability generally, but which also preserved established good practice such as that demonstrated by UK CRM.</p> <p>We deliver combined HF training and believe that technical and non-technical skills could be merged further.</p>			<p>It is important for us that safety occurrences are investigated with a broad input from the business, including HF experts.</p> <p>Would like to be able to share meaningful HF data more easily.</p>		The selling back of rostered days off is frequently offered by around 20% of pilots at [large airline].
RISK	TRAINING	DESIGN & MANUFACTURE	RESEARCH	REPORTING & ANALYSIS	COMMUNICATION	OTHER
<p>ATSD – Want to see formal procedures for airport SMS and risk analysis.</p> <p>FLT OPS - We have to allow for human error.</p>	<p>AWD - Need to assess the effectiveness of training.</p> <p>AWD - Need appropriate training.</p> <p>AWD - Front line staff need to be kept aware of current HF incidents that small organisations can relate to.</p> <p>AWD - Train then standardise.</p> <p>Recurrent HF training required for CAA staff.</p>	<p>AWD - HF requirements for the design of ground equipment.</p> <p>AWD - Standardisation of cockpit displays will reduce risk.</p> <p>ATSD - Technological solutions at aerodromes need to be simple in practice.</p>	<p>GSS - Be specific about what the analysis hypothesis is.</p> <p>AWD - CAA to team up with external consultants to work and contribute to research projects. CAAi to facilitate.</p>	<p>GSS - Industry should own the data and do the analysis. CAA should compare and fuse.</p> <p>GSS - Need better [expert] HF input to investigation.</p> <p>GSS - HF data in MORs is not high fidelity because of lack of HF knowledge among SDA staff.</p> <p>GSS - MORs fields need more HF definition and relevance to be</p>	<p>ATSD - Need improved collaboration across internal and external stakeholders.</p> <p>CAPs, guidance and requirements - align with regulatory framework and refresh.</p>	

				<p>useful.</p> <p>GSS - Prevalent human conditions should be identified within the 'why' of occurrence reports.</p> <p>GSS - MORs fields should strike a better balance between free text 'scenario' and a more structured 'deeper' HF taxonomy to be useful.</p> <p>GSS - Lack of consistency in format of shared data.</p> <p>ATSD - Data could be used more effectively.</p>		
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