

# The Ergonomist

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The Chartered Institute of Ergonomics & Human Factors

**GAMES TO ENGAGE: INCREASING MENTAL HEALTH AWARENESS  
STRESS IN TRAINEE MENTAL HEALTH PROFESSIONALS**

**A BRIEF HISTORY OF THE ADVANCED TECHNOLOGY CENTRE**



**Analysing safety  
critical tasks**

## Editorial

### A wealth of knowledge

As we settle into our new Chartered status, redevelop our website and prepare for the Ergonomics & Human Factors conference in April we are struck afresh with the absolutely enormous breadth of knowledge and experience our members have in such a wide range of sectors.

It's very hard to pin down exactly what any one ergonomist might be doing in the world, which is what makes the field endlessly fascinating and exciting. We are a fast-moving group, constantly learning from other disciplines, constantly developing ideas and solutions, constantly reinventing.

This month's issue showcases just how diverse a range of areas ergonomics and human factors touches. One area of the discipline is explored by Sine Masuku in her discussion of how safety critical task analysis is used in high-risk industries.

Laird Evans and colleagues give an overview of the history of BAE Systems' Advanced Technology Centre (ATC) in Bristol, which has one of the longest established human factors groups in the UK and which is due to close in the near future. Human factors professionals at the ATC have spent the last 50 years researching and developing defence and aviation systems.

Michael Craven and Lucy Simons describe how they apply ergonomics and human factors to public health awareness, using gamification to teach the public about ADHD.

John Galvin explores another facet of human factors: workplace stress, particularly that faced by trainee mental health professionals.

If you have any ideas for feature articles on research or practice in ergonomics and human factors, news items, details of relevant events or suggestions for new content for *The Ergonomist*, please email us.

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[www.ergonomics.org.uk](http://www.ergonomics.org.uk)



## From the President



### Treating an ailing patient

The National Health Service is a laudable model of health care, highly prized here, admired internationally.

Bevan's tenets from 1948 that the NHS should meet the needs of everyone, be free at the point of delivery, based on clinical need not ability to pay, are still there, championed and extended in the NHS Constitution published by the Department of Health in 2011. These ideals are accompanied by a high level of commitment and professionalism among those working in healthcare. It is obvious, though, that the NHS is unwell.

The NHS has hardly been out of the news, with crisis following crisis, scandal following scandal. Personal encounters bring home that something is broken. I have my own back pocket full of examples. Take the following: a relative in her 80s, four years on from a first referral for a back operation, still waiting for treatment having moved up one waiting list after another, her mobility and quality of life deteriorating along the way. And another, referred with suspected cancer, who received very rapid attention, albeit with inconsistent information from different clinicians about treatment pathways. After day case surgery, this relative was sent home with an obsolete out-of-hours phone number in the event of post-surgery complications. Another instance was needing to obtain prescriptions from the pharmacy of a large city hospital, relocated to a portakabin in the hospital car park during refurbishment. Picture large numbers of

patients in a cramped area, many having to stand, distressed and angry at having to wait 1½ hours for prescriptions to be dispensed, and then with everyone else listening in. In my experiences, actual clinical treatment has been good, especially for the most serious conditions and critical illnesses (once past A&E!). The problems have arisen with access to elective care and non-clinical, poorly interleaving systems and processes, that have to be negotiated along the way.

As campaigning steps up ahead of the May general election, the NHS is centre stage. Political responses to the problems with the NHS are high level financial, regulatory or structural initiatives. The NHS is a mesh of complex sociotechnical systems, however, and mending it is not going to be achieved by such interventions alone, however bold. Whether they realise it or not, those involved without and throughout the NHS in turning things around are going to have to address EHF issues. The Human Factors in Healthcare Concordat, published in 2013, recognised the importance of EHF for patient safety and clinical excellence. There is still a steep hill to climb to gain sufficient understanding that EHF aspects are pervasive throughout the NHS and that we have much to bring to the table. The Institute is addressing this, seeking influence and partnerships with other parties through which we can amplify EHF input. This is important work: the NHS matters greatly to us all.

Best wishes

# Games to engage: increasing mental health awareness

Michael P Craven & Lucy Simons

In recent years there has been rapid growth in the development and use of digital tools in healthcare. One area of research interest is the use of games as tools to improve health and education. Gamification of health is a broad area that includes games aimed at encouraging healthy behaviours through motivation, 'exergaming,' which explicitly aims to improve health through physical activity, 'serious games' that are intended to support therapies and rehabilitation, and games that support training, for example through simulation. Another area is public health awareness and education which is an area of current research in MindTech.

MindTech is a healthcare technology co-operative funded by the National Institute for Healthcare Research. We work in a health research organisation linked to a university and community NHS trust, with a specific focus on mental health, including diagnosis and treatment. We are also concerned with the need to increase public awareness, particularly to address the problem of stigmatisation of people living with mood disorders such as depression, neurodevelopmental conditions like Attention Deficit Hyperactivity Disorder (ADHD), or dementia.

Research suggests that the stigma of mental health conditions can significantly impact on engagement with treatment and affect mental wellbeing. With respect to ADHD, for example, factors associated with stigma include public uncertainty about the validity of ADHD as a diagnosis, perceived dangerousness of individuals with ADHD, and scepticism towards ADHD medication. Progress has been made in the acceptance of ADHD in children, which has a prevalence of 3-5% at school age. However, despite European-wide consensus validating ADHD as a condition persisting into adulthood for the majority, it remains under-diagnosed and under-treated in adults.

## Evaluation and engagement gap

Examples of awareness initiatives for mental health that use game elements are few, but include puzzles such as crosswords and

word-squares, Flash video games, and one notable narrative-based adventure game called Depression Quest. These examples are all delivered on web browsers suited to desktop or tablet PC platforms.

Even when they exist, however, evaluation of digital mental health public initiatives is missing. This lack of evaluation is perhaps not so surprising. England's largest programme aiming to challenge mental health stigma is Time to Change, which includes social marketing and media campaigns, community activity and events, user-led projects and a network of patient leaders. The programme has an integrated evaluation led by the Institute of Psychiatry and its chosen methods for assessing impact are longitudinal designs which sample the population to compare knowledge, attitudes and behaviour before and during/after any campaign. Results of the evaluation have shown that while it is likely that such programmes can produce short term positive effects, longer term impacts can be harder to discern and sustain. Furthermore, it is difficult to determine the exact contribution of any campaign initiative to the changes reported in the follow up studies.

Still, it should be possible to evaluate some aspects of individual initiatives. For digital technologies such as websites and apps it is already possible to introduce surveys and use data analytics, although there are limitations, not least that web surveys are not exactly fun. Moreover, data analytics running in the background are aimed at developers and may not offer the information healthcare researchers are looking for. Developers may be interested in engagement but they may be less interested in measuring what impact playing has on outcomes in terms of a change in behaviour or an increased awareness.

In parallel to this emerging field, a strong element of the anti-stigma work in mental health is the long tradition of activism and self-advocacy: people with lived experience of mental health problems are actively involved in improving care, treatment and services

## ABOUT THE AUTHORS

Michael is a Senior Research Fellow and Lucy is a Research Fellow with MindTech, a healthcare technology co-operative funded by the National Institute for Healthcare Research. See [www.mindtech.org.uk](http://www.mindtech.org.uk).

as well as increasing understanding in the general population about mental health, as demonstrated by their role in the Time to Change campaign.

Active involvement has extended into health research, where it is deemed good practice to involve people with lived experience in the design, conduct and dissemination of research. Typically, people have been involved in research through fairly conventional methods, such as consultations, telling their stories and participating in committees and groups. Again, these methods have limitations as they tend to appeal to only certain sections of the population. However, more recently, researchers are beginning to draw on methods from user-centred design to enliven the processes and are extending into the digital realm, for example, using social media for engagement and the growing number of citizen science projects.

Maybe gamification could offer an engaging way to evaluate public mental health activities whilst facilitating more meaningful involvement and sharing of lived experience in novel and interesting ways.

### Screens in the wild

Emanating from a previous study where MindTech had developed an interactive reaction time test for ADHD on a web-based platform, we linked up with Nottinghamshire Healthcare NHS Trust who had recently produced a video aimed at patients and healthcare professionals to educate them about ADHD in adults. The existing test, which involved presenting stimuli on a touch screen for a little over two minutes, was made into a game called Attention Grabber, where the players were instructed to watch a sequence of different fruit but to touch only one type, bananas, and ignore the rest. Scores were awarded as the game progressed, depending on reaction time. Penalties were given for incorrect or missed selections. The score was also compared to the high score at the end. The screens were large 46-inch touchscreen displays at four public places in Nottingham and London, networked to allow players to share high scores and see themselves and others playing.

After the game, players were invited to watch the video about adults with ADHD, lasting a further two minutes. To integrate evaluation we included three questions before the video: Did playing the game make you think about your own attention span? How much do you know

about ADHD? How aware are you that ADHD affects adults? After the video there was one question: How much has the film increased your knowledge of ADHD?

The study is still running but initial results are encouraging: from 860 plays, players are prepared to answer questions integrated into the game (48% answering the pre-video questions and 20% persevering through to the post-video question). This data will enable us to measure levels of prior knowledge and its perceived improvement.

### Taking it further

Ergonomists are conversant with a toolkit of methods for co-design and evaluation which already include game-like elements. For example, personas, scenarios and role-playing translate well to narrative-based games. Can we use gamification to make our methods of involvement more fun and engaging and capture our evaluation data as we go?

Games-based learning (GBL) is the primary focus of serious games and has particular relevance in health education. There is a body of literature that includes evaluation frameworks focused on educational outcomes with learners and instructors. GBL strategies are used to support training courses for medical and nursing students and there some examples with young people to encourage healthy behaviours. Evaluation frameworks could be usefully developed for the mental health domain where the participants are patients, carers or the general public and the outcomes are related to health education or awareness goals. Extending use of games to engage a wider section of the population, especially younger people, is an area we are keen to explore in MindTech.

Whilst considering gamification, there are some ethical issues within mental health in particular. One is risk of harm from failure in competitive games. Cooperative games are an attractive alternative. Another risk is that games could make mental health seem less serious than it is. Actively involving people with lived experience in the design of the gaming aspects would help to avoid this.

If done with care and sensitivity, bringing game elements into the toolkit of user-centred design methodologies for engaging people with research and mental health awareness has good potential and is worthy of continued attention.



### FURTHER READING

Craven, M P, Young, Z, Simons, S, Schnädelbach, H, Gillott, A. From SnappyApp to Screens in the Wild: Gamifying an Attention Hyperactivity Deficit Disorder continuous performance test for public engagement and awareness. Proceedings of the 2014 International Conference on Interactive Technologies and Games.

Messineo, L, Allegra, M, Alessi, N. Game-based learning for education and training in the health sector. Proceedings of the 4th International Conference of Education, Research and Innovations (ICERI 2011).

## Journal overview

The Institute's new membership package includes instant access to seven online journals. Simply go to [ergonomics.org.uk](http://ergonomics.org.uk), log in to 'MyLEHF' and click on 'My journals' to see the full list.

The latest issues include the following articles:

### Ergonomics

*Volume 57, Issue 12, 2014*

- › Mapping ergonomics applications in developing countries
- › Drivers' communicative interactions: on road observations
- › Announcements examined in a simulated aircraft cabin
- › Attentional costs and failures in air traffic control notifications
- › Decision-making strategies in interaction with alarms
- › Validity of the modified RULA for computer workers
- › Ergonomic evaluation of a wearable assistive device
- › Biomechanical changes during repetitive asymmetric lifts
- › Anthropometric information among firefighters
- › Psychophysiological responses in experienced firefighters
- › Evoked myogenic potentials in motion sickness
- › Duration of slip-resistant shoe usage in restaurants
- › Effects of mental fatigue on biomechanics of slips

### Applied Ergonomics

*Volume 46 Part A Jan 2015*

- › Performance of novel chorded keyboards and pointing devices
- › Assessing the intuitive use of new technology: prior schemata
- › An activity-oriented study of driving instructor guidance
- › Typing performance among obese office workers
- › Different types of insoles and postural stability in older adults
- › Validation of standard ASTM F2732: cold protective clothing
- › Intense illumination: mood, alertness, mental performance
- › Design method for multi-user workstations
- › How ergonomics can contribute to sustainable development
- › Assessment of visual complexity of automotive instruments
- › Onset of pain: Effects of pressures applied to the plantar foot
- › The effects of obesity, age, and workload levels on handgrip
- › Physical demands on firefighters using stair descent devices
- › Debate spaces: Developing participatory safety management
- › Collaboration in redesign of family-centred rounds process
- › Identifying factors of bicycle comfort: An online survey
- › Should electric fans be used during a heat wave?
- › Understanding the complex needs of automotive training
- › Physical and psychosocial risk factors for low back symptoms
- › Body armour with fighting load impacts soldier performance

### Behaviour and Information Technology

*Volume 34, Issue 2, 2015*

- › Intention to exert pressure to engage in web accessibility
- › Exploring perceptions of web accessibility: a survey approach

- › Improving accessibility of mobile devices with EasyWrite
- › Intentions of users to 'stick' to social networking sites
- › Understanding civic engagement behaviour on Facebook
- › Effectiveness of a support system for weight loss
- › Self-image congruity and trust on social networking
- › Understanding the continuance use of social network sites

### Theoretical Issues in Ergonomics Science

*Volume 16, Issue 2, 2015*

- › Human-in-the-loop: probabilistic predictive modelling
- › A Virtual Reality-Mediated Therapeutic Process model
- › Cognitive work analysis and design
- › Auditory similarity
- › Postural analysis and workspace design: a kinematics model

### Work and Stress

*Volume 28, Issue 4, 2014*

- › Is avoidant leadership a root cause of subordinate stress?
- › Is work affecting my health?
- › Perceived intent of supervisor and abusive supervision
- › Night work and symptoms of depression among nurses
- › Why me? Relative deprivation in the face of budget cuts
- › Managerial support for psychological needs

### International Journal of Injury Control and Safety Promotion

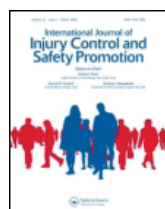
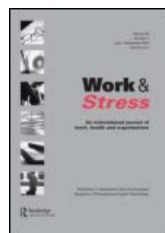
*Volume 21, Issue 4, 2014*

- › Estimating the causes of traffic accidents: logistic regression
- › Severe road traffic injuries and youth
- › Development of uncertainty-based work injury model
- › Seat-belt use still low in Kuwait: driving behaviours
- › The effect of a permitted phase for left-turning vehicles
- › The rate of seat belt use among drivers in Tehran
- › Functional movement screening score and history of injury
- › Road crash injuries and fatalities in Isfahan, Iran, 2006-2009
- › Factors associated with bicycle-helmet use among children
- › Socio-economic determinants of helmet-wearing behaviour
- › Years of life lost among Iranian people killed in the Iraq-Iran war: the 25-year perspective

### Journal of Sports Sciences

*Volume 33, Issue 4, 2015*

- › Referee-biased injury times and effects on home advantage
- › Role of maturity timing in selection procedures
- › Kinematics of a striking task: accuracy and speed-accuracy
- › Intra-day effects on biochemical responses in weightlifting
- › Stress, exercise self-regulation and exercise involvement
- › Timing strategy, temporal accuracy in rapid interception task
- › Effects of changing speed on knee and ankle joint load
- › Visual search, movement behaviour and boat control



## Survey on flexible working indicates need for greater ergonomics awareness

In October and November 2014, Netherlands-based company BakkerElkhuizen conducted an online survey, 'IT and flexible working', among IT professionals in Germany, the United Kingdom, Belgium and the Netherlands. Flexible working was defined by the survey as 'time and place-dependent working.'

521 IT professionals employed by medium to large companies in a wide variety of sectors participated in the survey, which aimed to determine whether the role of the IT department had changed due to the emergence of flexible working, and to identify the issues that flexible working may cause for the department in areas such as security and ergonomics.

### Extent of flexible working

It was found that 79% of organisations surveyed in the Netherlands have implemented flexible working, while the figure stands at 65% in the UK, 60% in Germany and 57% in Belgium. In companies where flexible working has not been implemented, reasons given included a need for the physical presence of staff and IT systems that were not yet suitable for flexible working. One of main reasons cited by respondents for the implementation of flexible working was 'working more efficiently.' Other reasons included higher staff satisfaction and greater autonomy for staff.

### Workplace concepts and tools

In Germany, the UK and Belgium, the fixed workplace is still the most commonly implemented concept. However, the Netherlands fixed workplaces are found in only 36% of organisations. 80% of organisations in the Netherlands offer mobile workplaces, in contrast to 56% of organisations in Germany and 46% in the UK.

The tool identified across the board as most important for flexible working was the laptop, with 97% of professionals in Belgium ranking it at the top. Respondents in the UK have different preferences with only 48% choosing the laptop and 26% choosing the conventional desktop computer. In the Netherlands, only 4% indicated the desktop as the most important tool, while it was not mentioned at all by professionals in Belgium.

The tablet, which was cited as an important tool by 21% of UK companies, was mentioned by only a few professionals in the other countries. Most of the organisations surveyed supply their employees with a laptop, but a tablet is less likely to be supplied, with 53% of UK companies and only 31% of Belgian companies providing them.

### Flexible working and ergonomics

According to the survey, the majority of IT professionals

believe that their organisations do not provide employees who work flexibly with enough support to ensure safe, ergonomic working. The reasons attributed to this lack of support were cost and the fact that there is simply no attention being paid to the issue.

When asked whether ergonomics was an important issue within their IT department, only 21% of professionals in the Netherlands and 29% in Belgium answered that it was. The situation was better in the UK and Germany with 49% and 46% of companies respectively responding that ergonomics was important.

In the Netherlands, in particular, there is a lack of awareness among IT professionals of the need for advice to be given to employees about the ergonomics of using mobile devices such as laptops or tablets, with 42% responding that there is no need for such support to be given. The situation is better in the other countries, although in the UK only 47% of respondents believed it was necessary to pay attention to the ergonomics of how employees work flexibly.

The survey also asked professionals if they believed it was necessary to define special staff profiles in which the workplace type, hardware and software configuration and computer accessories required are described. In the UK, 58% of professionals agreed such profiles were necessary, while the figure stood at 57% in Belgium, 56% in the Netherlands and 51% in Germany.

When flexible working is implemented, the main concern of IT departments is security and networks and systems administration. While IT departments have decision-making power when it comes to buying hardware and software, their role in developing workplace concepts tend to be advisory.

It is clear from this survey that the way in which people work is changing dramatically and that the traditional office environment now no longer applies to many workers. The situation in which people work is far more fluid, with many workers providing their own hardware, particularly when it comes to tablets and smartphones.

However, in all four of the countries surveyed it seems that while there is an awareness of the need for tools such as staff profiles, a clear ergonomics strategy that takes mobile devices into account isn't always implemented. This is due to worries over cost or simply because no attention is paid to the need for ergonomics for those who work flexibly.

For the report, go to [www.bakkerelkhuizen.co.uk/international-IT-and-flexible-working-survey](http://www.bakkerelkhuizen.co.uk/international-IT-and-flexible-working-survey).

# A brief history of the Advanced Technology Centre

Laird Evans, Steve Harmer, Rob Hutton, Andrew Leggatt & Monica Sen Gupta

In December 2014, BAE Systems announced the imminent closure of its Advanced Technology Centre (ATC). Sadly, this announcement signals the demise of one of the UK's longest established industrial human factors departments. The purpose of this article is to mark the passing of the ATC's Human Factors Department and in so doing, provide a brief account of the department's origins, history and achievements.

## British Aircraft Corporation

The origins of the ATC's human factors department go back some fifty years or so to the mid 1960s, when the department was part of the British Aircraft Corporation's (BAC) Guided Weapons (GW) Division. The department was then, and predominantly still is, based in Filton in the north of Bristol. The eminent ergonomist, John Spencer, had some association with the department during its formation but we know no more than that. John was a very well known and respected ergonomist, who was recipient in 1994 of the Ergonomics Society's (as was) Paul Branton Meritorious Service Award. He was a Senior Lecturer in the Applied Psychology Department at the University of Wales.

## British Aerospace

The main focus of the human factors department's research in those early years was in supporting BAC's development of guided weapon systems. This focus remained when the human factors department was incorporated into British Aerospace (Dynamics Group), following the formation of British Aerospace (BAe) in 1977. As a consequence of these origins, the department developed strengths in two critical research fields: human visual performance and manual control skills. These capabilities were developed as a result of a Guided Weapons operator's requirements to visually acquire a target and then track it with an optical sighting system under joystick control. As a consequence of the department's strength in visual performance, the name of the department was, at one time, the Human Factors and Vision Research Department.

Led by Ian Overington, a small team of vision scientists developed a suite of models, known collectively as ORACLE™. The ORACLE™ models evolved over the years and were still in use until only a few years ago. They enabled the prediction of human visual performance with a wide range of sensors and displays, in combination and in isolation. In many respects the ORACLE™ suite of models represents one of the most significant successes of the ATC's human factors department. In recognition of their pioneering work in developing the ORACLE™ models, Kevin Cooke and Philip Stanley were honoured by the Ergonomics Society in 2005 with the award of the Sir Frederic Bartlett Medal for "significant contributions to original research, the development of methodology, or application of knowledge within the field of ergonomics".

Another of the Institute's awards, the Richard Clive Holman Memorial Prize is awarded to a final year university student, on an undergraduate course that has been approved by the Institute, for an essay relating ergonomics to information and communications technology. Richard began his career in the BAe (Dynamics Group) Human Factors department. He was well known and highly respected in defence ergonomics circles and within the Ergonomics Society. As a tribute to Richard, we have extracted the following text from the Institute's website: "Richard Holman graduated in Ergonomics from Loughborough University of Technology in 1975. After six years in ergonomics with British Aerospace, he joined the Admiralty Research Establishment at Portsmouth, working particularly on human computer interaction problems and system design. He was leader of the Human Factors Section within the Maritime Command System Division of the Defence Research Agency at Portsmouth."

## Sowerby Research Centre, 1983 – 2000

The human factors department was one of several research departments that were incorporated within the BAe Sowerby Research

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All the authors work in the Advanced Technology Centre. Laird Evans is the Human Factors Capability Leader. Steve Harmer is the Human Factors Capability Technology Leader. Rob Hutton leads the Interaction Technologies Group in the Human Factors department. Andrew Leggatt leads the Behavioural Sciences Group in the Human Factors department. Monica Sen Gupta Leads the Human Factors Integration Group in the Human Factors department.



Centre (SRC) when it was founded in 1983. The SRC was the brainchild of James McGregor Sowerby, a former Research Director of BAE (Dynamics Group). Sowerby's vision of a single corporate research centre for all of BAE became reality in 1987 when this honour was bestowed upon the SRC. With the formal ratification of the SRC as BAE's corporate research centre, the department's capabilities diversified significantly, although human visual performance and the related topics of display design, assessment and optimisation remained among the department's greatest strengths.

During the 1980s a number of young ergonomists joined the SRC's human factors department. A few of these individuals have gone on to become influential in our discipline, notably Professor Bob Stone, currently Chair in Interactive Multimedia Systems at the University of Birmingham, and Ian Hamilton, Human Factors Global Head at Environmental Resources Management.

overnight, but we also enhanced significantly our capability with the addition of training specialists and experienced human factors engineers with maritime domain knowledge and expertise.

Since 2006, the human factors department has numbered approximately 30 members of staff, which made it one of the largest industrial human factors groups in the UK. The department's capabilities have changed significantly in the fifty years or so since it came into being. This change has been partly in response to the increasing complexity of defence and aerospace technologies that we have witnessed over that period, partly in response to the changing requirements of BAE Systems' various business units and partly in response to the changing landscape of Ministry of Defence funding for human sciences research. With respect to this last point, the ATC's human factors department was a major contributor to the Human Factors Integration



### BAE Systems ATC, 2000 – 2015

In 1999 BAE Systems was formed, with the merger of two industrial giants: British Aerospace and Marconi Electronic Systems (MES). The following year the Sowerby Research Centre combined with the former MES Research facility at Great Baddow, Essex to form BAE Systems' corporate Advanced Technology Centre (ATC). The department witnessed another significant change in 2006 when BAE Systems' Human Factors Consultancy Services group (formerly part of MES) joined the ATC from another business unit within the Company. Not only did the department grow considerably

Defence Technology Centre and since 2012, to the Defence Human Capability Science and Technology Centre.

Throughout its lifetime the department has been called upon to support BAE Systems' business units through not only the provision of research but also the application of Human Factors Engineering (HFE) and Human Factors Integration (HFI). We firmly believe that both strands of endeavour are equally valuable, as HFE and HFI have allowed the ATC's human factors specialists to support the design and development of some of the UK's most advanced military platforms for air, land and maritime.

This has not only provided valuable experience for the ATC's staff, as it allowed them to work alongside engineers and designers in other parts of BAE Systems and in other organisations, but it has also assisted them in identifying those engineers' and designers' requirements for human factors methods and tools. In many cases these requirements have subsequently been addressed in research programmes within the ATC. The outputs from these research programmes, once validated, have then been exploited on real engineering programmes to the benefit of BAE Systems and its programme partners.

It is testimony to the quality of the ATC's human factors scientists and engineers that many examples of successful exploitation can be cited. As one example, the ATC's human factors department provided a critical role in the certification and acceptance of the Eurofighter Typhoon Head Equipment Assembly during the period 2002 to 2010. In recognition, the team received the Royal Aeronautical Society's Specialist Bronze Team Award in 2010.

Other noteworthy research achievements are listed below. This list is not exhaustive by any means, but serves to illustrate the broad range of research topics that have been addressed by the human factors department over the past 30 years or so.

- › The development of numerous tools for human performance assessment, including: Aircrew Workload Assessment System (AWAS); Crew Awareness Rating Scale (CARS); Quantitative Analysis of Situational Awareness (QUASA); Gwyllo – generic human performance assessment system for simulation-based experiments; Team Sensemaking Assessment Method (TSAM).
- › Post 9/11, as part of the European SAFEE (Security of Aircraft in the Future European Environment) programme, developing techniques to identify and respond to suspicious behaviour in civil aircraft cabins.
- › The development of an approach for training Improvised Explosive Device (IED) detection, based on the identification of behavioural markers (see article in *The Ergonomist*, No. 514 April 2013).
- › The secondment of the sole human factors specialist to the MoD's Counter-IED 'Tiger Team' in 2009. This proved significant in raising the awareness of the human issues relating to IED detection.

- › Support to a number of major multinational experiments, led by the US Department of Defense, one of which addressed the critical and highly topical issue of how to transfer authority and responsibility to a host nation following a period of occupancy by a coalition military peacekeeping force.
- › The development of a White Paper addressing the human issues associated with cyber security.
- › Providing human factors support to the UK's Winter and Summer Olympics teams in 2010 and 2012 respectively, as part of a collaboration with UK Sport.

In addition, our human factors engineers have supported the design and development of many of the UK's finest military platforms, including:

**Military aircraft:** Phoenix Remotely Piloted Vehicle, Harrier, Nimrod MRA4 Reconnaissance Aircraft, Tornado Multi-role Aircraft, Typhoon Multi-Role Fighter.

**Naval platforms:** Type 45 Destroyer, Type 26 Frigate, Queen Elizabeth Class Carrier, Astute Class Submarine.

**Land/other systems:** Challenger 1 Main Battle Tank, Warrior Armoured Personnel Carrier, Terrier Armoured Engineering Vehicle, Rapier GW System.

In summary, we are extremely proud of the many successes of one of the longest established and largest human factors groups in the UK and of the role we have played in promoting the discipline of human factors within the UK's largest defence and security organisation, the defence industry and beyond.

Many current and past members of staff are highly respected for their technical expertise and have reputations that extend well beyond the BAE Systems family of companies. However, the strength of the ATC's human factors department has always been in our collective expertise and experience across a very wide range of human factors topics and across all military domains: air, naval, land and joint operations.

This has enabled us to provide both research and consultancy services, of the highest quality, across a broad range of human factors topic areas, whilst also providing deep understanding in specialised areas, such as human vision, situational awareness, and cognitive systems engineering, to name a few. ❖



## New human factors book set for publication in April

Publishers Elsevier have announced that *Designing for Human Reliability: Human Factors for the Oil, Gas and Process Industries*, written by Institute member Ron McLeod, is due to be published in the US in April 2015, with publication in other regions shortly thereafter.

*Designing for Human Reliability* is illustrated with many examples, case studies and stories from the author's personal experience. McLeod describes some "hard truths" of human behaviour and performance, and illustrates the importance of paying attention to the principles of human factors engineering during the design and development of assets and equipment.

McLeod adopts the concept of local rationality to try to get "inside the head" of the operators involved in major incidents. It explores how well understood psychological processes can lead people to make decisions and to take actions that otherwise seem impossible to understand.

*Designing for Human Reliability* also explores why work systems and equipment interfaces are designed and implemented in ways that induce human error. It sets out thirteen key elements required to deliver the levels of human reliability expected to achieve the return on investment that is sought when decisions are made to invest in projects.

It also demonstrates how investigation of the human contribution to incidents can be improved by focusing on what companies expected and intended when they chose to rely on human performance as a barrier, or control, against incidents.

For more information on the book, visit <http://bit.ly/1C2GvLJ>.

### Dear Editor

We have two modern small cars made by different manufacturers. They both have similar speedo designs. One goes from 0 to 120mph, the other from 0 to 140. Even with a following wind and going down a steep hill I doubt if either car would exceed 90mph. Why waste the space taken up by the dial above 90 with unnecessary figures? It could be used to increase the size of the information needed.

Worse than that, the critical speeds of 30mph, 40mph and 70mph are not at good scanning angles of 0, 90, or 180 degrees. My original Morris Minor had a better layout than these modern dials (and I was able to convert it to provide a head up display long before HUDs became standard in fighter jets!).

Somewhere along the line we just are not getting the ergonomics message through to designers.

**Ted Lovesey**

## Ergonomics Everywhere



I write this with 100 days to go to the General Election in the UK. No doubt this election will generate a huge amount of interest, given the fragility of the economy, flux in Europe and the resurgent interest in politics here following the referendum in Scotland. In many ways it's heartening to see rather less political apathy and a degree more fervour. Much of that renewed interest is centred around belief, a belief in better.

We will welcome at least one major political figure to the evening launch of our Chartered status, to take place in London on 3 March. The Right Honourable Nicky Morgan MP, Secretary of State for Education and MP for Loughborough will be the guest of honour, shoe-horned in to a busy schedule at what will be a very hectic time, politically. But that Nicky Morgan was excited to confirm her attendance in advance says plenty about our profession and discipline, and about our heritage in the town of Loughborough, which goes right back to 1949. There has been a firm link since then, which we look forward to celebrating with invited press and figures from industry and society, figures who we think are candidates to both embrace our discipline and profession and also promote the adoption of who we are and what we do, a newly-Chartered body of highly-skilled, high-quality professionals, putting their work to good effect in society at large.

Healthcare will vie with the economy for the key issue this election, and I believe our involvement in the coming year will be significantly increased. By the time you read this your Council will, I trust, on February 12 have approved a Strategic Plan for the next five years which will include amongst other initiatives a significant partnership in the healthcare sector, and revised, improved commercial relationships with the publishers of our two journals, which will contribute to our financial strength and capabilities.

Both avenues offer new opportunities for members, both individually and via Regional and Special Interest Groups. Without pre-judging the outcome of the meeting of your trustees, I look forward to sharing the key aspects of our strategy to grow our membership and our visibility not only this year, but each year over the next five years.

There will be new ways for members to interact with society and with each other, to great effect. I sense that you too, as ergonomists and human factors specialists, always believe in better. This year will give each of us different opportunities to put our shoulder to the wheel, and do something to raise interest in ergonomics as a career and discipline which can bring innovative, sometimes subtle but routinely significant, benefits to the way we live and work.

**Steve Barraclough**  
CIEHF Chief Executive

# Analysing safety critical tasks

Sine Masuku

Human performance is a topic of interest across many different industries, but it is especially important in industries where humans interact with safety critical systems. Even with the advancement in technologies introduced to promote safety, the human factor is still present because of the required interactions. Although human performance is now given more attention, there has not always been enough information available that is industry specific.

In a process chemical plant, where safety critical tasks (SCTs) have been identified in a safety system, there is a need to understand how human factors influence behaviour and consequently safety performance. The traditional safety management systems have been found not to give enough consideration to the human factors elements. However, this is changing and now more organisations are not just considering human factors but are actually applying human factors analysis techniques in conjunction with the traditional safety management techniques, to reduce or prevent loss of containment.

The term 'loss of containment' in general refers to unintended or uncontrolled release of any substance to atmosphere, resulting in an incident or accident. We learn from history and from our personal experience but it's from previous major accidents such as Texas City or Buncefield that important lessons can be learned. For organisations handling and storing hazardous material, it's not only in the interest of its people and assets that foreseeable failures are prevented but also for the environment and the surrounding communities.

The phrase "to err is human" is frequently cited in research concerning people's interaction with complex systems. This phrase originally conveyed the idea that forgiveness is a worthy response to human failing. It has since then been used to emphasise that errors will occur in complex systems because they require human input and humans make mistakes. As much as this is true, it is also recognised that not all errors are equal. Some errors may be isolated incidents, others may have significant consequences and others may be ingrained into the way we work. However random

these failures may seem on the surface, it is important that we understand the principles of human error and the way in which they may be categorised.

## The Human Factors Task Analysis process (HFTA)

The HFTA process, which is used to analyse SCTs, provides a systematic and structured method for looking into human error. The process helps us to understand how and why these errors could happen so that appropriate corrective actions are defined to minimise the chances of them occurring. This method of analysing SCTs for human failure is part of our safety management system to prevent incidents and accidents. These SCTs are then prioritised based on consequence of risk.

### Step 1: Identifying the task to be analysed

A task is defined as an activity which can be broken down into a series of individual steps. It has a defined start/end points and a clear objective to achieve. SCTs are identified through the Process Hazard Reviews (PHRs), a standard process used in the chemical industry to identify process safety risks. However, other tasks may be identified through incident investigations and project work. SCTs from the PHR have been identified because they are linked to a hazardous scenario that may lead to an incident or accident. The HFTA process will be applied to address human error.

### Step 2: Conducting a Hierarchical Task Analysis (HTA)

To understand the task, a task analysis must be conducted. The purpose of a task analysis is to understand the constituent steps of the task. Cristal uses HTA methodology, supported by commercially available software, to describe the task. When undertaking this process, it's important to be clear in defining the task as it's intended to be performed under the current working conditions. A major benefit of this tool is that it allows for other useful techniques to be incorporated, such as observations, talk-through or simulations to collect information about the task at hand. Depending on the nature of the task, an HTA team is formed to capture relevant expertise knowledge. The team typically includes the following members:

#### ABOUT THE AUTHOR

Sine Masuku is a Human Factors Analyst working for Cristal Pigment UK Ltd, the world's second-largest producer of titanium dioxide. Sine joined Cristal after completing her BSc Ergonomics and Human Factors degree. She works in the Human Factors and Competence department.

- › Human Factors Analyst
- › Plant Operator or Technician
- › Engineer from required disciplines
- › Task Owner or Area Specialist

As the human factors analyst facilitates the discussions in the room, they draw the HTA, capturing all the required details from the discussions of the task. In instances where there are conflicting details of the task, an observation is arranged for clarification, ensuring that the information on the HTA truly reflects the current best practice and is realistic or achievable.

### Step 3: Human Error Analysis (HEA)

Once the content of the HTA has been agreed and signed off, a final observation is conducted to validate the HTA and a HEA is conducted to identify the safety critical steps. This process of breaking down the task allows for the safety critical steps to be identified. The HEA uses a 'Human HAZOP' approach, a method widely used to review SCTs by using guidewords to assess factors that influence human performance. The purpose of this is to enhance these factors, so that the risk of human failure during the key steps is minimised.

### Step 4: Corrective Actions

Corrective actions are then generated from the HEA to minimise or eliminate the chance of human error. At this point Performance Influencing Factors are addressed. Other actions that are recorded may be related to the task efficiency identified during the observation. A 'Hierarchy of Control' concept is used to identify actions. In order of preference, the options are considered as follows:

- › Eliminate the hazard
- › Reduce the hazard
- › Prevent people coming into contact with the hazard
- › Implement safe systems of work
- › Utilise personal protective equipment

### Step 5: Generate Instruction or Procedure

The task analysis lends itself to generating the procedure or instruction, as all of the procedural steps will have been identified in the HTA to the level of detail necessary for that task. This information is then used to either create a new procedure or amend an existing one. The procedure goes through a sign-off process before it's uploaded onto the system. All the procedures that have gone through the HFTA process will have safety critical steps marked with a small 'Safety Critical' triangle.

### Step 6: Action Completion

As all actions should be completed within the expected timescales, the progress is recorded in the action tracking database. Any actions that are likely to become overdue are discussed between the human factors analyst and the task owner. Actions are reviewed on a monthly basis by the human factors team, facilitating action progress to completion sign off.



### Step 7: Competence Assurance

The final stage of the process involves using the level of detail obtained through the HFTA process to define the level of competence required for the task. The next important step is to identify the knowledge and practical skills elements required for the task. This then allows job roles, which are assessed on the required elements, to be identified. For example, a practitioner will require both knowledge and skills elements as opposed to a line manager that might only require the knowledge elements. Units of Competence (UoC) are then generated by the human factors and competence (HF&C) department from the HFTA process. Trained assessors use the UoC for assessment and/or training of identified job roles. An authorisation list is produced with authorised persons that have passed the assessment and are deemed competent.

### Setting up for success

The HF&C department aims to work closely with the other functions of the business to ensure a constant communication route. The objective is to be proactive in every aspect of the process, which includes addressing any changes in the plant that may affect tasks already analysed through the HFTA process. Depending on the changes, a full review may be required to ensure that changes are captured in the HTA/HEA process. This will also allow relevant documents to be updated. This is a continuous process that follows the HSE Human Factors Roadmap to assure human performance. This process is still being developed and continuous improvement is the key. ❖



## From submarines to health science: one year post MSc

Having completed my MSc in September 2013, my first exposure to the job market was an unsuccessful interview at BAE Systems. With a week to prepare for my next interview, at QinetiQ's Maritime Life Support group, I decided to use the time to brush up on my diving physiology knowledge, in the belief my ergonomics learnings were still fresh in my mind.

I spent seven days studying chapter 26 of McArdle, Katch and Katch fifth edition and Wikipedia entries on gas laws. The day came and after giving a short presentation, the questions started. I batted off some basic ergonomics questions, along the lines of 'what is ergonomics?' Research design, no problem.

Then we got to the diving physiology and submarine escape. Like only a man who had been locked in a room reading about all things subsea could, I rattled off answers on pulmonary function. Boyle's law, yes I've remembered that word for word. Henry's law, Dalton's law, I'm nailing this. Forty five minutes later and they're done, they look impressed, and we're talking about Game of Thrones.

Ten months of decompression tables, carbon dioxide concentration concerns and blowing air through a submarine. Whilst fun, this wasn't quite what I'd undertaken an ergonomics course for.

So I have taken up my next project, following submarine escape physiology with the completely unrelated information visualisation and health service design. I just need to learn how to visualise information and design services, and I've got this.

So now the focus is on user-centred design and patient participation in healthcare. Hopefully these articles will also get more visually appealing.

**Nye Canham**



## The PhD Blog

by Steph Eaves

This month I have been moving forward with my research now that analysis of my second study is complete. In April 2015

I'm planning a dissemination and feedback event which will include a presentation of the findings of my two studies. I will be inviting stakeholders who have been involved in the research, including the interviewed participants from the workforce and also the project managers, health and safety officials, client liaison officers and so on who were involved in the focus groups of my second study.

The aim of my research is to produce a document for the construction industry that will encourage healthy ageing and engagement of the workforce by considering the design of the workplace using participatory ergonomics.

The very essence of participatory ergonomics is involvement of the end user in the development of interventions, so it makes perfect sense to hold an event for these participants to get their in-depth feedback on the type of intervention they think would be most successful.

In order to do this, I've been investigating the interventions and campaigns that are already out there. There are certainly plenty to choose from, including large National Lottery grants to support good quality of life in older age and a government pledge to improve ageing in the construction industry.

However, whilst reading up on these, I found myself wondering how far these campaigns have involved the end user, namely the ageing population and the older worker. This is hopefully a gap that can be partially filled by my own research, one small step closer to improving and facilitating healthy ageing at work!

## Dieter W Jahns Award: 2014 winner announced, 2015 nominations open

Nominations are now open for the 2015 Dieter W Jahns Award given by the Foundation for Professional Ergonomics, a nonprofit dedicated to advancing professionalism in ergonomics. The award was created in honour of Dieter Jahns, a lifelong advocate of the practice of ergonomics and a leader in ergonomics certification.

The annual award is given to the student (or group of students) for a project that demonstrates the major practice areas of ergonomics: analysis, design and evaluation. The award and cash prize of \$500 will be presented during the HFES Annual

Meeting, 26-30 October 2015, in Los Angeles, California.

Congratulations to Denny Yu, a student at University of Michigan, winner of the 2014 Award. Denny's project is entitled "Understanding the Effects of Alternative Displays on the Work Demands in Microsurgery".

Musculoskeletal symptoms are major concerns in microsurgery, where surgeons are required to operate with surgical microscopes that fixate their postures over optical eyepieces, constrain surgeon's eye locations, reduce comfort, and force surgeons to be in awkward positions.

Please go to [www.ergofoundation.org](http://www.ergofoundation.org) for complete details on criteria and format for this award.

## A late Christmas present

Happy New Year everyone from the book reviews department. I sincerely hope Santa Claus brought you the very latest ergonomic books for Christmas, but if not, don't worry. We can do considerably better than the TV adverts offering "double discounts" and "nothing to pay for four years". In the case of book reviews for the journal *Ergonomics*, there is nothing to pay at all. We just require a fair, balanced, professional critique of the book you have chosen to review and an answer to the immortal question "would my fellow Ergonomists find this useful and worthy of the purchase price". If a space in your diary is opening up in the post-Christmas gloom, and you find yourself in a position to provide a 1000 word book review, then the selected title is yours to keep.

### Flying fast jets

Let's kick off with something thrilling: *Flying Fast Jets*. The average passenger wouldn't be too preoccupied with topics such as G force, ejection and escape/survival, disorientation, high altitude physiology, pilot training and selection, helmet-mounted equipment, situational awareness, data fusion and multi-sensor integration, human machine interface issues and advanced cockpit design. Ergonomists, however, would definitely be highly interested in these topics, all of which get excellent coverage.

### Fire and emergency

If your fast jet were to turn itself into a shower of burning debris then this next book might bring some comfort on the way down. *Human Factors Challenges in Emergency Management* deals with large scale emergency events and the people involved in dealing with the challenges therein. The book deals with topics like team work, decision-making under stress, improvisation, ad-hoc versus pre-formed teams and wildfires.

### Patient safety

We journey a little further down the emergency response chain with our next featured title, and an excellent book called *Patient Safety Culture*. The fundamental (and highly valid) questions this book sets out to deal with are as follows: How safe are hospitals? Why do some hospitals have higher rates of errors involving patients? How can we accurately measure and assess staff attitudes?

### Sounds interesting, but is it ergonomics?

Our next book deals with gamification. Another one of those buzzwords floating around at the moment, but when you turn tasks into games some pretty dramatic behavioural side-effects can emerge. This book, *The Gameful World*, asks: What happens if all of life turns into a game? Will 'algorithmic incentive systems' become our new robot overlords or is it the answer to mankind's biggest challenges like pro-environmental behaviour change? Answers in a 1000 word book review please.

The full list of current books for review appears below. If you would like to request any of these titles please email Dr Guy Walker at Heriot-Watt University at [G.H.Walker@hw.ac.uk](mailto:G.H.Walker@hw.ac.uk). We normally request that reviews are complete within a not-too-onerous four to six week timeframe.



## Books for review

- Newman, D G (2014) **Flying fast jets: human factors and performance limitations**. Farnham: Ashgate
- Hollnagel, E, Braithwaite, J & Wears, R L (2013). **Resilient healthcare**. Farnham: Ashgate
- Hollnagel, E (2014). **Safety-I and Safety - II: The past and future of safety management**. Farnham: Ashgate
- Regan, M A, Horberry, T & Stevens, A (eds) (2014) **Driver acceptance of new technology**. Farnham: Ashgate
- Berggren, P, Nahlinder, S & Svensson, E (eds) (2014). **Assessing command and control effectiveness: dealing with a changing world**. Farnham: Ashgate.
- Gambaro, J (2014). **The truth about carpal tunnel syndrome: finding answers, getting well**. Plymouth: Rowman & Littlefield
- Hale, K S & Stanney, K M (2014). **Handbook of virtual environments: design implementation, and applications**. 2nd edition. Boca-Raton: Taylor & Francis
- Falzon, P (2014). **Constructive ergonomics**. Boca-Raton: Taylor & Francis
- Forsythe, C, Liao, H, Trumbo, M & Cardona-Rivera, R (2014). **Cognitive neuroscience of human systems: work and everyday life**. Boca-Raton: Taylor & Francis
- Menoni, O, Battevi, N & Cairoli, S (2014). **Patient Handling in the Healthcare Sector: A Guide for Risk Management with MAPO Methodology (Movement and Assistance of Hospital Patients)**. Boca-Raton: Taylor & Francis.
- Youngman, P A & Hadzikadic, M (2014). **Complexity and the human experience: modeling complexity in the humanities and social sciences**. Singapore: Pan Stanford
- Cohen, G & Lynch H F (eds) (2014) **Human subjects research regulation: perspectives on the future**. Cambridge, MA: MIT Press
- Simonsen, J et al. (eds) (2014). **Situated design methods**. Cambridge, MA: MITPress
- Mayer, R E (2014). **Computer games for learning: an evidence-based approach**. Cambridge, MA: MIT Press
- Waterson, P (2014). **Patient safety culture: theory, methods and application**. Farnham, Ashgate
- Walz, S P & Deterding, S (2014). **The gameful world: approaches, issues, applications**. Cambridge, MA: MIT Press

# Stress in trainee mental health professionals

John Galvin

In a complex work environment it is likely that multiple hazards will have an impact on workers' stress levels. However when measuring stress levels in complex work environments it is common for researchers to concentrate their measures on a small selection of variables rather than considering multiple factors which may contribute to stress levels and interact with each other simultaneously.

A researcher's decision to limit the focus of their measure in this way is understandable, as time, costs and participant attrition can make alternative solutions appear impractical. However, such a measure is unlikely to provide information that reflects the real world situation. For this reason, there must be a shift towards more complex measurement in the field if we are to successfully understand how the structure of a specific workplace impacts on workers' stress.

At the Centre for Occupational and Health Psychology (COHP) at Cardiff University, Professor Andy Smith and his group of PhD students have been investigating wellbeing using structured single-item questions. Research carried out by Dr Gary Williams as part of this group has demonstrated how structured single-item questions can be a reliable and valid method to use when time and cost constraints do not allow for lengthy questionnaires. The ability to use single-item questions is advantageous when the services being offered are under significant time pressure, as is often the case in the NHS.

Single-item questions were generated based on previously validated multi-item scales. The questions were generated by providing examples in parenthesis of what each question was referring to and instructing participants to use these examples for guidance. A sample 'demands' question would be:

Demands: I feel that I do not have the time I need to get my work done (for example: I am under constant time pressure, interrupted in my work, or overwhelmed by responsibility or work demands).

Participants had to rate their agreement with the statement from 1:disagree strongly to 10:agree strongly.

A number of PhD students at the COHP are now investigating stress using the single-item approach in a variety of populations including seafarers, train drivers, call centre staff, nurses, doctors and other health professionals. My PhD project looks specifically at stress in two groups of mental health professionals in training: trainee clinical psychologists and psychiatric nursing students. During a time of increased demand and pressure on resources for mental health workers, this area of investigation is particularly important. Furthermore, the experiences of mental health students during their training programme is likely to shape the type of practitioner they will become in the future. It can have implications for future job satisfaction and the quality of care that patients receive.

There are five main phases to this research project.

## Phase 1: Literature review

The literature review highlighted some limitations in previous research focusing on these two groups. First, there have been a number of studies focusing on trainee clinical psychologists but these are often left unpublished. One reason for the lack of publication could be that qualified clinical psychologists and trainees conduct research studies on themselves, but they don't have the time to commit to the publication process. This certainly seems to be the case from my discussions with colleagues in the clinical psychology department in Cardiff University. As a result, the conclusions drawn from such studies are limited as they have not been through the critical scientific process of independent peer review. Furthermore, unpublished research can cause issues in terms of the dissemination of information and can inhibit the development of the area.

A second limitation of the available research is

## ABOUT THE AUTHOR

John Galvin is a PhD student at the Centre for Occupational and Health Psychology at Cardiff University. His interests include occupational and health psychology, educational psychology, and stress and disease. He will present a paper on his research at the Ergonomics & Human Factors 2015 conference in April. For more information on the event see [www.ehf2015.org.uk](http://www.ehf2015.org.uk).



that researchers focusing on nursing students often fail to consider the different specialities of nursing when collecting their data. That is, many studies focus more broadly on ‘nursing students’ rather than considering psychiatric nursing students as a population in their own right. Indeed, psychiatric nurses will have their own unique stressors, as will nurses who work in other areas such as adult, child and learning disabilities settings.

### Phase 2: Qualitative research

The second phase of the research involved one-to-one interviews with participants, with the aim to explore stressors and coping strategies. A number of participants described how their own psychiatric history and that of their family had led them into the mental health domain, and how they believed these experiences help them in their dealings with patients. The ‘wounded healer’ is a well-known device in the academic literature and popular culture and suggests that the mental health professional is compelled to treat patients because they themselves are ‘wounded’.

It was interesting that participants invoked this idea to explain their own stress in this study, as well as drawing on another stereotype of mental health professionals, the ‘natural listener’. That is, participants described how they have always been the person who friends and family will turn to in a time of need, and how being able to sit and listen to other’s problems is something that comes naturally to them.

### Phase 3: Cross-sectional research

We then collected questionnaire data from a sample of 168 trainee clinical psychologists and 94 psychiatric nursing students, which represent relatively large sample sizes compared to other studies focusing on these groups. We also collected data from 253 PhD students as an additional control group. The study measured factors such as work characteristics, coping strategies, appraisals, personality, health behaviours, childhood experiences, own psychiatric history, family psychiatric history, job satisfaction, life satisfaction and stress outcomes. Observations from this study include:

- › The findings supported other research that suggests that mental health professionals are at a greater risk of mental health problems than other groups, with participants reporting higher than controls on a variety of stress outcomes.

- › A higher incidence of negative childhood experiences and family psychiatric history was reported by both groups compared to controls, supporting previous research and the idea of the ‘wounded healer’.
- › Trainee clinical psychologists tend to reflect on their childhood experiences and family psychiatric history as having a positive impact on their development, psychiatric nursing students less so.
- › Psychiatric nursing students engage in more emotion-based coping strategies and less problem-focused coping strategies than other groups.
- › High alcohol consumption is a coping strategy adopted by many psychiatric nursing students and this is predictive of poor health outcomes and low job satisfaction.

### Phase 4: Longitudinal research

The longitudinal phase of the research is ongoing. We are currently following trainee clinical psychologists and psychiatric nursing students at three different time points over the course of the current academic year using quantitative and qualitative research methods.

### Phase 5: Triangulation

The final stage of the project will involve conducting focus groups with training providers and a selection of participants. At the beginning of the focus group, I will present the key findings of the studies I have conducted during my PhD and ask participants to discuss their views on them. An insider’s perspective on the findings will be important for validating the results and can also be helpful for generating ideas and making suggestions to programmes. Indeed, one of the difficulties I have found during my investigation into this area is, as a PhD student, I am considered an ‘outsider’ by the training programme. Although this has been helpful in some respects, it can be problematic when making suggestions for change.

Looking at different groups in this manner produces a vast array of information and provides a comprehensive account of the factors influencing stress levels. The idea here was to measure a wide variety of variables relevant to both the personal and professional lives of two groups of trainee mental health professionals. This information can now be used in the planning and implementation of stress management interventions. ❖





### Occupational Health and Safety in Europe 24 February 2015, Brussels

This international symposium will provide an invaluable opportunity to discuss how the number of occupational accidents can be reduced, especially in high risk industrial work environments, and consider an effective cross-border strategy to prevent psychosocial risks and other work-related diseases. The symposium will allow delegates to examine and assess projects, tools and best practices tackling occupational safety and health issues in Europe so as to create healthy workplaces and foster growth.

For more information, visit <http://bit.ly/15Fa2y6>.

### Patient Safety with Interactive Medical Devices 24-25 June 2015, Reading

The aim of this symposium is to bring together researchers and practitioners working in the area of patient safety and interactive medical devices. The submission deadline for papers is Monday 13 April 2015.

For event and submission details, see [www.chi-med.ac.uk/symposium2015/submissions.php](http://www.chi-med.ac.uk/symposium2015/submissions.php).

### Human Factors and Combination Products 20 May 2015, London

This one-day seminar taking place at Guy's Hospital will be of interest to anyone developing combination or drug delivery devices and who wants to learn more about human factors in the development process. For more information, see [www.medical-device-usability.com](http://www.medical-device-usability.com).

### Automotive User Interfaces and Interactive Vehicular Applications 1-3 September 2015, Nottingham

AutomotiveUI 2015 will address novel in-vehicle services, models of and concepts for enhancing the driver experience, driver performance and behaviour, development of (semi-) autonomous driving, and the needs of different user groups.

Submissions can include papers, workshops, work in progress and doctoral colloquium with deadlines from Monday 13 April. Papers that include theoretically-based, quantitative predictions of experimental outcomes as well as validation of those outcomes, are particularly encouraged. For more information, see [www.auto-ui.org](http://www.auto-ui.org).

### Rail Human Factors 14-17 September 2015, London

The Fifth International Rail Human Factors Conference is jointly organised by RSSB, Network Rail and The University of Nottingham.

The aim of this conference is to bring together scientists,

consultants, regulators, operators, infrastructure managers, manufacturers and suppliers to share rail human factors knowledge. Abstract submission is currently open (closing date 20th March).

For more information about the conference visit [www.rssb.co.uk/railhf2015](http://www.rssb.co.uk/railhf2015) or email [railhf2015@rssb.co.uk](mailto:railhf2015@rssb.co.uk).

## Events set for 2015 for the North West Regional Group

The NW Regional group aims to organise three technical meetings and a social each year. These events are open to all.

- › **March:** Tuesday 10th, 5:30pm for a 6pm start at AREVA RMC, 303 Bridgewater Place, Birchwood Park, WA3 6XF: "Identifying and Analysing Errors of Commission" by Ned Hickling, Synergy Consultants Ltd; "The Centre for Registration of European Ergonomists" by Claire Dickinson, CIEHF CREE Panel Chair.
- › **June:** details TBC, "New Build Competency Process" by David Gledhill, Cavendish Nuclear Ltd.
- › **September:** details TBC, "Life as an Expert Witness" by John Lovegrove, Canary Designs; "Expert Witness Role" by Claire Dickinson, Office of Rail Regulation.
- › **December:** details TB, Christmas social.

If you're interested in attending the next event or would like to present at a Group meeting, please contact the Group Organiser Emma Ridsdale, email [emma.ridsdale@arevarmc.com](mailto:emma.ridsdale@arevarmc.com).

Thank you for your continued support for the Institute's events and meetings.

## NATS visit for Southern Regional Group

NATS have very kindly offered to host a visit to the Air Traffic Control Centre at Swanwick, Hampshire. Their limit is 15 people per visit and we are tabling two dates: Tuesday 21st April at 2pm and Tuesday 12th May at 2pm.

The visit will include:

- › An introduction to NATS and Air Traffic Control.
- › A view from the viewing gallery and talk about one of their Air Traffic Control rooms.
- › An overview of human factors in NATS.
- › Case studies of the practical application of human factors.

We will try and select the most popular date but they have very generously offered to host two visits if we exceed the limit. This is an operational Air Traffic Control Centre and security is very high so we would need to provide a list of attendees at least two weeks before the planned date. Please can you indicate which date(s) you can make by emailing Group Organiser Jo Davies at [jo@ese-assoc.demon.co.uk](mailto:jo@ese-assoc.demon.co.uk).

## Membership matters

### Calling all graduates

Hello all, I hope 2015 is treating you well so far. How are your New Year's resolutions going? If you need any inspiration to make a change here's an easy one for all our Graduate Members – get involved in the Early Careers Network.

Launched in the January edition of *The Ergonomist*, the Early Careers Network now encompasses all of those in the early part of their career, not just researchers. I wanted to draw your attention to this exciting development in case you missed it last month. So if you are a graduate working in industry or if you are a researcher just starting your career, this group is for you.

First a little history. A couple of years ago some researchers got together and decided that they needed more support from their Institute to develop, communicate, build relationships, etc. This group applied to the IEHF to have a Special Interest Group (SIG) set up for researchers to network, share ideas, discuss issues, etc. This group has been very successful in engaging with its members - all those in the early stages of a research career - and supports events such as the annual Doctoral Consortium. However, it was noted that industry wasn't included and it was felt that those working in consultancies and in industry would also benefit from a group tailored to their needs. In collaboration, the SIG and the Council's graduate representative developed the terms of the Early Careers group which has now become the Early Careers Network.

The new group members were introduced in a column in last month's issue of *The Ergonomist*. They have defined the aims of the new group as follows:

- › To provide networking opportunities with like-minded people at similar stages of their careers both online and at networking events.
- › To give individuals in the early stages of their careers a voice within the Institute.
- › To help individuals with the Registered Membership process.
- › To identify and disseminate job/voluntary opportunities.

There is a LinkedIn group where individuals are encouraged to share their experiences and a dedicated Early Careers Network Twitter account. Get in touch, share your thoughts. Tell the group what you want to happen and they will consider how they can meet your needs.

My advice to all graduates, either working in industry or within academia, is to take advantage of this opportunity and join the group. This is an exciting development with many benefits. It is important to support each other through difficult times at work and equally vital to build your professional network early on in your career.

This opportunity is equally useful for those working alone and those operating in groups, as it is your connections across industry and academia that will help shape future prospects. There have been many discussions at recent conferences about this link between industry and academia, this group helps ensure those links are strengthened.

I would like to say a big thank you to the co-ordinators of the group, Chrissie Hare, Laura Lewis and Byron Edwards for identifying the opportunity to provide support to our graduates through the Early Careers group and for implementing the changes to the existing group to welcome all early career Institute members. It is your hard work and drive that will make this a successful group. Good luck!

Aside from the Early Careers Network, there are many other Institute SIGs in a range of sectors that you can join. Contact the SIG co-ordinator and request to be included on the mailing list. See our website for further information on all our SIGs.

Please feel free to contact me to discuss any aspect of membership of the Institute. My email is [clare.pollard@arevarmc.com](mailto:clare.pollard@arevarmc.com). However, please note that there will be changes to the membership group in the near future with next month being my final article as I step down from this role at the IEHF.

## Ergonomics Design Award soon to launch

Look out for the launch of the Ergonomics Design Award later this month when a new website will be unveiled together with plans for the judging session, award ceremony and a design ergonomics seminar.

The proposed deadlines for entries is the end of June with the award presentation and seminar taking place in September.

This the only award of its kind in the UK recognising ergonomics excellence in a project and the aim of the re-launch in the IEHF's Chartership year is to take it to a new level.



Clare Pollard,  
Chair of  
Membership  
Services

### DIVERSIONS...

#### We told you it was hot

Notice in a hotel. According to the receptionist it was there to comply with health and safety.

Please help yourself to delicious Hot Chocolate.

Please be careful when dispensing as our Hot Chocolate is **HOT**.

*Thanks to Charlie Turner for this contribution.*



All Institute members should by now have received their membership renewals by email or post.

If you haven't yet paid your 2015 subscriptions, please do so as soon as possible as your continued support will enable us to start moving on with our plans for the year.

If your membership renewal was emailed to you, it will also have contained a link to the new membership package available to you once you renewed. This includes access to seven online journals (see page 6 of this issue of *The Ergonomist*) and a discount scheme (see page 22).

Along with your renewal request, you should also have received your login details for our new web portal, MyIEHF. To renew your membership, go to [www.ergonomics.org.uk](http://www.ergonomics.org.uk) and click on MyIEHF. Log in and you will find your membership invoice under 'Membership subscription'. You can pay securely online with a debit or credit card.

If you pay by Direct Debit, you don't need to do anything unless we have already contacted you.

If you are a Registered Member or Fellow and have submitted your CPD, you could be eligible for Chartered status but only if you pay your subscription. So don't delay, take advantage of the benefits Chartership brings by renewing your membership now if you haven't already.

If you haven't received your renewal request or your log in details, please let us know by emailing Membership Manager, Rebecca Kelly at [r.kelly@ergonomics.org.uk](mailto:r.kelly@ergonomics.org.uk).



## Grapevine

**Sylvia Horner** left Quintec in September 2013 and has set up her own consultancy, HuSys Limited, which provides a range of technical consultancy services to the defence, rail, nuclear and security industries through a network of trusted associates. She has a range of clients who have contract work in areas such as ergonomics, human factors, safety, risk, change management and training needs analysis. Email Sylvia at [Sylvia.Horner@HuSys.co.uk](mailto:Sylvia.Horner@HuSys.co.uk).

## Membership update

The Institute welcomes those listed below who have recently been accepted as new members, and congratulates those who have upgraded.

### Fellows

**Jean Page** from Lancashire.

### Registered Members

**Lucy Hunter** from Bristol. Employed as a senior human factors engineer at Abbot Risk Consulting.

**Richard Willcocks** from Bristol.

### Graduate Members

**Ayse Eren** from Nottinghamshire. "I have a background in manufacturing engineering and have completed an MSc in Human Factors at the University of Nottingham. I am currently a second year PhD student at Nottingham and my research focuses on glance behaviour in driving and driver distraction. I use eye tracking and driving simulation in my research and would be happy to have discussions with colleagues in these areas. Apart from my current research area I also have an interest in accessibility and design of assistive technologies for people with disabilities. I am also the Registered Membership Coordinator for the Early Careers Network."



**Fiona Theobald** from Cheshire. Employed as a human factors director at Three Circles Consulting Ltd.

**Jason Harmer** from Somerset. Employed as a director at Albachten Harmer Ltd.

**Kirsty Angerer** from Leicestershire. Employed as an associate ergonomist at Humanscale.

**Emily Catlow** from Berkshire. Employed at Greenstreet Berman Ltd.

**Elizabeth Hoe** from London.

**Graham Sabine** from Cumbria. Employed as a human factors engineer at BAE Systems Ltd.

**Thomas Winski** from South Lanarkshire. Employed as a research scientist (ergonomics) at IOM Consulting.

**Diane Hewetson** from Hertfordshire. Employed at Kings Langley Physiotherapy Clinic.

**Jason Hanson** from London.

**Alison Wheeler** from Norfolk.

## Associate Members

**Diane McGivern** from Stirlingshire. Employed as an HSE Risk Assessor at Syngenta. "With a BSc (Hons) Degree in Chemistry and 15 years' experience as a Process Chemist, redundancy prompted re-evaluation of my career. Having a keen interest in health and safety, I was delighted when offered the role of HSE Risk Assessor for an agrochemical (COMAH) site. This career change has taken me from the laboratory to the fascinating area of human factors. Despite the steep learning curve, my previous experience has been invaluable in the application of HF to this environment. I look forward to experiencing the benefits of CIEHF Associate Membership and intend to work towards Technical Membership."



**Kate Ewing** from Gloucestershire. Employed at EDF Energy.

**Vicky Dunn** from Wiltshire. Employed as an associate scientist (aircrew systems integration) at QinetiQ.

**David Keane** from Manchester. Employed as a human factors design engineer at Lockheed Martin UK.

**Nick Woodier** from Nottinghamshire.

**Jo-Anne Albertsen** from Hordaland, Norway.

**Richard Lilley** from Nottinghamshire. Director of Tracksys Ltd.

**Paul Wotton** from Somerset. Employed as a Principal Consultant at Quintec.

**Ann Abbassi** from the West Midlands. Employed as Hollier Simulation Centre manager/TeamSTEPPS Programme Lead.

**Wayne Stevens** from Cumbria.

**Sally Lombaert** from Durban, South Africa. Employed as an ergonomics manager at Toyota South Africa Manufacturing (Pty) Ltd.

**William Twiney** from Wiltshire. Employed as an air division graduate at QinetiQ.

**Paul Wheeldon** from Worcestershire. Employed as HSEQ division manager at ERIKS Industrial Services Ltd.

## Student Members

**Jamie Everitt** from Essex.

**Tom Bivins** from Suffolk.

**Matthew O'Brien** from Tipperary.

**Maureen Jennings** from Aberdeenshire.

**Suzanne Amos** from London.

**Miguel Aulet** from Ayrshire.

**Riccardo Bovo** from London.

**Sanda Budimer** from London.

**Arindra Kumar Das** from Assam, India.

**Ismail Ferullo** from London.

**Elise Hein** from London.

**Riasat Islam** from London.

**Joshua Jennings** from London.

**Tanay Kapoor** from London.

**Kyung-Ae (Celina-Sarang) Kim** from London.

**Georgina Kirk** from Berkshire.

**Sandeep Kollannur** from London.

**Anne Kuforiji** from London.

**Nicolas Lam** from London.

**Christie Lau** from London.

**Tom Lee** from London.

**Kexin Lee** from London.

**David Little** from London.

**Yuqi Liu** from London.

**Wen-Jie Lo** from London.

**Alessandra Luz de Medeiros Ferreira** from London.

**Ningling Pan** from London.

**Matthew Pateman** from London.

**Paul Whittington** from Dorset.

**Benjamin Skowera** from London.

**Gustavo Soto** from Santiago, Chile.

**Ting Chih Wang** from London.

**Lemin Wu** from London.

**Minghui Zhang** from London.

**Linge zhang** from London.

**Weiwei Zhang** from London.

**Enhui Li** from London.

**Victor Bassey** from London.

**Yuval Cohen** from London.

**Vita Rutkovska** from London.

**James Piercy** from Surrey.

**Matthew Culloty** from London.

**Jinesh Mathew** from Nottinghamshire.

**Pedro Huertas Leyva** from Florence, Italy.

**Pavle Mijovic** from Belgrade, Serbia.

**Keiko Okuyama** from Nottinghamshire.

**Jagjit Panaich** from Berkshire.

**Putra Yamin** from Nottinghamshire.

**Glenn Robertson** from Tyne & Wear.

## Dear Editor

I very much enjoyed the piece by Julie Waldron in your last edition ("Making architecture enjoyable as well as functional"). It reminded me how much potential there is in this area for those with formal EHF skills. I think it's still probably true that apart from those studying ergonomics specifically as a first degree, architects still receive one of the best all-round undergraduate preparations for a career in EHF. A mix of engineering and applied social and human sciences, professional studies, and much else, all brought together in the practical design of complete, complex, integrated systems. And so it remains a mystery to me as to why so few do take that path.

There are positive advances in construction that we would approve of though, despite the lack of professionals with EHF credentials on their business card in the sector. In particular the increased use of Integrated Design Processes. This is the idea that many of the design weaknesses that emerge during the building and lifecycle of a structure can be anticipated by getting all the subject matter experts around the table before you go too far: Everybody, Everything, Early. There are opportunities here, especially as facilitators of the IDP sessions.

Julie's excellent article also put me in mind of an area of architectural ergonomics that seems to have largely disappeared. The Belgian architect Lucien Kroll experimented in the 1970s with allowing those doing the actual building, and those about to occupy the building, considerable say on design features such as windows and doors. This had its up and downs inevitably, but in the 32 years since completing my own architectural degree I've consistently come across people in all corners of the industry from tradespeople to labourers and inspectors who surprise me with how much they care about aesthetics and usability. And they have much to contribute to design.

The constant drive to achieve perfect project management (exactly as the drawings, on time, to budget) and to avoid any variations means that any creative input by the wider subject matter expert group has to be introduced very early indeed. Far earlier than you would have for a product that could be modelled, trialled and mocked up at life size and in working prototype before committing to the final design.

The new Building Information Modelling technology coming through now, and being required by some government clients, provides, in combination with IDP, the best ever tools and an avenue for EHF professionals to apply their decades of experience in simulation and iterative early development to the built environment.

**Dave Moore**

## New benefits scheme launched for members



By being a member of the CIEHF, you now have access to My Discounts, a portfolio containing money-saving discounts, designed to support you both personally and professionally.

There is no sign up process, or any extra charge to access these benefits – you are automatically eligible by virtue of your current membership. At a time when every penny really does count, My Discounts has been designed to make your membership even more rewarding.



We realise that it's becoming increasingly easy to find 'competitive' deals and offers through work or on the internet. That's why many of the benefits carry a stamp:



**National Price Promise:** This stamp means that you should be getting the best possible price / deal in the UK, for this product or service.

**Provider Price Promise:** This stamp means that you should be getting the best possible price / deal that this company makes available.

The benefits that My Discounts offer fall under a series of categories. Some of the benefits are described below to give you an idea of what is on offer.\*

- › **Lifestyle:** Great savings on Apple products, restaurant dining, mobile phone deals, energy savings, discounted flowers and top UK attractions.
- › **Travel:** Discounts on package holidays from many of the major tour operators, hotel accommodation, cottages, airport parking, lounges & hotels and foreign exchange.
- › **Work & Business:** CV & interview coaching, text books, IT & professional development training and website creation.
- › **Advice:** Financial planning and mortgage assistance.
- › **Insurance:** Life, home, car and travel insurance.

To access these discounts, simply log in to MyIEHF at [www.ergonomics.org.uk](http://www.ergonomics.org.uk) and click on My Discounts.



\* Terms and conditions apply to all benefits. See CIEHF My Discounts website for details. Offers and prices subject to change without notice. Insurance subject to underwriting. Some benefits not available in Northern Ireland or outside of the United Kingdom.

My Discounts is managed on behalf of CIEHF by Parliament Hill Ltd of 3rd Floor, 127 Cheapside, London, EC2V 6BT. Neither are part of the same group as a provider.

## Academic vacancies

### PhD Studentship: Forensic science at the interface between chemistry and physical ergonomics Loughborough University

This studentship is one of five new studentships in the mini-Centre for Doctoral Training – ‘Policing for the Future: Socio-Technical Resilience and Innovation’. It involves developing a novel collaboration between the two departments in question that aims to assess the feasibility of matching fingerprint development techniques to a novel method of rapidly providing an in-situ physical characterisation of the potential suspect.

Deadline: 27 February 2015.

See [www.jobs.ac.uk/job/AKG413](http://www.jobs.ac.uk/job/AKG413).

### Senior Research Assistant: Ride Comfort for High Speed Railways University of Southampton

The correct identification of the events causing passenger discomfort requires an appropriate model of track-to-passenger perception of motion. The project will develop a set of dynamic models of track-to-passenger perception so as to investigate how changes in the track system affect passenger experience.

The models will use the findings from recent research and include the effects of vehicle dynamics, seating dynamics, and the dependence of passenger response on the frequency and direction of motion. The applicability of the models will be investigated with laboratory simulations of the changes in motion associated with different track and maintenance parameters.

Deadline: 22 February 2015.

See [www.jobs.ac.uk/job/AKK150](http://www.jobs.ac.uk/job/AKK150).

### PhD Studentship in Automated Mobility: To draw on probabilistic causal models and smart technologies to reduce driver error and improve safety Loughborough University

Vehicles in the future will incorporate increasing levels of automation of the driving task and enhanced interface methodologies, and respond to changing demand characteristics of the environment, the connected life of the driver, and non-driving related activities. Key research challenges that these changes pose include: managing variable levels of driver-vehicle control; awareness and state of the driver; and how the interior of an autonomous vehicle will change user interaction with it.

Deadline: 31 March 2015.

See [www.jobs.ac.uk/job/AKI638](http://www.jobs.ac.uk/job/AKI638).

## ‘The Ergonomist’

### The membership magazine of the IEHF

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**Discounts:** Institute members and Registered Consultancies are offered a discount of 15% on the rates above.

**Format:** Copy should be supplied as a high resolution PDF emailed to Tina Worthy. Copy can also be emailed as a Word document by prior request.

**Inserts:** Inserts, in the form of a PDF, will be made available to all members via our web portal on the day the issue is published. Contact us for further details.

**Deadlines:** Adverts and inserts should be booked by the 20th of the month preceding publication. Copy deadline is normally 25th of the month preceding publication.

**Booking:** Please contact Jackie West in the Institute office on 01509 234904 or email [advertising@ergonomics.org.uk](mailto:advertising@ergonomics.org.uk).

**Online listing:** All recruitment adverts published in *The Ergonomist* will also be listed on the IEHF website at [www.ergonomics.org.uk](http://www.ergonomics.org.uk).

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Chartered Institute  
of Ergonomics  
& Human Factors

# Ergonomics & Human Factors 2015

13 - 16 April 2015, Daventry

## Chartership Celebrations

This conference will be the first major event at which we will celebrate our new Chartered status, and the occasion will be marked with a quality programme packed with must-see presentations and activities. A special celebration dinner is planned so please come along and join in.

## Keynotes and plenaries

The Institute Lecture, this year entitled "Human Factors/Ergonomics Implications of Big Data Analytics" will be given by Colin Drury, Distinguished Professor Emeritus of Industrial and Systems Engineering of University at Buffalo, SUNY.

The Donald Broadbent Lecture will be given by Professor Chris Baber of the University of Birmingham who will talk on "All systems great and small".

Dan Jenkins of DCA Design will give a plenary on "Keeping Human Factors On Track – The Design Of The Next Generation Intercity Express Train".

"Simulation and safety in healthcare" is the title of a presentation which will be given by Bryn Baxendale, Director of Trent Simulation & Clinical Skills Centre, NUH.

Sidney Dekker of Griffith University, Australia will give the final keynote of the event, called "Ergonomics, Accountability and Flexibility". Sidney is a best-selling author on human factors and safety, and a pilot.



## Diverse programme

There is great scope at this event for learning lessons from other industries and meeting those who have direct knowledge and experience of them. As examples of the diversity of presentations at this event, you can learn:

- › How user centred design can help tackle the obesity epidemic.
- › How a new communication tool for a ship's bridge emerged.
- › How the difficulties currently encountered by powered wheelchair users in their home environments can be alleviated with use of assistive technology.
- › How technology use in road freight can ensure road safety and environmental demands are comprehensively met.
- › How culture affects human behaviour in conflict situations, and how we could provide better cultural training and more culturally competent staff.
- › How awareness, trust, and acceptance affects human-robot collaboration and its integration into high value manufacturing environments.

See the full provisional programme at [www.ehf2015.org.uk/programme](http://www.ehf2015.org.uk/programme).

## Exhibitors



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## Poster submissions

There's still time to publicise your work with a poster at this event. You will have the chance to speak to all delegates during our Just a Minute session. You have until 13th March to submit a two page abstract. See [www.ehf2015.org.uk/posters](http://www.ehf2015.org.uk/posters).

## Staverton Park, Daventry

With facilities including an indoor leisure complex with pool, sauna, steam room, spa and even its own 18-hole golf course, Staverton Park is one of the best equipped business hotels in Northamptonshire. There is free WiFi and wired internet access throughout, and energy stations with free flowing tea, coffee, mineral water, biscuits, fresh fruit, porridge and popcorn. The venue is set in 150 acres of beautiful countryside in the heart of Daventry. It is easily accessible from the M1, M6, M40 and there is plenty of parking. Northampton and Rugby Stations are 12 miles away and are served by regular Intercity trains from London Euston. Birmingham International Airport is 30 miles away.

## Registration is open

There are several booking options which we hope will suit your available time and budget. Prices start from under £200. Please note that if you book before 1st March, you'll benefit from our early bird discount which offers a substantial saving on standard rates. Go to [www.ehf2015.org.uk/booking](http://www.ehf2015.org.uk/booking).

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