Institution: University of Greenwich

Unit of Assessment: (UoA 12) - Aeronautical, Mechanical, Chemical and Manufacturing Eng

a. Overview

The Centre for Numerical Modelling and Process Analysis (Centre), established in 1983 (http://bit.ly/18ozOmu), represents a key component of the University's strategic plan (http://bit.ly/18eXM68), a main goal of which is to establish 20 research groups with an international reputation for excellence. It is a large multi-disciplinary team of engineers, mathematicians, physicists, computer scientists, materials scientists and psychologists from Computing and Mathematical Sciences (CMS) and Engineering and consists of 4 research groups which collaborate within an environment of shared infrastructure and resources. In this way, tools, techniques and expertise developed to solve one problem can be adapted to best effect in solving related problems across themes. The groups are:

- **Fire Safety Engineering Group (FSEG)**, founded in 1986 and led by **Prof Galea,** has research interests in the development and application of computer models for evacuation, combustion, fire/smoke spread, and fire suppression. It's core activities relate to the development and application of the EXODUS evacuation and SMARTFIRE CFD fire modelling tools. FSEG's work has application to aerospace, maritime, rail and built environments. In REF2014, FSEG submitted 9.5 FTEs in 3 UoA's.
- **Computational Science and Engineering (CSE)**, founded in 1983 and led since 2001 by **Prof Pericleous**, has worked in a range of industrial or environmental problems involving transport phenomena, aero-acoustics and electromagnetics. The group is particularly known for its expertise in metals/minerals processing (smelting, casting, welding, solidification microstructure, particulate handling). Its focus is "Multi-Physics" modelling expressed in unique algorithms and software, including the multi-physics code PHYSICA and the spectral MHD code SPHINX (induction melting, levitation). In REF2014, CSEG submitted 4.25 FTEs in 3 UoAs.
- **Computational Mechanics and Reliability (CMRG),** founded in 2004 by **Prof Bailey** has research interests in the development of computer models for multi-physics/multi-scale predictions, numerical optimisation, failure analysis, reliability and maintenance of engineering structures. Core activities relate to the development of software tools, such as PHYSICA, ROMARA, and POWERLIFE. CMRG work is applied to a number of sectors including medical, aerospace, automotive, telecommunications. In REF2014 CMRG submitted 7.25 FTEs in 3 UoAs
- **The Wolfson Centre for Bulk Solids Handling Technology (Wolfson),** active since 1974 and led since 1991 by **Prof Bradley** specialises in the physical behaviour of powders, granular and particulate materials in all aspects of handling, processing and use. Core activities relate to measurement and control of powder flow properties, two-phase flow, effect of electrostatics, powder caking, segregation and degradation. The group is known world-wide for its close work with industry in developing characterisation techniques, applying its research to the most challenging solids handling design projects, and troubleshooting processing difficulties. In REF2014 Wolfson submitted 3 FTEs in 2 UoAs.

While some Centre staff will be returned under other UoA's, as much of this research is multi-disciplinary, the majority of the research environment is common for all staff across these groups.

b. Research strategy

The Centre has developed an international reputation for addressing complex engineering problems in industry, the environment and human systems. This is demonstrated through: the award of international prizes for the quality and impact of its work, winning research funding from a variety of sources including EPSRC/EU, producing PhD Graduates, engaging in challenging consultancy for local to multinational companies, and generating outstanding research publications during the assessment period (see http://bit.ly/18eYlgb). Each RAE up to 2008 the Centre, which formed in 1983 within CMS, had been ***collectively*** submitted into different UoA's. In RAE2008 its staff were submitted into a number of different UOA's which best represented the highly multi-disciplinary nature of its research – which does not fit neatly into the UoA framework. The core group were submitted to UoA28 (Mechanical, Aeronautical and Manufacturing Engineering).

i) Current position with reference to the research position described in RAE2008

Relevant research objectives from 2008 were to:

- enhance human factors modelling capabilities of EXODUS suite of evacuation/pedestrian

dynamics simulation tools through introduction of; emotion modelling, interaction with elevators, urban scale evacuation and rail evacuation simulation capability.
- enhance capabilities of CFD fire modelling to include more sophisticated physics and chemistry to accurately predict toxic gas generation in vitiated burning environments and improve efficiency of numerical techniques.
- enhance the capability of PHYSICA to better predict complex multi-scale physics found in engineering processes.
- continue development of a suite of software tools for predictive reliability and real time prognostics. Extend their application to the high technology and heritage sectors.
- extend the capabilities of the QPM Toolkit to incorporate particle segregation through aeration effects, degradation of large particles and a more in-depth capability of assessing particle caking through moisture migration.
- continue research addressing enhanced understanding of behavioural characteristics of particulate materials to further increase plant availability, throughput and reliability, and build on initial work on bio-mass related issues.
- address the challenge of multi-functional materials for: high temperature power/propulsion applications and hydrogen fuel cells and hydrogenation catalysts; and anthropogenic climate change including: CO_2 abatement, renewable/alternative energy sources and environmental protection.

Significant progress has been made towards these objectives through support from external funding, training graduates to PhD completion, and strategic investments in infrastructure. Since 2008 the number of staff returned to this UoA has increased by 63%, from 5.5 to 9.

ii) Forward Strategy and Vision

The Centre's forward strategy is to continue to grow its world leading research in its traditional areas, and also expand our research capabilities further into government high priority areas such as, innovative manufacturing, healthcare and energy and expand our human behaviour modelling interests to the urban-scale. This will be achieved through:

- further developing our understanding of human behaviour associated with wayfinding, and the decision making process associated with using lifts or stairs for evacuation, better characterise and quantify the evacuation performance of people with disabilities, understand the impact of social culture on evacuation behaviour, explore the concept of multi-scale evacuation modelling in large urban scales for disaster management planning. These techniques will be embedded into the EXODUS software to accurately represent human behaviour and widen the scope of its application.
- further developing the capabilities of our CFD fire modelling to include; improved representation of the generation and propagation of fire smoke, improved representation of the generation of toxic products of combustion such as HCN and improving the computational efficiency of CFD fire modelling through the use of the hybrid descritisation concept and GPUs.
- further develop our multi-physics and multi-objective optimisation capabilities for materials and advanced manufacturing processes. To embed these capabilities into our software tools such as PHYSICA, SPHINX, ROMARA and POWERLIFE.
- further develop our reliability and failure analysis modelling capabilities in electronics product design and in particular the electronics-energy (Power Electronics) and electronics-bio (Medical Devices) sectors.
- combining advances in Internet-of-Things and Cloud Computing with our modelling tools for real time prognostics and health management of engineering products.
- continue to enhance the science behind measurement and control of powder flow properties, particle attrition, caking and 2-phase flow in industrial systems, as well as modelling and design techniques to enhance process efficiency, yield and quality.
- increase the particulate systems research we have started to pursue in High Value Manufacturing (eg aerospace) advanced materials (carbon nanotube composites) and emerging energy sources (eg biomass).
- continued collaboration on UK/Overseas Government (e.g. EU, DoD, etc) funded projects with leading research organisations.

- continue to use HEIF and RCIF funding to support enterprise and new infrastructure requirements within the centre

These activities are being supported by the University through the appointment of a Business Development Managers (BDM), one in Engineering and one in CMS, who work closely with Centre staff to identify funding opportunities and assist in developing proposals and through the investment of RAE (£2.44m), HEIF (£711k) and RCIF (£950k) funds.

c. People, including:

The vitality of the Centre is demonstrated by its ability to maintain a strong, rich and multidisciplinary research team and environment including a network of links with laboratories, companies and research organisations worldwide.

i. Staffing strategy and staff development

The research group directors collectively manage the Centre providing a coherent approach to staff development. The University has a policy of encouraging staff development and providing facilities for staff at all grades. In terms of the Concordat to support career development of researchers, the university is fully compliant and seeks to ensure that the potential exists for research staff to have clear and well-defined career progression opportunities (http://bit.ly/18XahOG). To this end, staff development opportunities are made available to research staff, with training and development provided both within the University (http://bit.ly/177WBE3) and also externally within reasonable budget constraints. All staff have the opportunity at appraisal – and throughout the year – to raise development issues with line managers. The University also has procedures in place for equal opportunities and diversity (http://bit.ly/18X9VaV).

All UoA 12 staff are active members of their Schools and have a mix of research, teaching, mentoring and administrative roles. ***Galea, Lawrence, Bradley, Bailey, Lu, Pericleous*** and ***Patel*** provide day-to-day management and mentoring for the Centre's staff. ***Patel*** also provides an important research linkage directly into all the groups where he contributes to the development of multi-physics techniques. ***Galea, Lawrence, Gwynne, Bailey, Lu, Pericleous and Patel*** teach on the CMS MSc Applicable Mathematics programme, provide a variety of short courses for industry, and contribute to undergraduate teaching, where they inspire the next generation of researchers. The Centre actively seeks to develop their staff so that they fulfil their full academic potential. Senior Centre staff mentor junior staff through the University promotion scheme which has a clear career path for research staff, e.g. ***Patel*** and ***Gwynne*** were promoted to Professor and Reader respectively in 2013 and other Centre staff submitted to other UoA's were promoted to Reader (***Drs Stoyanov and Bojarevics 2010***). The Centre also encourages the development of new staff with the Centre taking on five ECR's, who were former Centre PhD students, submitted to other UoA's (***Drs Deere, Xie, Rajaguru, Tilford and Kao***). The Centre also has several new ECR's not submitted to the REF but who will be submitted in later REF's. Within the University, ECR's are part of a network which provides career development support. It was setup in 2009 as a response to the Concordat. The network runs an annual awards scheme to identify and reward exceptional research. ***Dr Kao*** was the recipient in 2013.

ii. Research students

The University has a well-developed procedure for monitoring PhD research programmes, administered by faculty Research Degrees Committees (RDC). There is also a Post Graduate Tutor (PGT) (***Pericleous)*** to monitor PhD student progress and provide pastoral care; each student is assigned two research supervisors. Supervisors are required to have undergone a specified training programme within the University (or its equivalent) and have specific experience of research supervision before becoming a lead supervisor. PhD students attend appropriate MSc units or short courses as part of their studies. They are expected to disseminate their research findings at conferences and for this they first practice their presentation skills in internal seminars in front of peers and supervisors. A regular programme of invited external speakers enhances awareness of relevant research beyond the university. All PhD students have access to state-of-the-art computational and laboratory facilities supported by RCIF and project funds.

d. Income, infrastructure and facilities

The evident sustainability of the Centre is shown by its ability, within a highly competitive research environment and during an era of global recession, to attract UK government, EU, overseas and

Industry (from SMEs to multi-nationals) funding without sacrificing research quality. Over the assessment period the Centre has generated £10.2m from research and enterprise activities (£7m from REF related research activities and £2.94m from Enterprise activities). Each group is a cost centre with directors having overall responsibility for managing research income/expenditure and investment of RAE, RCIF and HEIF funds. The groups jointly fund core research infrastructure i.e. computer networks, computer technicians, large scale compute resources, secretarial support, etc. The Centre's research culture is supported through external grant income (research councils, EU, govt. agencies), commercial activities (consultancy and licensing of software) and internal investments. Income from commercial activities supports research staff salaries. An example is sales from FSEG software which exceeded £1m during the assessment period. Each year, the University allocates a proportion of RAE income to established research groups that were successful in RAE2008 and allocates the remainder by competitive internal bidding. The Centre bids for RAE funding to underpin its main activities and supplement its research grant and enterprise income. This funding is used to: support active researchers with travel and equipment, provide funding for RA's and provide bursaries for PhD students. Over the assessment period, the Centre has received £2.44m in RAE funding. The University recently introduced a number of PhD studentships which are awarded annually on a competitive basis. Over the past 2 years since its inception, the Centre has won 9 of these.

Research infrastructure is continually being updated and enhanced. RCIF funding is available through competitive bidding to provide state-of-the-art research infrastructure. All research staff/students have their desk-top computers upgraded as part of a rolling programme. The School-based research network is continuously upgraded e.g.: 6 Tb SAN storage has been upgraded to 10TB this year, off-site backup/replication for maximum resilience of storage area, 1GB comms back-bone has been upgraded this year to 10GB, 1GB switches and dedicated research servers. Other facilities include a dedicated server room space in Dreadnought Library which has been enhanced to cater for HPC servers, two distributed memory high performance clusters, a 40 processor system and a high performance shared memory 64 processor Linux cluster, implementation of Virtual Desktop Environment and Virtualisation of servers enabling research groups the ability to demonstrate software to clients and development of their specialised software. Most recently, in 2013 a 20 node window cluster and 12 node GPU cluster was purchased to support parallel and distributed computing research for the Centre. These provisions have been made available via RCIF expenditures of £802K since Jan 2008. The Wolfson group has extensive analytical labs containing all the cutting edge techniques for measuring and characterising the behaviours of powders, including a pilot plant occupying 1000m^2 of floor space, containing the largest selection of industrial-scale equipment for conveying and processing of powders and bulk solids under one roof anywhere in the Northern hemisphere. All scales are catered for, from atomic force microscopy of single particles, through microdosing down to 10mg for pharmaceuticals, up to 150 tonnes/hr for minerals processing and pipelines up to 400m long. Investment in these facilities since 2008 has been £422k of which £176k came from RCIF funds. Within the School(s) Directors of Research and Enterprise are on the School Management Committee, bringing the research and enterprise agenda to the highest levels of School governance.

e. Collaboration and contribution to the discipline or research base

- **Examples of research collaboration**

The Centre has been active in engaging with other academic institutions and researchers. This is evident through our collaborative research contracts, for example the £18m EPSRC funded project - Underpinning Power Electronics - with Cambridge, Nottingham, Bristol, Warwick, Newcastle, Manchester and Strathclyde – where Greenwich is leading on the cross theme activity of Design and Modelling activities. Another project is the EPSRC HEED project concerned with the WTC evacuation which was led by the University of Greenwich and involved Ulster University and Liverpool University. This project also involved collaboration with two US universities, Polytechnic University of New York and John Jay College, The City University of New York. In both of these US institutions, Prof Galea was made a visiting professor. We have also been involved in initiatives such as Marie Curie (e.g. Pb-Free project which brought Dr Alam to Greenwich, and supported close collaboration with City University, Hong Kong) and the Prime Ministers International Research Collaboration Initiative which supported staff exchange visits between CMRG and Kyoto University, Japan. We also engage with the wider community through our

Visiting Professorships which includes Professor Peter Mason (Royal Academy of Engineering), Professor Nihal Sinnadurai (Chairman IEEE UK &RI Chapter), Associate Professor Yuki Akizuki (University of Toyama, Japan), a social scientist, who spent 10 months at FSEG working with Prof Galea in 2010 and Dr Jun-Ho Choi, a National Research Foundation of Korea Scholar and Architect (Kyungpook National University, Korea) who spent 10 months with Prof Galea in 2012. Professor Galea is also a Visiting Professor at the University of Gent in Belgium from 2009 and Institut Superieur des Materiaux et Mecaniques Avances (ISMANS), Le Mans, France from 2010. Prof Pericleous is a member of the ESA international topical team for the study of materials processed in microgravity, under the ELIPS project 'SOL-EML'. The team includes scientists from ESA, NASA, the Japanese space agency JAXA and others. With sponsorship from the steel industry giant ArcelorMittal, Prof Pericleous co-supervised a PhD student (Yannick Doh) at Nancy University. Under the EPSRC project ELFVAR (Rolls-Royce, Specialty Metals & British Steel) Prof Pericleous co-supervised with Prof P.D. Lee the PhD student Yuan Lang at Imperial College.

- **Wider Influence (Public engagement)**

Working closely with the University's publicity unit, we have engaged with the public via the press, radio and TV. Examples of this include our work on the Cutty Sark which has received significant amounts of publicity (http://bbc.in/15nnzXq), and FSEG's work on fire and evacuation has attracted considerable media interest, with staff appearing in more than 60 television and radio programmes to discuss their research and its impact since 2008. Examples include a BBC Horizon documentary based on FSEG research, entitled, "How to Survive a Disaster" (10/03/09, BBC1, http://bbc.in/15noerY) which attracted 1.7 million viewers or 7% of the audience (http://bit.ly/17BHAJx). Other programs include the Channel 4 documentary "Terror at Sea" (31/01/12, http://bit.ly/17BIXHU) which followed the sinking of the Costa Concordia, attracting 3.4 million viewers (http://bit.ly/17BJjP1). A string of other press interviews followed on this topic including BBC Radio 4 Today, SKY News, ABC News (USA). These appearances and those in the international print media e.g. The Guardian, Wall Street Journal, India Times, demonstrate the vitality of our research, assist in improving the public understanding of science, attract the next generation of engineers and help shape public policy.

- **Support for interdisciplinary and collaborative research**

Centre academic and research staff are encouraged to work with colleagues from other disciplines, both within and outside the university. This is evidenced by the large number of EPSRC, TSB, EU funded multidisciplinary projects that have taken place since 2008. For example FSEG has six EU FP7 projects which are running through the assessment period (SAFEGUARD, FIREPROOF, BeSeCu, AIRCRAFTFIRE, IDIRA and GETAWAY). These projects involve interaction between physiologists, engineers, naval architects and computer scientists e.g. BeSeCu, GETAWAY, FIREPROOF and SAFEGUARD and emergency services and disaster planning agencies e.g. IDIRA. Another example is our collaborative work in the EPSRC Innovative Electronics Manufacturing Centre (http://bit.ly/HbNs2Y) where we are undertaking interdisciplinary work with a number of universities and companies. Professor Bailey being a member of the Executive Committee of this centre providing an opportunity to open up dialogue with other disciplines. This has supported a number of joint university/industry research projects including the Power Electronics Flagship project, PEMREL and FAMOBS which led onto a EU-FP7 project with four research organisations and 10 SME associations.

- **Wider contributions to the research base**

In addition to our subject specific research, a considerable body of the work being carried out in this UoA, is focused on broad topics that have an impact on a large number of cognate areas. For example, the work in CMRG although originally focused on electronic components is now being adopted for conservation of heritage structures, and as part of our strategy is being developed towards healthcare and renewable energy systems. As the sole UK participant in ESA ELIPS3 physical science projects, Prof Pericleous was asked by the UK Space Agency to present the benefits of microgravity research to an EPSRC panel at a joint EPSRC/UKSA meeting.

- **Leadership in the Academic Community**

Awards and Prizes

- In 2011, a Centre publication which appeared in, The Aeronautical Journal 2010, won the Royal Aeronautical Society's Bronze Award for the best paper in the peer reviewed journal for 2010. The work was also short listed for the 2010 Times Higher Awards (THE) for outstanding Engineering Research project.

"Fire and evacuation analysis in BWB aircraft configurations: computer simulations and large-scale evacuation experiment", Galea, E.R., Filippidis, L., Wang, Z., and Ewer, J., The Aeronautical Journal, volume 114, Number 1154, pp 271-277, April 2010.

- In 2008, a Centre publication which appeared in the Journal of Fire Protection Engineering 2007, won the SFPE Jack Bono Engineering Communication Award for the advancement and application of professional fire protection engineering.

"Signage Legibility Distances as a Function of Observation Angle", Hui X, Filippidis L, Gwynne S, Galea E.R., Blackshields, D., and Lawrence P., Journal of Fire Protection Engineering, Vol 17, No1, pages 41-64, 2007. DOI: 10.1177/1042391507064025.

- In 2008 our work with the Cutty Sark Trust received the best Knowledge Transfer Partnership Award & the Outstanding Research Project.
- Received THE Award for Outstanding Engineering Research Team of the year 2009
- DEFRA funded project "Economical Powder Flowability Tester" was awarded the IMechE "Innovation in Bulk Materials Handling" prize 2012, nominated in THE Awards 2010, was runner up in IChemE Innovations Award 2010, and was selected for the prestigious U.S. R&D journal's "top 100 inventions" for 2011.
- Prof Bradley was awarded the IMechE Bulk Materials Handling Award 2012, for services to the discipline

Editorship of Journals

- Prof Galea was guest editor of a special edition of Safety Science, "21st Century Grand Challenges in Evacuation and Pedestrian Dynamics.", Vol 50, Issue 8, 2012.
- Prof Galea is Associated Editor for the International Journal of Fire Protection Engineering and the Aeronautical Journal of the Royal Aeronautical Society (November 2013).
- Prof Bailey is Associate Editor of the IEEE Journal of Components Packaging and Manufacturing Technology (January 2011)
- Prof Pericleous is on the editorial board of the following journals: Applied Mathematical Modelling (Elsevier), Journal of Algorithms and Computational Techniques (Multi-Science), High Temperature Materials and Processes (De Gruyter)
- Prof Bradley is a member of the editorial board for IMech E Proceedings "Journal of Process Mechanical Engineering" (Sage)

Leadership Roles in Learned Societies or Professional Bodies

- Professor Bailey's membership of IEEE-CPMT Society (Member of board of Governors), and is Chair for IEEE UK&RI CPMT and Reliability Chapter,
- Professor Galea's membership of the executive committee of the International Association of Fire Safety Science and is a member of the Society of Fire Safety Engineering task group on Human Behaviour.
- Prof Bradley is a member of the Institution of Mechanical Engineers' Bulk Materials Handling Committee
- Dr Gwynne authored the chapter on engineering evacuation calculations in the SFPE Fire Protection Handbook which is the authoritative professional guideline in Fire Engineering.

National or international advisory board membership

Prof Galea is/has been a member of

- SAPER, a Government Committee, chaired by Government Chief Scientific Officer (Prof Sir David King and, more recently Prof Sir John Beddington), reporting direct to the Prime Minister and UK Government Cabinet Office. Prof Galea was a member of the committee from its inception in 2003 until the dissolution of the committee in 2010.
- SAG–B and SAG-M, cabinet office committees, known as Science Advice Group – Behaviour/Modelling. They deal with aspects of human behaviour resulting from terrorist attacks on British infrastructure and the public and modelling approaches to predict behaviour. Prof Galea has been a member of SAG–B/M since their inception in 2010.
- an ad-hoc scientific advisory group chaired by former Chief Scientist Prof Sir John Beddington to provide scientific advice regarding safety/security for the London Olympics (2009-2012).
- UK representative to International Standards Organisation committee TC92.
- UK expert on maritime fire and evacuation to IMO meeting e.g. FP49.
- BSI Committee life safety FSH/24/2. This committee sets UK standards on fire safety.
- Member, Home Office Committee on CBRN modelling. This committee was established to review the UK preparedness for Chemical, Biological, Radiological or Nuclear terrorist attack

(2004 until its dissolution in 2010).
- Office of the Deputy Prime Minister Committee establishing the Fire Research Academy, (2004 until its dissolution in 2011).

Prof Pericleous is on the Scientific Advisory Board of the Helmholtz Alliance of German Universities

Prof Bailey is/has been a member of:
- Working Group developing IEEE Standard I865 – Prognostics and Health Management of Electronics Systems (this standard is due for release in 2013)
- a member of International Microelectronics Manufacturing Initiative roadmap team working on the Design, Modelling and Simulation theme
- Executive Member of the EPSRC Innovative Electronics Manufacturing Initiative (IeMRC) Committee Member of the Association of Computational Mechanics in Engineering
- Member of the Industrial Advisory Board for the National Physical Laboratory up to 2010.
- Committee member of NAFEMS multi-physics working group, and the NAFEMS EASIT team where Prof Bailey produced Engineering Competence statements for Multi-Scale Modelling

Prof Bradley is/has been a member of:
- European Federation of Chemical Engineers' Working Party on the Mechanics of Particulate Solids
- Chairman of Solids Handling and Processing Association's Technical Committee and member of Council of the Association
- European Committee on Biomass Safety
- British Standards Committee MHE/9, Mechanical Handling Equipment
- Particulate Engineering Committee of Institute of Materials, Mining and Minerals
- Founder member of ISO standardisation committee "Safety in Handling of Pelletised Biofuels"

Invited keynote lectures;
- Professor Galea was an Invited keynote speaker at a number of conferences including: PED 2008 Germany; Human Behaviour in Fire 2009; Emergency Evacuation of People from Buildings, Warsaw Poland, 2011; FORUM8 International Conference, Tokyo, 2010, 2012, RIFA, London 2011.
- Professor Bailey was an invited keynote speaker at a number of conferences including IEEE conferences such as: Eurosime 2009 Germany, ISSE Slovenia 2011, IMPACT Taiwan, 2010, 2012, and Prognostics and Health Management China 2010.
- Prof Pericleous was a keynote speaker in several international conferences including the following series: TMS, EPM, PAMIR, MCWASP, LMPC.
- Prof Bradley has given invited keynote lectures at International Conference on Bulk Materials Handling, public lecture for Institute of Materials, Minerals and Mining

Conference Programme Chairs;

Since 2008, Prof Galea has been a member of a number of National and International conference planning committees and invited chair of sessions.
- Invited chair of sessions at a number of international conferences including: Interflam 2010; IAFSS 2008, 2011; Human Behaviour in Fire 2009, 2012; PED 2008, 2010, 2012; Emergency Evacuation of People from Buildings, 2011.
- Member of conference organising committees including: Human Behaviour in Fire 2009, 2012, UK; NACRE International Conference 2008 (UoG hosted the conference); PED 2010 USA, 2012 Switzerland, Emergency Evacuation of People from Buildings, Warsaw Poland, 2011, IAFSS 11th Symposium, evacuation session, New Zealand 2014.

Since 2008, Prof Bailey has organised a number of National and International conferences, as well working on conference planning and technical committees. These include:
- General Chair for IEEE ESTC conference, Greenwich (2008), General Chair for IEEE Advanced Packaging Conference, UK 2010; Technical Programme Chair for IEEE Nanotechnology conference USA 2011; Technical Programme Chair for IEEE Prognostics and Health Management conference China 2010
- Member of technical programme committee and session chair in following conferences: IEEE EPTC Singapore (2008-2012); ISSE Europe (2008-2012); IEEE ICEPT-HDP (2008-2012); IEEE ESREF Europe (2009-2012); IEEE ESTC (2008, 2010, and 2012); IEEE Eurosime (2007-2012).

Prof Bradley is a member of the committee of the international conference Conveying and Handling of Particulate Solids; co-organiser of the Indian Bulk Materials Handling Conference (IMechE 2011/14).