Institution: DURHAM UNIVERSITY

Unit of Assessment: COMPUTER SCIENCE AND INFORMATICS

a. Overview

Durham University was founded in 1832 and is geographically centred around the World Heritage site of the Cathedral and Castle. It is collegiate, accommodates 15,000 students (3,500 are postgraduates from around 120 countries) and employs over 3,000 staff.

Computer Science is part of the *School of Engineering and Computing Sciences*, one of 7 departments/schools within the Faculty of Science and formed by the merger of the Department of Computer Science and the School of Engineering in August 2009. Within Computer Science (as of 1st December 2013), there are 17 faculty research staff comprising 4 Professors, 1 Reader, 2 Senior Lecturers and 10 Lecturers, with a strong international profile (staff come from Bulgaria, China, France, Germany, Greece, Holland, Poland, Russia and the UK) and with both a median and average age of around 41. We teach around 100 FTE undergraduates and recently redeveloped our undergraduate curriculum so that as of 2012 we offer two focussed, research-led degrees: a 4 year M.Eng. and a 3 year B.Sc. in Computer Science (the M.Eng. requires A-level entry grades of A*AA and the B.Sc. AAA). There are also inter-disciplinary undergraduate degrees under the University's Natural Sciences programme as well as a taught masters programme.

Computer Science research is undertaken within two research groups in the School:

- **Algorithms and Complexity ACiD** (Bordewich, Dantchev, Friedetzky, Gadouleau, Johnson, Krokhin – group leader, Mertzios, Paulusma, Stewart)
- **Innovative Computing IC** (Breckon, Budgen, Ivrissimtzis, Li, McGough*, Obara, Theodoropoulos – group leader, Weinzierl**).

* McGough only arrived at Durham in October 2013 and has not been returned to REF.

** Weinzierl arrived at Durham in November 2013.

These twin foci of our Computer Science research are, roughly speaking, on "theoretical" and "practical" Computer Science, respectively, and allow us, as a relatively small collection of researchers, to better strategically develop, support and coordinate our research. As we shall explain, there are (increasingly) strong interactions between the two research groups, with the strengthening and sustainability of these interactions being strategic research aims. Moreover, both groups are also actively involved in wider University activities such as the new *Institute for Advanced Research Computing iARC* (of which Theodoropoulos is Director; more later).

b. Research strategy

The environment post-RAE2008 has been heavily influenced by the merger of the erstwhile School of Engineering and Department of Computer Science in 2009 and by the creation of the pan-university Institute for Advanced Research Computing iARC in 2012. The merger presented an opportunity for the University to take advantage of the increasingly diverse computational opportunities arising both within the new School and across the University, e.g., within Durham's *Biophysical Sciences Institute* and *Wolfson Research Institute for Health and Wellbeing* but most recently, and importantly, within iARC. As such, the Computer Science research environment has been enhanced by its closer integration with other University ("computational") research and there is much potential for exciting new intra- and inter-disciplinary opportunities for Computer Science research, both within the new School and across the wider University and beyond.

Research developments since RAE2008 for ACiD have seen a continuation of its core research across a wide spectrum at the interface between Mathematics and Computer Science involving *algorithms, computational complexity, logic, game theory, graph theory and discrete mathematics*, along with an increase in inter-disciplinary activity. Since its inception in 2003 ACiD has continued to grow, develop and strengthen its research. ACiD's research strategy from RAE2008 was primarily to "*continue to focus on its core activities* [*of algorithms and complexity*]" with an "*increasing involvement of the group within inter-disciplinary research*", and, in addition, "*to provide a research environment within which* [*top-quality*] *research can best be undertaken*". ACiD has successfully pursued this strategy and has gone from strength to strength since RAE2008, so much so that it is recognised and advertised by EPSRC as one of 4 major EPSRC research investments in *Maths of Computing* within EPSRC's ICT portfolio. Exemplars of ACiD's successful pursuit of its RAE2008 research strategy in relation to increased inter-disciplinary activity are in:

- bioinformatics, e.g., Bordewich with Charles Semple (Canterbury), Allen Rodrigo (Duke) and Tom White (Cornell) on systematic biology, and Friedetzky with Cenk Sahinalp (Canada Research Chair in Computational Genomics, SFU) on modelling biological networks and

the consequent biological analysis
- engineering, e.g., Stewart with Phil Taylor (Engineering, Newcastle) and Janusz Bialek (Engineering) on autonomic power systems
- operations research and mathematical economics, e.g., Paulusma with Walter Kern (Twente) and Peter Biro (Economics, Hungarian Academy of Sciences) on game theory
- pure mathematics, e.g., Dantchev with Norbert Peyerimhoff (Mathematics) on geometry, algebra and topology
- nanotechnology, e.g., a former member of ACiD (Hajo Broersma) with Mike Petty (Engineering) and researchers at Twente, Trondheim, Lugano and York on nanostructures to perform complex computations by means of controlled evolution (and which has culminated in the award of a €2.9 million EU grant, with continued ACiD involvement).

IC grew out of the Software research group, that was returned in RAE2008, after the merger in 2009 and the period since then has been one of transition. IC is now unrecognisable in comparison to the former Software group (with 10 of the 13 Software staff returned in RAE2008 no longer at Durham and with research in, e.g., technology-enhanced learning, software visualization and formal methods no longer part of IC's future research portfolio; as such, the RAE2008 research strategy of the Software research group is defunct). The decision to realign and refocus Durham's methodological and systems-oriented Computer Science research, in tandem with pan-university developments, has resulted in two exciting core research areas within IC:

- *computer graphics, image processing, computer vision and visualisation* (Breckon, Ivrissimtzis, Li, Obara)
- *parallel, distributed and empirical computing* (Budgen, Li, McGough, Theodoropoulos, Weinzierl).

Not only are there now two core clusters of like-minded researchers, with synergies across these two clusters, but there is massive potential for high-quality inter-disciplinary research through iARC; indeed, inter-disciplinarity will be a central tenet and prime driver of IC's future research. A future strategic aim is to bring the theory of ACiD and the practice of IC closer together (this has already started to happen, e.g., Dantchev and Ivrissimtzis's recently published work on the efficient construction of the Čech complex). The period since the formation of IC has seen its gradual evolution and it is only with very recent appointments that IC has properly established its future identity; the two clusters of researchers are now superbly positioned to take full opportunity of the new inter-disciplinary and computational developments at Durham and across Computer Science.

Our research strategy for Computer Science is incorporated within the School's 2010-2015 Strategic Plan which, in turn, aligns with the University's research strategy, key aspects of which are "*transformative research of the highest calibre across a broad subject base of sciences, social sciences and the humanities*" and the fostering of "*new subject-specific, inter-disciplinary and multi-disciplinary ideas*". In more detail, our research strategy for Computer Science is:

- *"to focus on and establish critical mass in our core areas of research so that there is an encompassing relationship between these topics, the research and the researchers involved, and so that our research in these core areas is internationally leading"*
- *"to strengthen and further develop relationships between theoretical and practical research"*
- *"to increasingly develop research collaborations both within the wider spectrum of Computer Science and also of a multi-disciplinary and industrial nature so that not only does the research undertaken impact significantly on other disciplines and on real-world problems but also involves high-quality Computer Science research"*
- *"to provide the core scientific capability of iARC"*
- *"to build a vibrant and dynamic research environment: within which there are both focussed and more general research activities; that engages with research and researchers on both a national and an international level; and that is conducive to collaborative activities"*

The Institute for Advanced Research Computing iARC is a new University research institute that will facilitate both multi-disciplinary computational research and also the impact of Durham's computational research. It was established as a pan-university research institute in 2012 (and Theodoropoulos became its first Director in 2013) so as to provide the strategic focus of all computationally-oriented research at Durham. The main aims of this new institute are: "*to foster multi-disciplinary collaboration on a large scale to enable transformative research; to facilitate access to and exploitation of computational resources and encourage resource sharing; to*

undertake long-term relationship building with external partners so as to enhance impact outcomes and industrial opportunities; and to become a leading international centre in research into advanced computing, enabling Durham to react strategically to changing funding environments".
Durham University already has a significant computational infrastructure: it hosts one of the UK's largest academic high-performance computing resources through its Hamilton and COSMA super-computers; and the *Durham Visualization Laboratory*, which is run by IC and equipped with imaging, visualisation and HPC equipment (more later), will be a focal point for iARC's activities.
Theodoropoulos has considerable experience of working in a multi-disciplinary and industrial environment. He joined Durham from IBM Research, Dublin where he was a Senior Research Scientist contributing to the development of the company's Exascale Systems research programme (targeting mainly smart cities and computational engineering domains). Prior to joining IBM he co-led the IT Infrastructure Theme of the Warwick-Birmingham Interdisciplinary Research Alliance (SCIRA) in the context of Birmingham Science City and was also actively involved in the UK's ESRC e-Social Science and the AHRC e-Science Programmes, having previously been a founding director of the Midlands e-Science Centre. Despite only being at Durham for a short time, he has initiated a number of iARC-based inter-disciplinary activities, exemplars of which are with: David Held (Government and International Affairs) on ICT systems for global policy; Sara Curtis (Geography) on complex socio-technical systems; Simon Marvin (Geography) and IBM Research on smart urbanism; and Mikhail Epstein (Center for Humanities Innovation) and Barbara Graziosi (Classics and Ancient History) on computational humanities. Moreover, iARC has supplied seed-corn funding to projects involving researchers from Archaeology, History, the Business School, Engineering, Applied Social Sciences and Chemistry.
Our vision for Durham's Computer Science research is international excellence in all its core areas so that each core area feeds into and interacts with each of the others, and so that Durham's Computer Science research underpins the multi-disciplinary and myriad computational research activities right across the University and lies at the heart of iARC. We will be looking to grow Computer Science at Durham University significantly over the coming years.
Achieving our vision is facilitated by our critical mass in core activities and an enhanced ability to control and support new developments; moreover, as we expand we will be better able to ensure that all new appointments are properly strategically focussed. What will be important is research-group engagement with iARC and the development and realization of new research opportunities (as well as maintaining our high-quality core research).
Research management is over-arching within the School and encourages the dissemination of good research practice and collaboration. Research is organised within 5 research groups: ACiD and IC are two and Mechanics, Energy and Electronics are the three Engineering research groups. The focus of research management is the School's Research Committee, chaired by the Director of Research (Stewart), which oversees all strategic aspects and has all Heads of Groups as members, as well as postgraduate/postdoctoral representation. Research Committee reports directly to the Board of Studies. There is also a small Senior Management Group (on which the Director of Research sits) which monitors all School management issues.
As regards research dissemination, both ACiD and IC have always maintained their own seminar series to which external speakers are invited and at which all group PhD students are expected to attend, e.g., ACiD's has roughly 20 seminars per year. These seminar series are augmented with internal seminars where postgraduate students present their research (often prior to speaking at a conference) and also with seminars given by ad hoc research visitors (staff from one group attend seminars organised by the other). Reading groups are also organised intermittently.

c. People, including:

i. Staffing strategy and staff development

Staffing strategy and staff development throughout the REF period has been to focus on our core areas of strength so as to achieve the research objectives of both ACiD and IC.
New appointments made since RAE2008 have strengthened ACiD (Gadouleau and Mertzios) and enabled us to refocus IC in its core areas as well as towards inter-disciplinary research, so as to create critical mass (Breckon, McGough, Obara, Theodoropoulos, Weinzierl).
The recruitment of Gadouleau (2012) and Mertzios (2011) has been in keeping with ACiD's stated research strategy from RAE2008: not only do Gadouleau and Mertzios contribute to ACiD's core algorithms and complexity research (and broaden this area in scope) but new opportunities as regards inter-disciplinary research have been established, e.g.,

- Mertzios publishes with Sotiris Nikoletseas (Sensor Networks, Patras) on population dynamics, and with Ori Gerstel (CISCO Israel) on optical networks
- Gadouleau publishes with Zhiyuan Yan (Communications and Signal Processing group, Electrical and Computer Engineering, Lehigh University) on network coding, and with Peter Cameron (Mathematics, QMUL) on coding theory.

As regards IC, recruitment has been dramatic and exciting with Breckon (2013) and Obara (2012) joining the research cluster on computer graphics, image processing, computer vision and visualisation, and McGough (2013), Theodoropoulos (2013) and Weinzierl (2013) joining the research cluster on parallel, distributed and empirical computing. The potential of both research clusters (in terms of both basic Computer Science and inter-disciplinary research opportunities) has been massively enhanced. For example, as regards inter-disciplinary research:

- Breckon collaborates with a range of major industrial partners (Selex Galileo, Marshall, QinetiQ, TRW Conekt, Jaguar Landrover, GE Imaging), a range of government partners (HOSDB/CAST, DfT, DSTL) and research teams at Waseda University, Kyushu Institute of Technology, Birmingham, KU Leuven, TU Graz, INSA Rouen and Wroclaw, publishing on computer vision aspects underpinning defence, automotive and biomedical engineering
- Obara publishes with researchers at Oxford, Essex, KCL, Edinburgh, Imperial, UCSB and Caltech (in Engineering Science, Mathematics, Biology, Biochemistry, Ophthalmology, Plant Sciences and Neuroscience) on imaging aspects of a variety of topics in cell biology, plant and systems biology, neuroscience and bioinformatics
- Theodoropoulos publishes with researchers at Birmingham, Sheffield, UCD Ireland, Princeton, TUDelft and Monash (in Local Government Studies, Urban and Regional Studies, Town and Regional Planning, Archaeology and Antiquities, History, Geotechnical and Hydrogeological Engineering and Systems Biology) on agent-based simulation aspects of resilient and sustainable communities, housing markets, urban planning, digital humanities and systems biology.

Career development is uppermost within the School, e.g., every early-career member of staff is assigned an experienced research mentor (not their line manager) to support career development and provide individual assistance with all aspects of university life, e.g., grant proposal preparation, MSc/PhD supervision, teaching and administration. It is School policy that preferential treatment is given to new, early-career members of staff as regards teaching/admin loads (1/3 in their first year, 2/3 in their second and a full load in their third) and the allocation of PhD studentships is heavily biased towards early-career staff. Every new early-career member of staff is required to attend the PG-CAP course (new staff are also encouraged to attend other University-organised research-support modules). Durham has won a national award for these activities (Outstanding Support for Early Career Researchers award, Times Higher 2009) which are also made available to PDRAs.

Each member of staff meets their line manager annually in a (confidential) Academic Staff Review (ASR) in order to support career paths. In parallel with ASRs, individual (non-confidential) Personal Research Plans (PRPs) are agreed. Staff can apply for research leave every one term in seven. Particularly important has been the support and recognition of staff through promotions: since 2008, of the current staff Paulusma and Bordewich have been promoted to Reader and Senior Lecturer, respectively. The University provides research support funds through, e.g., faculty infrastructure bids, seed-corn funding and Durham's Institute of Advanced Study fellowships.

PDRAs within the School have the opportunity to undertake undergraduate teaching if they so wish (and with appropriate support). Within research groups PDRAs organise ad hoc research events, e.g., reading groups with graduate students, and can nominate external speakers for seminar series; they are also encouraged to play a role in the supervision of PhD students when appropriate. Since RAE2008, 25 PDRAs have been funded through research grants, with the majority who have left going on to academic positions or industrial research labs in the UK and abroad, e.g., to universities in Bergen, Birmingham, Darmstadt, Derby, Hertfordshire, Middlesex, Novosibirsk and Amsterdam and to Beijing Aerospace UAV System Engineering Research Institute. The quality of our PDRAs is testified by them having produced joint papers (whilst at Durham) with over 60 academics from over 40 non-UK universities from over 20 countries.

Equality and diversity has always been a strong feature of the Computer Science staff profile. The School has implemented the Concordat to Support the Career Development of Researchers (5 of the 7 appointments made since RAE2008 have been to non-UK nationals, and those leaving Durham within the REF period include nationals from Austria, Brazil, China, the Netherlands, New

Zealand, Singapore and USA). Also, the Science Faculty has Athena Swan Bronze status.

Fellowship applications are strongly encouraged by the School and we provide support for staff applying for important fellowships, e.g., mock interviews for EU/EPSRC fellowships. Krokhin was an EPSRC Advanced Research Fellow (2005-10) and Bordewich was an EPSRC Postdoctoral Fellow (2006-9). Paulusma was Sir Derman Christopherson/Sir James Knott Foundation Fellow in Durham's Institute for Advanced Study (2011). A member of staff, Stefan Szeider, who has since left the UK, won a Leverhulme Research Fellowship (2009) and an ERC Starting Independent Researcher Fellowship in 2009 whilst at Durham.

Visiting scholars have been numerous over the REF period. There have been around 75 overseas research visitors to Computer Science since 2008, the vast majority of whom gave at least one seminar (and this is not to mention routine UK-based invited seminar speakers).

Outgoing staff and their destinations over the REF period are Rafael Bordini (Associate Professor, FACIN-PUCRS, Brazil), Hajo Broersma (Chair of Programmable Nanosystems, Twente), Liz Burd (Pro-Vice-Chancellor Learning and Teaching, Newcastle, Australia), Yifeng Chen (Research Chair, Peking), Keith Gallagher (Associate Professor, Florida Institute of Technology), Nick Holliman (Professor, York), Rynson Lau (Professor, Wuhan and Shanghai), Malcolm Munro (retired), Shengchao Qin (Professor, Teesside), Shamus Smith (Senior Lecturer, Newcastle, Australia), William Song (Professor, Dalarna) and Stefan Szeider (Professor, TU Vienna). Also, Pedro Gonnet arrived at Durham in 2012 and left in 2013 (for family reasons).

ii. Research students

The School always acts decisively with regard to PhD student recruitment in that high-quality candidates are promised ear-marked funding as early as possible. All research students within the School receive 3.5 years of funding and are supervised by a team of 2 staff supervisors. In addition, the School funds conference attendance and research support activities by each student up to a total amount of £1,500 per annum. Each research student undertakes our Graduate Programme (monitored by the Director of Postgraduate Studies) which includes a first-year written report, a first-year viva and annual progress reports. We operate a portfolio model of training whereby research students create a tailor-made training package by selecting from a menu of courses from within the School and the University. The School's annual Research Day allows all its PhD students to present their research through talks and posters for everyone in the School.

Since RAE2008, we have had 43 PhD students and 3 MRes students graduate and there are currently 24 PhD students and 2 MRes students (funded from a variety of sources including EPSRC DTA awards, Durham's Doctoral Fellowships and EU and non-EU sources). The quality of our students is testified by the fact that during their studies at Durham, our students have had joint publications with researchers from Athens, Bergen, Berlin, Birmingham, Bordeaux, Bratislava, Brussels, Cambridge, Chennai, Eindhoven, Koper, Liverpool, Mainz, Metz, Montpellier, National Institute of Informatics Japan, National University of Singapore, Ochanomizu, Paderborn, Prague, Quebec, Qufu, Rutgers, Siegen, Singapore, Tokyo, Trier, Twente, Utrecht, Vancouver, Vienna, Warsaw and Warwick; and of the PhD students graduating, 6 have gone on to academic positions.

d. Income, infrastructure and facilities

Income generation since RAE2008 has been successfully pursued within Computer Science. In particular, ACiD has been extremely successful, so much so that ACiD are acknowledged by EPSRC as being one of 4 major EPSRC research investments in *Maths of Computing* within EPSRC's ICT portfolio. Within the REF period, Durham's REF-returned Computer Science staff have been PI or CI on Durham research grants valued at around £6.5 million in total (with additional grants valued at over £2 million on which staff who have since left Durham were PI or CI). Funding has come from a variety of sources including the EU, EPSRC, Royal Society, the LMS, ESRC, the Nuffield Foundation, Leverhulme, KTP and KTA schemes, and industry. Whilst not contributing to Durham's REF research income, recently arrived staff have proven that they can attract significant research funding from industry, the research councils and elsewhere which bodes well for the future, e.g., during the REF period Breckon was PI or CI on 13 grants with a total value of around £2 million (and McGough PI or CI on 7 grants valued at over £11 million).

Future research funding plans are, in short, to seek funding from all available sources. The nature of ACiD's core research means that its natural primary sources for funding are the EPSRC and the EU. It has been successful in the past and its focus on these sources of funding will continue though increasingly through collaboration both from amongst ACiD and with others. Increasing ACiD's inter-disciplinary research will also create new funding avenues.

IC has a much more diverse portfolio of potential funding sources. Recent appointments have opened the door to new sources of funding, e.g. (as well as Theodoropoulos's new projects):

- since RAE2008, Breckon has secured funded research in collaboration with Jaguar Land Rover, TRW Conekt, the MOD, Stellar Research, Home Office Scientific Development Branch, TRANSEC (Department of Transport), Centre for the Protection of National Infrastructure, Blue Bear Systems Research, Marshall SDG, Selex Galileo, QineteQ, Formula Santander, Environment Agency, Magellium Ltd. and the Metropolitan Police
- Obara's interests in multi-disciplinary aspects of imaging have already resulted in new research proposals to previously inaccessible funding sources: with Biologists, Physicists and Engineers on advanced light microscopy, plant biology, optics, electron microscopy, Monte Carlo modelling, and molecular and nanoscale electronics.

iARC will be used as the vehicle by which to set up and engender new industrially-oriented proposals for research funding. iARC's inter-disciplinary ethos and interactions will be a superb conduit for funding opportunities for Computer Science research. Furthermore, the University has recently signed strategic alliances with both Proctor and Gamble and IBM and this will lead to additional funding opportunities. As regards quality assurance, the School strictly insists that all research proposals are internally peer-reviewed prior to submission.

Infrastructure and facilities are not key to ACiD's research (which is primarily theoretical and does not involve the need for substantial lab-based facilities or dedicated equipment) but the situation is different for IC. After the formation of IC, the *Durham Visualization Laboratory* (DVL), which had been set up in 2004, was extended and improved. The DVL has supported research in stereoscopic imaging, scientific visualisation, haptic interaction, distributed virtual environments and high-performance computing, and is maintained and governed by IC. Within the DVL there is approximately £500K of specialist research equipment that is used by IC, other research groups across the University (e.g., Psychology, Physics) and in research-led teaching. Funding for the equipment and its maintenance has come from a variety of sources including research grants, industrial contributions and strategic investment from the University. The equipment available in the DVL includes: 3D displays; natural user interface devices (haptics and gesture); and high-performance multi-core workstations for graphics, imaging and parallel computing research. Nvidia has donated several high-end GPGPU cards for parallel computing research and IBM has both supported access to equipment in Durham's COSMA supercomputer and provided loan systems for testing code portability. Strategic University investment enabled the upgrading of 3D projection equipment, visualisation systems and still/film cameras to support stereoscopic imaging research with full S3D HD image quality. The School as a whole is currently undergoing extensive refurbishment, e.g., to build purpose-built PhD student offices and a state-of-the-art seminar suite.

e. Collaboration and contribution to the discipline or research base

Collaboration is both national and international and is wide-ranging, e.g.,

- *intra-research group collaboration*, e.g., since 2008 there have been 68 research papers and 4 funded grant proposals involving at least 2 different members of ACiD
- *inter-research group collaboration*, e.g., Dantchev and Ivrissimtzis's recently secured EPSRC funding with Norbert Peyerimhoff (Mathematics) on "Topology, Geometry and Laplacians of Simplicial Complexes; and Stewart and Theodoropoulos's upcoming consideration of data centre topologies in relation to performance evaluation via simulation
- *collaborations outside core research areas*, e.g., Stewart has an EPSRC project working with Steve Furber's research group (Manchester) on the design of interconnection networks
- *international collaborations*, e.g., ACiD is a partner in DIMATIA (http://dimatia.mff.cuni.cz), the Center for Discrete Mathematics, Theoretical Computer Science and Applications (a joint project of Charles University, the Czech Academy of Sciences and Institute of Chemical Technology, Prague) resulting in numerous research visits and collaborations; and members of IC have collaborated with researchers at University of Oslo, University of Lund, MPI für Informatik, ICIMAF (Cuba), POSTECH (Korea), City University of Hong Kong, UCSB, Caltech, NUS and NTU (Singapore), and UCD, TCD and NUIM (Ireland).
- *inter-disciplinary collaborations*, e.g., since RAE2008, members of IC have engaged in research involving: the perception of stereoscopic visualisation images (MRC-funded with Psychologists from Southampton and UCSD); stereoscopic aspects of colour appearance (Wellcome-funded with Neuroscientists and Vision Scientists from Oxford, UC Berkeley and SUNY); 3-D movies with Durham's Cosmologists; the 3-D visualisation of geological

models with Durham's Earth Scientists; virtual environments with Durham's Psychologists and Biologists; and the use of multi-touch devices with Durham's Educationalists.

Conferences: organisation, committees, keynotes, invitations since RAE2008

- ACiD has been involved with the organisation of 3 conferences at Durham (*WG* 2008; *BCTCS* 2008; *ACID* 2010) and 5 external workshops (*Workshop on CSP and Algebra*, Toronto 2011; *Workshop on Propositional Proof Complexity*, Edinburgh 2010; *Workshop on Network Coding, Partitions and Security*, Durham 2013; 2 *Dagstuhl* seminars).
- Budgen is the co-founder and steering group member of the *EASE* conference series, running successfully for 17 years; Li co-organised *ICWL* 2008, 2013 (China, Taiwan), *IDET* 2008, 2009 (China, Taiwan) and *KMEL* 2012 (Romania); Theodoropoulos co-organised *DS-RT* 2011, 2012, 2013 (Manchester, Dublin, Delft), *VTM* 2012 (Dublin) and *IMIS* 2011 (Korea), and in 2011 co-founded, with IBM, the *ESPAS* workshop series as part of the *HiPEAC* conference (since held in Paris, Berlin and Vienna).
- Chairs: *DS-RT* 2011, 2012, 2013 (program co-chair), *VTM* 2012 (general co-chair), *Modeling, Simulation and Performance in Ubiquitous and Pervasive Computing* track of *IMIS* 2011 (co-chair) (Theodoropoulos); *IDET* 2008 (program co-chair) (Ivrissimtzis); *ICWL* 2007, 2008, *IDET* 2008, *IDET* 2009 (program co-chair), *ICWL* 2009, *U-Media* 2009 (workshop co-chair), *MTDL* 2010 and *U-Media* 2010 (publicity co-chair) (Li); special session *on Detection and Characterization of BioMedical Networks* at *ISBI* 2012 (co-chair) (Obara).
- Additional Program Committee memberships: on around 100 occasions in total.
- Invitations to invitation-only research workshops, e.g., Dagstuhl, Newton Institute, Fields Institute, American Institute of Mathematics, LMS-EPSRC Durham Symposia, MIT's Lorenz Center and NATO Task Group Meeting, on over 50 occasions.
- Keynote lectures on 22 occasions, e.g., SIMUTools (Cannes, 2013; Theodoropoulos), LICS (Toronto, 2011; Krokhin), ECOOP (Maribor, 2010; Budgen), TAMC (Prague, 2010; Dantchev), CSL (Brno, 2010; Krokhin), AI-2008 (Cambridge, 2008; Breckon).

Journal editorships since RAE2008

- Current: *J. of Discrete Mathematics* (Bordewich); *Int. J. of Distance Education Technologies* (Associate Editor), *Int. J. of Cyber Ethics in Education* (Li); *Computer Journal* (Associate Editor; Managing Editor of Track A from the end of 2013), *J. of Discrete Algorithms* (Stewart); *ACM Trans. on Modeling and Computer Simulation* (Associate Editor), *Int. J. of Simulation and Process Modelling* (Theodoropoulos), *IET Computer Vision* (Breckon).
- Recent (but in REF period): *LMS Journal of Computation and Mathematics* (Stewart); *Simulation: Trans. of the Soc. for Modeling and Simulation International* (Theodoropoulos).
- Guest editor: *J. of Discrete Algorithms* (Johnson, Paulusma, Stewart); *J. of Multimedia* (Ivrissimtzis); *World Wide Web*, *J. of Multimedia*, *Int. J. of Distance Education Technologies* (Li); *Future Generation Computer Systems, Simulation Modelling Practice and Theory*, *Int. J. of Simulation*, *Systems*, *Sci. and Tech.* (Theodoropoulos), *Springer LNCS* (Paulusma).

Prizes and Awards since RAE2008

- Best paper award at *ICALP* 2010 track C (Mertzios, early career researcher).
- 2 top cited Paper Awards (Bordewich, Krokhin) for best cited papers published in *Discrete Applied Mathematics* 2005-10.
- *Computing Reviews* Notable Paper in Computing award for 2012 (Krokhin).
- Glover-Klingman Prize (Paulusma) for best paper(s) published in *Networks* in 2008.
- Best paper awards at *DS-RT* 2011 and *DISIO* 2011 and nominations for best paper award at *DS-RT* 2009 and 2010 (Theodoropoulos).
- Best paper award at *ICALT* 2013 and (co-author of) best student paper at *ICWL* 2010 (Li).
- *Royal Photog. Soc. Selwyn Award* 2011, *IET Award for Innovation* 2009, *MOD R.J. Mitchell Trophy for Innovation* 2008, *Finmeccanica Group Innovation Award* 2009 (Breckon).

Leadership roles include: FBCS (Breckon, Stewart)**;** EPSRC college members (Breckon, Budgen, Krokhin, Paulusma, Stewart)**;** UKCRC (Stewart; formerly a member of the Executive Committee 2006-2008 and also 2013-)**;** BCS Academy of Computing Research Committee (Stewart); DIMATIA International Scientific Advisory Board (Stewart); Treasurer and Executive Committee Member of British Machine Vision Association (Breckon); STFC Advisory Panel - Innovation Partnership Schemes 2011-14 (Breckon); London Technology Network Business Fellow 2008-11 (Breckon).