Institution: University of Westminster
Unit of Assessment: UoA11; Computer Science and Informatics

a. Overview

Westminster's Computer Science and Informatics research is based within the School of Electronics and Computer Systems (ECS). To provide strong support for all academics in the School engaging or intending to engage in research, and consolidate diverse research activities ECS has structured its research in four clusters:

- Parallel and Distributed Computing (PDC) coordinated by **Getov**

- Semantic Computing and System Engineering (SCSE) coordinated by **Kapetanios**

- Operational Research and Intelligent Systems (ORIS) coordinated by **Chaussalet**

- Electronic and Communication Engineering (ECE) coordinated by **Budimir**.

Cross-cluster activities on interdisciplinary research resulting in joint research ventures, common research environment and budget, are common and supported by the School. Therefore, it was decided to make a single submission to UoA11 Computer Science and Informatics since the ACM Computing Classification System adopted by this unit lists all active research areas in ECS.

b. Research strategy

The University is committed to high-quality, practice-informed research with global impact. An eco-system for research provides facilities aligned with National and European funding bodies, support for early career researchers, and pump-priming for early stage research. The Graduate School provides a focal point for all staff, doctoral researchers and post doctorates engaged in research activity, offering a range of developmental activities, including seminars and networking events to facilitate sharing of best practice, it supports the personal and professional development of doctoral and early career researchers. Higher Education Innovation Funding (HEIF) resource allows ideas with high social impact to be explored with mini-grants and entrepreneurial fellowships designed to stimulate knowledge exchange activities. A policy on formation and monitoring of research centres is designed to develop areas of significant strength, focus resource through the University's research development fund, promote longevity of activity and support multi-disciplinary research with high impact wherever it is found. Open-access policy provides an institutional fund as a top-up to RCUK funds with selection rules designed to encourage critical mass, target and grow early career research, and support non-traditional outputs. Each School is supported by a research development officer (RDO) with primary responsibility for horizon scanning and bid preparation. Enterprise support occurs through WestFocus (a collaboration of universities in London and the Thames valley including the annual bright Ideas programme to take research through to exploitation).

One of the goals achieved by the creation of ECS is consolidation of research and focusing it around strengths supported by the critical mass of research-active staff and on-going activities. This helped to achieve the School's research targets in terms of contributions to the disciplines, transferring knowledge to the end-users creating impact outside academia, and improving metrics that quantitatively assess the level of research activity. The evaluative overview of progression since RAE2008 is summarised by research clusters below.

PDC: The main research areas include distributed computing infrastructures (DCIs), science gateways, workflow interoperability and service deployment, component oriented design and development, parallel and distributed algorithms. Westminster's work on science gateways aims at bridging the knowledge and skills gaps that slow down or inhibit DCI users from exploiting these infrastructures for computational and data resource demanding applications. Together with collaborating partners a gateway framework called P-GRADE has been developed that comprises a toolset and a customisation methodology to support end-users running their applications on DCIs in a seamless way. The resulting science gateway instances offer seamless access to DCIs, shield the users from numerous heterogeneous computing solutions, hide technical details and offer reliable and efficient service through its graphical development and execution environment to elaborate and run distributed and parallel applications. This work has been supported by an EU-funded grant (SCI-BUS) and JISC project (PROSIM). The development

of P-PGRADE is underpinned by work on infrastructure interoperability solutions enabling submission and execution of applications on different DCIs and feeding heterogeneous data into these applications. The developed bridging mechanism is capable of managing differences and heterogeneous features of DCIs. This activity was funded by a series of external grants coming from the EU and EPSRC (EDGeS, DEGISCO, EDGI, IDGF-SP, VENUS-C and Cloud bursting). Another research theme underpinning the work on P-PGRADE is addressing the issues of workflow interoperability in DCI. Through this activity a Coarse-Grained Interoperability methodology (CGI) has been developed. In CGI the workflows of different workflow systems are managed as black boxes and stored in a public repository. The users can search the repository, download and execute the workflows of different workflow systems or combine them in meta-workflows through a P-PGRADE gateway. This work was supported by EU grants (SHIWA and ER-flow). Westminster's work on Grid Component Model (GCM) and component-based dynamically reconfigurable grid computing platforms has been supported by two EU-funded grants: CoreGRID and GridCOMP. In CoreGRID ECS has led the European Institute on "Grid Systems, Tools and Environments", which developed a new design methodology for invisible grids. In GridCOMP the lead contribution was to the development of new generation component-based and dynamically reconfigurable grid computing platforms. In September 2009 the GridCOMP project was named the EU project of the month.

SCSE: The main research areas covered are semantic computing, image and video analysis, computer vision, imaging science.

Westminster's research on semantic computing concentrates on processing natural languages for web search and question answering. Computationally scalable forms for contextualised querying and information retrieval have been developed, while maintaining simplicity of context and semantic parsing of natural-language-based query languages. This work extends Westminster's approach towards multi-lingual systems and knowledge representation models, such as Simple Knowledge Organisation Syndicate (SKOS) as proposed by the W3C. This work is supported by the Technology Strategy Board and ActiveStandards Ltd. The research on computer vision focuses on statistical and probabilistic learning methodologies for image classification, modelling and interpretation of human identities and behaviours, 2D texture descriptions, unsupervised segmentation and 3D interactive environments. The work attracted consultation projects from Westminster City Council and Southwark Playhouse. In the EU-funded project NOESIS an image-based methodology for non-destructive analysis of inks was developed. The work aided the historical analysis and examination of five significant Mediterranean manuscript collections in Egypt, Jordan, Lebanon, Cyprus, and Israel. Research into combining computer vision, imaging and visual science resulted in experimental derivation of human contrast sensitivity- and contrast discrimination- functions from displayed images of natural scenes. It describes a novel experimental paradigm, examines the demands of the relevant imaging systems and presents initial human contrast sensitivity measurements. This research is supported by "Spatiotemporal Visual Sensitivity to Complex Images" a grant from the Ministry of Defence and consultancy projects funded by Nokia. Related to this research is work on content-based automatic grouping of video scenes to identify those affected the most and least by compression. The developed methodology uses psychophysical measures to recommend acceptable level of compression for different scene groups. The Home Office Centre for Applied Science and Technology funded a PhD scholarship in support of this work.

ORIS: The main research activities cover the development and use of Statistics and Operational Research (Stats & OR) methods as well as computational intelligence methodologies to modelling complex systems, supporting decision making processes, data mining and knowledge discovery. The Stats & OR quantitative modelling methodologies are applicable across a wide range of disciplines and industries. However, the focus is on the health and social care organisations whose needs largely direct this research and who are a major benefactor of the work. This research on modelling processes within the NHS led to the development of new loss queuing network approaches that were used to model neonatal units and networks for the purpose of capacity planning. Novel techniques for modelling the risk of patient readmission as well as proposed random effect modelling of patient pathways through the NHS system have resulted from this work. This research found a number of applications within the NHS, and led to the development of software systems supporting the methodologies and courses for the NHS staff to train them in the practical use of these methods and tools. This work has been supported by grants from the

Department of Health ("Purchased Healthcare - Demand planning tool development for Continuing Care"), and NHS ("Modelling for NHS Continuing care", "Curriculum for Modelling and Simulation TORCH").

The University's computational intelligence research aims at the development of new methodologies and algorithms, such as neuro-wavelet and fuzzy-wavelet neural networks, utilised by this discipline but also at improving the efficiency and qualities of the existing ones. The natural development from this research is to deploy such tools in cross-disciplinary activities to support research and applied activities in other areas of science and engineering. Examples of applications within the last six years include forecasting of power consumption in the Greek national grid system and related to this management support, automatic monitoring of food spoilage, biomedical diagnosis and multi-sensor data fusion.

ECE: The main research areas covered are: Digital Signal Processing (DSP) - theory, algorithms, software and hardware implementation; novel methodologies of designing high-performance GHz-frequency components, circuits and systems for communication engineering.

The signal processing research aims at holistic, power- and computationally-efficient complexity-reduced solutions for applications in communications, on-board satellite systems, global navigation systems, biomedical imaging and other domains. Low-power solutions utilising delta-sigma and multi-rate DSP for constructing analogue-to-digital and digital-to-analogue converters were developed. Advanced signal sampling and related processing methodologies exploit properties of non-uniform sampling to reduce the amount of data and computational power needed to achieve the processing tasks. For example the DSP technique based on non-uniform sampling, Digital Alias-free Signal Processing, permits efficient spectrum sensing (one of the core tasks of cognitive radio) using arbitrarily low sampling rates. To this end a robust theoretical framework was developed to aid designers achieving the required levels of confidence (i.e. probability of detection and probability of false alarm) by processing a finite number of signal samples. Novel non-uniform sample selection techniques were exploited to propose a design methodology of Multi-Standard, Multi-Frequency Digitally Configurable / Software Defined Radio for Global Navigation Satellite System (GNSS) applications. In July 2012 the University demonstrated at the National Physical Laboratory the UK's first receiver driven by Chip Scale Atomic Clock that used this technology. The design was characterised by tenfold reduction of complexity and power consumption. The methodology deployed of reducing the size of large systems, Balanced Model Truncation (BMT), has been used to design low-order IIR filters whose performance matches that of very large FIR filters. This approach helped industrial customers and partners construct practical solutions, e.g. satellite on-board electronics with a competitive edge in terms of power efficiency. This research has been funded by a number of grants including EPSRC "Extending the Applications and Improving the Efficiency of Positioning Through the Exploitation of New GNSS Signals" and European Space Agency and Astrium Ltd "Efficient Techniques for On-Board Processing". Westminster's research on radio frequency and microwave components, circuits and systems aims at miniaturisation, efficiency, and compensation of unwanted nonlinearities from the circuits. This work is supported by the EU exchange project EUROWEB that attracts a stream of overseas researchers for long-term visits to work in this area with the Electronic and Communication Engineering cluster team.

Future plans

In the summer 2013 the School of ECS became a part of the newly created Faculty of Science and Technology (FST). This new larger academic entity comprises departments from ECS, and the School of Life Sciences as well as the Department of Psychology (previously with the School of Social Sciences, Languages and Humanities). One of the objectives of the new Faculty is promotion of cross-disciplinary academic activities, particularly research. Hence future strategy addresses not only the discipline-specific issues but also embraces the opportunities resulting from this reorganisation. The overall objectives of ECS research will continue to aim at providing technological solutions that address the needs of the modern society in the areas of information and communication technologies (ICT), health, social care, green technologies, safety, security, education, cultural heritage preservation, educational environments. While sustaining research in these areas the close presence of the science departments will be used to diversify application areas to deliver solutions that require more cross-disciplinary expertise and skills. Examples of such activities are envisaged to include:

- assisted living is an important concept of supporting people who because of their health problems, old age or other reasons require continuous monitoring. Use of ICT technologies (sensors, communication systems), combined with suitable medical and psychological expertise can offer such people better solutions than keeping them in the care homes;

- development and use of powerful simulation environments, possibly with use of grids and clouds to increase the role of in-sillico experimentations, i.e. simulations and reducing in-vitro experiments, i.e. those traditionally performed in biological / biotechnological labs;

- use of image and signal processing advanced techniques to provide tools for biomedical diagnosis, biological measurements (soft sensors), processing biochemical data such as that coming from NMR, where the vastness of information is one of the limiting factors in what can be achieved in this area.

Continued growth of research income is planned through growing engagement with end-users of the work through applied research, consultancy and knowledge transfer. The broader non-academic impact of the University's research will therefore be prioritised.

Since RAE2008 the Unit has vigorously increased the stream of research income with the objective of sustaining this trend over the next decade. By 2019 the annual research income is forecast to reach £1.5M. These plans rely on growing engagement with the end-users of the work. Therefore an increasing proportion of the income, up to 40%, will come from applied research, consultancy and knowledge transfer activities thereby strengthening impact from our research.

c. People, including:
 i. Staffing strategy and staff development

All new FT academic appointees to the School must be research active and their work must align with the School research strategy. While they must excel as academic teachers and contribute their share of administrative duties they are also expected to contribute significantly to the School research and knowledge transfer agenda. To help them with adopting to these duties all new staff are allocated mentors closely overseeing their personal development, providing professional advice and guidance. Through its engagement with the University Graduate School ECS participates in training of researchers at all levels including research students, postdocs, early career researchers and research assistants. The existing academics are expected to engage with research at least to the level that is needed to inform their teaching. To promote research and research culture among its staff, but also students and public outside, the School organises open research seminars. The speakers are from the community of academics, research students, invited guests, scholar visitors and collaborating research partners. These events are complemented by high-calibre professional presentations where the speakers from industry, business and professional organisations cover ranges of topics including employability, ethics, current and future trends in their business areas, interplay between business and research.

All ECS academic staff are members of one of the School's four research clusters. These are of similar size (around 30 people each) and include post-doctoral staff, PhD students, researchers from other Schools of the University and research visitors from the collaborating institutions. The clusters provide support and create the environment within which academics new to research can develop their research skills and activities. They are coordinated by senior academics with proven research track records and represented in the ECS Research Committee that oversees the School research strategy and research-related policies. They also assist the School Research Director (**Tarczynski**) in day-to-day management of research. Cross-cluster activities on interdisciplinary research are common and supported by the School.

The ECS annual research conference for staff, research students and external guests helps expose the academic community to a wide spectrum and diversity of research, well exceeding that of topical conferences, carried out in the School. The School hosts regularly the IEEE UKRI CAS and I&M-sponsored lectures promoted through the IEEE networks and open to the public. The speakers are distinguished researchers from the leading research centres around the world. Special events organised with the help of the Marketing Department during which the School exhibits its research focus mostly on external audiences. However, all staff are invited to participate either as exhibitors of their research, knowledge transfer and consultancy capabilities, or simply as visitors.

The School's work allocation model allows a fair distribution of staff workload maintaining the right balance between teaching, research, scholarship and administration for each individual – reflecting their current needs, the stage of career development and engagement with externally funded projects. All research and academic staff are appraised annually and since 2012 this process has been re-cast as the Professional Performance and Development Review (PPDR). PPDR is designed to support alignment of the individual's objectives with those of the University. PPDR helps regular progress monitoring and adjustment of plans to reflect changing circumstances.

The School's retired staff are replaced by skilled colleagues promoted to senior positions (**Terstyanszky** became a Professor, **Kodogiannis** and **Kiss** became Readers) and close links are maintained with retired colleagues. Professor Morling has been awarded the Emeritus Professor title; Professor Steve Winter continues his research on a fractional contract). The School has benefited from a number of visiting Professors who worked with us over the REF period, including Peter Millard (former president of British Geriatrics Society), George Justo (Capgemini UK Plc), Danilo Mandic (Imperial College), Andrew Marsh (International Council on Medical & Care Compunetics) and Bryan Manning (former DERA Programme Director for Technology Transfer) who supported research teams in debating strategic directions and helped building contacts with the leading players in the field.

In order to support staff with their research activities the School allocates a percentage of the overheads, or up to 90% of the profits in the case of commercially-costed projects to the disposal of the Principal Investigator for use accordingly to their own needs or the team they lead. Staff members who have insufficient such allocations can request additional ad-hoc support from the School research development budget to assist their research-related activities such as participation in conferences, networking activities aiming at establishing collaborative projects, purchasing equipment or services. Such support is linked to a longer-time development plans to shape the academic as fully developed researcher. An important component of assessing the success level of such plans are objective measures such as publications, research supervision or external funding brought to support their work. Other central funds, e.g. HEFCE research grant, are distributed annually to the research clusters through Annual Support for Research (ASR). In this process the clusters submit research plans that addressing the School research strategy, KPIs and their own needs and negotiate with the School the financial, organisational and administrative support required to deliver their agenda.

The School recognises that engagement in collaborative research projects, dealings with business end-users, and providing tailor-made consultancy and training programmes for businesses require specialised support to deal with of financial, legal and organisational issues (e.g. marketing). These issues are dealt with by the ECS Research Development Officer and ECS Business Development Officer who between themselves have the necessary skills and knowledge or, if necessary, can access such support from other parts of the University.

ii. Research Students

A recognised strength of the ECS research environment is its support for research students from diverse cultures and backgrounds. About 40% of the students are part-time. Some 10% of the full-time students are on the External Research Degree Scheme (ERDS) that allows overseas students to pursue their degree mainly from their country of residence while spending at least two months per year at the University. Once a year the supervisors visit their ERDS students in the country of residence. ERDS students must have local access to suitable facilities supporting their work. The University also offers PhD by published work.

The entry threshold to research degree programmes is Upper Second Class Honours or equivalent in a relevant academic area. A postgraduate degree is a preferred but not formally required option. The School offers financial support to research students - either fully funded scholarships (fees and a stipend) or fee waivers. The opportunities and the related conditions are openly advertised. Awards go to candidates with the best academic credentials who satisfy the conditions of the support.

Postgraduate research students undertake the University's Doctoral Research Development Programme (DRDP), the local implementation of the Vitae Researcher Development Framework (RDF) which replaced the RCUK Joint Skills Statement. Westminster is one of the institutions in the forefront of implementing the RDF, and the Graduate School director chairs the Vitae

Researcher Development Advisory Group. The DRDP includes academic, research and transferable skills delivered through University-wide and discipline specific sessions. These are specifically geared towards the student's needs at each stage of their PhD. Research students are also able to enrol on relevant modules/sessions from MSc courses. Student progress with the training programme and key stages of the research degree programme (registration, transfer, completion) is monitored annually at School level.

d. Income, infrastructure and facilities

Infrastructure and facilities: ECS provides a vibrant and supportive environment to a wide range of discipline-focused and interdisciplinary and multidisciplinary research. Refurbished offices for staff and students offer an excellent ambience and privacy to undertake academic work.

The School has well-equipped, specialised research laboratories located in newly created, dedicated accommodation available for use by staff and research students. The technical and material support to these facilities is coordinated at the School level. Their day-to-day operation, championing their expansion and facilitating their use is overseen by dedicated groups of researcher active staff who are the prime users of the laboratories.

The state-of-the-art Centre for Parallel Computing laboratory led by **Terstyanszky** (PDC Cluster) comprises: a high performance computer cluster of 256 cores, 18 IBM x3455 portal nodes, 64 x IBM x3455 computer nodes, 10TB storage and Infiniband networking; a GPU cluster of 10 CPU nodes and 20 GPU; and cloud cluster (Openstack virtualisation Cloud resource of 20 nodes with 16 cores). These facilities are complemented with access to external resources. Owing to our partnership since 2006 with the UK National Grid Service we access resources of the NGS. Through our involvement in the EU-funded research projects we have built a university-wide BOINC based desktop grid that connects more than 1600 laboratory PCs. CPC operates a number of Grid portals for users to run research experiments on Grid clusters at the national, European and international levels.

The Computer Vision and Imaging Group research laboratory led by **Psarrou** (SCSE Cluster) comprises Vicon system (optical tracking system), Polhemus trackers and an eye tracking system.

The Applied DSP and VLSI Research Group laboratory led by **Kale** and Wireless Communications Research Group laboratory led by **Budimir** (both ECE Cluster) comprise equipment for Real-Time DSP, Digital Radio Communications, GNSS signal generators and tools, RF, microwaves and biomedical applications, digitally configurable analogue front end FPGA platform for the GNSS receivers, and prototypes of Biomedical instrumentation. The labs are equipped with the latest RF and mm-wave instrumentation including a 67 GHz Agilent PNA (E8361A) vector network analyser for testing components for 3G, 4G and 5G mobile and ultra-wideband communications, a 20 GHz Tektronix spectrum analyser, a 26.5 GHz Agilent 8970BTM noise figure meter, and a 6 GHz Agilent MXG vector signal generator (N5182A).

All the laboratories are continuously upgraded with purchased and home-grown equipment using funding from research projects (GNSS facilities, GPU cluster, desktop grid), consultancy work, (Digital Radio Communications), SRIFF (computer cluster, vector network analyser facilities) and internal sources (cloud cluster, Biomedical instrumentation).

Funding: The external research funding received by the unit since 2008 of around 3 million pounds compares favourably with £919k reported in the RAE 2008. This income comes from around 50 projects contributing between £5,000 and £400k each and a stream of smaller contracts whose individual values in the assessed period did not reach £5,000 It comprises about £300k of consultancy and applied research income, including projects brought from the Department of Health by **Chaussalet**, from EADS Astrium by **Kale** and from IBM by **Getov**. EU funding contributed more than £1.2M including: EDGeS, EDGI, SHIWA, DEGISCO, SCI-BUS (**Terstyanszky**), NOESIS (**Psarrou**), CoreGRID and GridCOMP (**Getov**). Research council funding exceeded £700k including EPSRC-funded projects "Extending the Applications and Improving the efficiency of positioning through the exploitation of new GNSS" (**Kale**), "Optimal Scheduling of Scientific Application Workflows for Cloud-augmented Grid Infrastructures" (**Winter**) and AHRC-funded "Archigram Website" (**Winter**). UK national and local governments, JISC and a mix of charities, industries and other sponsors provided the rest of the unit income. Within the assessed period the School was involved in four KTP projects that brought together around £260k.

e. Collaboration and contribution to the discipline or research base

PDC: P-PGRADE, CGI technology and interoperability of distributed infrastructures have been developed and tested in collaboration with a large number of partner institutions representing a mixture of research centres and end users of developed technologies, including Academic Medical Center of the University of Amsterdam (NL), Brunel University (UK), Cardiff University (UK), Centre National de la Recherche Scientifique (F), CloudBroker GmbH (CH), Eberhard Karls Universität Tübingen (G), ETH Zurich (CH), Instituto Nazionale di Astrofisica (I), Ludwig-Maximilians-Universität München (G), Middle East Technical University (TR), MTA-SZTAKI (H), Stichting European Grid Initiative (NL), Trinity College Dublin (IRE), University College London (UK), University of Copenhagen (DK), and University of Zaragoza (S). P-PGRADE and the CGI methodology is used by several hundred users of major user communities such as astrophysics, computational chemistry, heliophysics, hydrometeorology, life sciences, seismology, etc. This research team has engaged with biosciences community to implement powerful tools for modelling protein molecule docking. This work helps minimising lengthy laboratory "in vitro" experimentations with very fast and much cheaper "in sillico" simulations. High performance grid computing and easy to use gateways to such systems help the scientific community to directly benefit from the University's research.

SCSE: Together with partners Museum of Kykkos Monastery (CY), Team Progetti S.R.L., National Bank of Greece Cultural Foundation, National Centre For Documentation Of Cultural and Natural Heritage, and University of Balamand non-destructive and non-invasive image-processing-based techniques have been developed to aid historical analyses of Mediterranean collections of manuscripts. This collaborative work with the Home Office has resulted in the production of official recommendations to Transport for London (TfL) for setting acceptable compression levels of CCTV footage of people boarded on London buses. The earlier mentioned project "Spatiotemporal Visual Sensitivity to Complex Images" exploited the novel paradigm of experimental derivation and measurements of the human contrast-sensitivity function and contrast-discrimination function from displayed images of natural scenes. This work aims at defining the required quality of the next generation imaging devices for the British Army in order to avoid spending large budgets for imaging systems that surpass the human visual limits. Research collaboration with Stanford University (USA) on Collective Intelligence resulted in Jan 2010 in joint guest editorship of the edition of *Information Sciences* (Elsevier) devoted to this topic.

ORIS: The cluster has extensive research collaborative links with NHS whose needs are addressed through our research. This work on statistical measures of the efficiency of medical treatments, allocation of resources within health-care organisations and modelling the pathways of patients within the NHS systems have been largely funded and then utilised by this organisation. The cluster has collaborative links with Universities of Southampton, Exeter and Manchester (UK), George Mason (USA) and Technical University of Athens (Greece). These collaborations exemplify through joint research projects (Southampton, Exeter, George Mason), jointly supervised PhD projects (Manchester) and co-authoring research papers (Athens, Manchester).

ECE: The cluster has extended collaboration with research institutions and industrial partners in the UK, Europe and outside. This work on Digitally Configurable/Software Defined Radio receivers for GPS, GLONASS and Galileo as well as its efficient on-board processor for communication satellites is carried out in partnership with UCL, Imperial College, University of Nottingham, and industrial partners including EADS Astrium, Thales Research and Technology UK Ltd, The Civil Aviation Authority and Air Semiconductor Ltd. The outcome of the research attracted attention of the European space Agency which is funding a consortium comprising Westminster's research team and EADS Astrium to expand and adjust the work to the specific needs of the Agency. Joint work with the Anna University Chennai (India) on use of image processing techniques has been used to diagnose malaria from thin film blood samples.

<div align="center">Exemplars of leadership in the academic community</div>

Chaussalet - chair and secretary of the Operational Research Society (ORS), Health and Social Services special interest group (since 2003), elected member of the Council of the ORS (2006 - 2012), member of the National Institute of Health Research Peer Review Panel (since 2007) and of the EPSRC

Kacsuk - member of Hungarian Academy of Sciences Computer and Automation Committee,

IASTED Technical Committee Council member of the Central European Grid Consortium, Member of the Technical Committee of RNCA (National Network of High Performance Computing), Portugal, Chair of the Council of the International Desktop Grid Federation

Kale – chair of UK&RI IEEE Circuits and Systems chapter, and UK&RI IEEE Instrumentation and Measurements chapter.

Terstyanszky - member of the National Grid Service (NGS) Collaboration Board, also was a member of the National Grid Service (NGS) Technical Board (2006-2009) and Member of Open Grid Forum (former Global Grid Forum) Grid Interoperability (GIN) Working Group (2006-2010)

<u>Membership of journal editorial and advisory boards</u>

Budimir – Microwave Review;

Chaussalet - Health Care Management Science, Open Journal of Medical Informatics, World Medical Health Policy, BMC Health Services Research (associate editor), and The Scientific World Journal;

Getov - IEEE Computer (area editor for High Performance Computing);

Kacsuk - Journal of Grid Computing (editor-in-chief);

Kale - Journal on Navigation (associate editor);

Triantaphillidou - Imaging Science Journal;

<u>Invited keynote lectures / speeches</u>

Chaussalet – 2009 British Geriatrics Society Workshop, Harrogate; 35th Conference on the Mathematics of Operations Research, "Operations Research in Health Care" Seminar, Lunteren, The Netherlands, 2010; 2012Nuffield Trust Conference on "Predictive risk 2012: applying predictive risk approaches and models effectively", London;

Getov – 2012 The ExaChallenge Symposium, IBM-Research, Dublin, Ireland; 2011 Internetware Symposium, China;

Kacsuk –2009 4th INGRID Workshop on Instrumenting the Grid, Alghero, Italy; 2009 WPLS Int. Workshop on Portals for Life Sciences, Edinburgh, UK; 2010 Int. Advanced Workshop on High Performance Computing, Grids and Clouds, Cetraro, Italy; 2010 GCCP, Bratislava, Slovakia; 2011 Workshop on Desktop Grids and Volunteer Computing Systems at IPDPS; 2011 IEEE Int. Parallel and Distributed Processing Conference, Anchorage, USA; 2011 Int. Advanced Workshop on High Performance Computing, Grids and Clouds, Cetraro, Italy; 2012 4th Int. Workshop on Science Gateways for Life Sciences, Amsterdam, Netherland; 2012 Grid, Beijing, China; 2012 Bio-IT World Europe Conf., Vienna, Austria; 2012 Int. EU-China Workshop on Scientific Computing, Zaragoza, Spain;

Kapetanios - Knowledge Engineering Principles and Techniques 2009, Cluj-Napoca, Romania

Psarrou - IEEE International Conference on Management and Service Science, 2009;

<u>Conference Chairs</u>

Bolotov - 17th Workshop on Automated Reasoning, London, UK (2010)

Getov - IEEE COMPSAC'2009, MobilWare 2011, and Vice-Chair of 14th IEEE/ACM International CCGrid 2014

Kacsuk - 7th Int. Conference on Distributed and Parallel Systems, Debrecen, 2008; 1st Int. P-GRADE Portal User Community Workshop, Zurich, 2010; 2nd Int. P-GRADE Portal User Community Workshop, London, 2011; Workshop on e-science workflows, Budapest, 2012

Kapetanios - NLDB 2008 (general chair), ACM MEDES 2009 (programme chair), ACM MEDES 2013 (special track chair)

<u>Other</u>

Triantaphillidou - awarded Davies Medal (2012) by the Royal Photographic Society for a significant contribution in the digital field of imaging science

Psarrou: Invited panel member for the Women in Games (WiG) Conference, 2008