Institution: University of Salford

Unit of assessment: UoA16 Architecture, Built Environment and Planning

a. Overview

This submission consists of 49 research-active academic staff (Category A).

Our Submission (UoA 16) is from the College of Science and Technology (CST), and from the three Schools that make up the College, namely the School of the Built Environment (SoBE), Environment and Life Sciences (ELS), and Computing, Science and Engineering (CSE). For this submission, research is carried out under three main themes - Sustainability, Management, and Information Communication Technologies (ICT), and conducted across eight Research Centres, within the three schools which comprise the College. The eight research centres are: Salford Centre for Research and Innovation (SCRI); Centre for Construction, Property Management and Economics (CCPME); Construction Information Technology Research Centre (CITC); Centre for Disaster Resilience (CDR); Centre for Sustainable Urban and Regional Futures (SURF); SURFACE (Inclusive Design Research Centre); Acoustics Research Centre; Civil Engineering Research Centre (CERC).

b. Research strategy

Our vision as UoA 16 is to perform quality research, which conforms to the highest standards of research integrity, and to play a leading role in setting the Built Environment research agenda nationally and internationally through real-world focused research in order to create a sustainable high quality industry and society which adds value to current and future stakeholders.

As a University, Salford has an international reputation as a research-informed institution that creates and applies new ideas, turning them into opportunities to benefit individuals and the knowledge economy. Our Research and Innovation Strategy is currently being reviewed in order to articulate a vision for research at Salford that is purposeful and applied so that it impacts distinctively on the knowledge economy. Research at Salford must also bring a range of benefits to learning and teaching, inform our community engagement activities, and incorporate lively national and international partnerships. The University of Salford's research will continue to be organised through four strategic interdisciplinary themes, which places the research presented in this UoA at the heart of the University's strategic priorities:

- Built environment
- Energy
- Health and wellbeing
- Media, digital technology and the creative economy

At the Vice-Chancellor's Executive level, research strategy and planning matters are within the purview of the Pro Vice-Chancellor (Research & Innovation) and supported centrally by the Director and Division of Research & Innovation, whose staff work with College research management staff in the provision of support for research activity. Research strategy and planning is overseen within Colleges by the Research & Innovation Committees, which meet regularly and have the responsibility for oversight and monitoring of local and University-level research targets.

At the time of the RAE2008, research at the University was organised into Research Institutes. In 2009-10 the decision was made to move away from the Institutes, and to integrate research activity into Schools and Colleges. The underlying aim of this change was to ensure that research activity and planning was prioritised centrally within Schools and Colleges and took place alongside and complementary to other academic activity, as opposed to being perceived as a somewhat separate activity removed from the core of the University's business. The

Schools manage issues related to postgraduate research (PGR), staff research workload and training, funding, and strategic and operational planning. However, administrative support for research is provided at the College Level. Each School has an Associate Head of School for Research & Innovation (AHRI) who leads research in the School and is a member of the College Research and Innovation Committee (CRAIC). The College Research and Innovation Committee (CRAIC) have oversight and govern the activities of research in the Schools.

The key principles that underpin our research ethos and activity within this UoA are: firstly, quality and the integrity of our research, ensuring that research ethics and all other dimensions of integrity are part of the values of our staff and that they govern our behaviour. Secondly, the development of internationally, nationally and locally leading research in the three themes of Sustainability, Management, and Information Communication Technologies (ICT) within the built environment disciplines, aimed at transforming the quality of life for society whilst ensuring the well-being of future generations through the provision of better and more sustainable futures; and to play a key role in setting research agendas through publications; funded research, engagements with stakeholders, and workshops and seminars. Thirdly, a thorough recognition that the issues facing the built environment are increasingly complex, requiring both excellence and strong interdisciplinary and multidisciplinary knowledge. Our research is organised to promote holistic and integrated concepts and solutions, within and across our research themes, whilst being informed by world class research in other disciplines. Fourthly, ensuring growth in the capacity and capability of academia, industry and policy communities; to tackle complex policy, social and business issues by ensuring effective knowledge exchange between our research and users. In addition, the work we conduct offers a seamless flow between research, education/training and application.

In the last 2008 RAE the three themes that underpinned our research were Environment, Management, and Information Technology. In REF 2014, whilst continuing with these themes, we have widened the "Environment" theme into "Sustainability". This "Sustainability" theme covers the research we do in that has environment, social and economic perspectives. This, therefore, covers the research we do in Acoustics, Urban Sustainability; Community Engagements; Impact of Buildings on Health and Welfare; "Social Return on Investments on Built Assets, "Energy Related Research and Retrofitting of Buildings; and "Planning and the Environment. In our RAE 2008 submission, we identified "Disaster Management" as an area of growth for the future. Since 2008, we have grown this area of research, as evidenced by the international presence of our Research Centre for "Disaster Resilience", and the level of successful award received in the general areas of "Disaster resilience" (see section 'd' below for examples of achievements in this area). Another area emphasised in the last RAE 2008 for future growth and exploitation is the area of ICT exploitation for improved integration and collaboration. We have grown this area significantly in the form of Building Information Modelling (BIM). The engagement of staff at academic, industry and government in this area through national and international research has significantly contributed to the lead up to the recent UK's government Building Information Modelling and Management (BIM) strategy and in its continued development and delivery.

Our research strategy, five years following REF 2014 submission, is one whose focus will still be anchored within the three themes of "Sustainability", "Management", and "Information Technology". It will, however, increasingly be multi-disciplinary and impactful in nature. The specific research growth areas will be "Disaster Management", "Building Information Management", "Acoustics", "Ageing and Inclusive Design Research", Digital Architecture" "Energy to Building Research"; and the "Impact of Building on Health and Welfare of individuals and communities".

A new and developing area of research, which is yet to perform at an international level, is "Building Performance". Investment has been targeted in this area, including the appointment of a Senior Lecturer in Building Retrofit (**Swan**), and the Energy House (see section 'd' below), as we see this area as a key research growth area for the future.

The drivers and factors that provide impetus to our research strategy post REF 2014 are partly to do with researching complexities in a sustainable environment; the increasing needs and demands of multiple stakeholders; and the capacity and capability of research within our schools and our colleges. Also, whilst prioritising research funding from RCUK, it is our strategy to continue to diversify our sources of research income. This will include targeting research funding through EU Horizon 2020, funding from industry, and funding from other countries through our collaborative research with international Universities.

c. People, including:

i. Staffing strategy and staff development

Building capacity and capability is an integral part of our research strategy. Our approach to staffing policy centres on the development of existing and new researchers through the mechanisms described below. The policy of the College of Science and Technology (CST) is to recruit staff with PhDs, capable of PhD supervision and with capability of research publication and bidding. Since the last RAE 2008, the following academic staff have been appointed: **Aziz**; **Ji**; **Norgate**; **Scholz**; **Sherriff**; **Wang**.

The term-time research workload for staff members is set by the Schools. Within the new School structure, all staff now undergo a regular unified Performance Development Review with their line manager which includes research activity as part of overall academic workload. Line managers consult with Research Centre Heads beforehand to ensure senior research manager input is included properly within the review. Each review includes a formal annual meeting and a mid-year progress review. Objectives for these reviews are set within the University's Academic Career Path descriptors, which provide gradated expectations for academic staff by career progression. All staff are eligible to apply for research leave after seven semesters of normal service under the School's sabbatical scheme. To ensure that equal opportunity is given to early career researchers, half of the School's eight sabbatical awards each year are reserved for non-professorial staff. All staff in the School are given the opportunity annually for review against the Academic Career Path criteria, either for HERA re-grading to Senior Lecturer (in the case of Lecturers), or for promotion to Reader / Professor by the University Professorial Promotions Committee. The following staff have been promoted during the period 2008-2013 to positions of Professor [**Abbott**, **Arif, Haigh**] and Readers [**Lee**, **Wu**, **Yusuf**].

Newly appointed staff are all placed on a one-year probationary period, and are allocated a formal mentor from amongst senior staff in their disciplinary area to support them through their first year of employment at the University. In discussion with their line manager, new members of staff who are early career researchers are normally given partial teaching loads in their first year, to ensure that their research activity is not hampered by a large teaching burden.

Research training and development is included within the induction programme. There are University-wide staff support schemes, such as the Vice-Chancellor's Research Scholarship Scheme for early career researchers and members of staff new to research (see below), College strategic investment funds, together with a rigorous programme for staff development at Research Centre, School, College and University level to ensure that staff are able to extend their skills and competencies in a number of areas, whilst ensuring the high-standard infrastructure and services are provided to our students and contract researchers. Early research career staff are encouraged to apply to the University Vice-Chancellor's Early Career Researcher scholarship, which provides financial support for research activities. The following staff have benefited from this scholarship [**Aziz**; **Ji**; **Keraminiyage**; **Kulatunga**; **Pathirage**] during the REF assessment period. The Scholarship is worth £2000 per staff. Successful candidates are allowed 10% of their Academic Workload to carry out their research. Early Career Researchers and new members of staff are encouraged from a very early stage to fully participate and present their work in training programmes. Pump-priming research funds are provided to support their research.

Supervisory training is also provided to all PhD supervisors as part of improving supervisory skills as well updating staff on new regulations associated with PhD provision. Such training also includes equality and diversity and widening participation. All members of staff are positioned within one of the Research Centres in the School, and can also become associate members of other centres. This allows members visibility and active participation in the development of thematic research strategies, making explicit research synergies across centres, and ensuring research cohesion. In 2010, the University was one of only 10 institutions recognised by the European Commission for its work in supporting the professional development of its researchers, and meeting a Concordat to support Career development of research staff. In addition, the researcher development opportunities offered at Salford played a significant role in retaining the European Commission HR Excellence in Research Award in October 2012.

External researchers are linked to activity within the School through the University's Visiting Research Fellow and Visiting Professor schemes. We currently have 32 Visiting Professors from Private, Public, and the third sectors, and from Europe, Asia, and the Americas. This allows Research Centres to link high-profile staff to the work, and promote the Centres' research. This includes Visiting Professor Martin Simpson (from Arup), who works closely with our Research Centre in Information Technology in Construction. Also, Dr. John Zeisel, (President and co-founder of the Hearthstone Alzheimer's Family Foundation and Hearthstone Alzheimer Care Ltd), works closely with staff in our Centres investigating the impact of buildings on health and welfare.

ii. Research students

Our research student community is an integral part of the research we do. Postgraduate research studies and activities are managed by the Director of Postgraduate Research within each School. We implement a formal Learning Agreement between the Postgraduate Research Student and the University, allowing the optimisation of student experiences and expectations. We also have close working links with the North West hub of Vitae, which is committed to working with universities, supervisors and other national organisations to support doctoral researchers.

PGR student recruitment has been a target for improvement over the REF period and the success of this can be seen in our increased number of entrants. In the School of the Built Environment, we had 171 registered PhD students In 2008. Now, in 2013, we have 240 registered PhD students. Postgraduate research supervision is supported by a supervisory team (two supervisors for each candidate) and a Personal Tutor for each candidate. Postgraduate Research Representatives are elected from the student body, who works closely with academic staff, and sit on school committees to make sure that the voice and expectations of students are heard and acted upon. We have diverse PhD modes/pathways which also enables us to maximise the number of students we recruit. These include full-time, part-time, split site and PhD by submitted works. We also have a successful online PhD programme, and the Professional Doctoral Programme, which began in 2008.

We strongly believe that a supportive research-focused environment is critical to research students in terms of the quality of their research, and the general satisfaction of their research experience and so we take active steps to ensure that we provide an environment which is supportive of postgraduate activity in order to foster and nurture young talent. The University-wide Graduate Teaching Assistant (GTA) policy, which started in 2003, funds PhD studies and provides training for teaching for the candidates, and has been very successful. To date this has funded over 30 GTAs within this UoA. We have also utilised external funds and Research Council Funds to provide studentship opportunities to over 20 students.

All PGR students in the Research Centres complete their doctoral studies under the University regulatory framework for progression. Students are required to meet three formal points in their studies in order to proceed – the Learning Agreement, completed with their supervisors within

three months of registration, to identify their broad research plan, training and development needs and doctoral timeline; b) the Interim Assessment, after the first year; c) the Internal Evaluation, after the second year. These are accompanied by annual progress reports by supervisors and self-evaluation documents by the students, which are scrutinised by the School's PGR tutor, with any issues arising brought to the attention of the College Research and Innovation Committee (CRAIC). The success of this targeted progression framework can be seen in the rise in PGR awards over the REF2014 period, of 129 students in total compared to 105 reported to the RAE 2008.

The University, College and School all provide appropriate development in generic and subject-specific skills for PGRs. The University Research and Innovation unit (formerly Research and Graduate College) provides generic training through its Salford Postgraduate Research Training programme (SPoRT) workshops, which are aligned with the national Researcher Development Framework. These cover aspects of doctoral study, such as expectations in the Progression Points and "surviving the viva", as well as introductions to core research skills, such as getting published, making a presentation, writing conference papers. It also provides introductions to key methodological approaches and software – interviewing techniques, focus group research, Nvivo and SPSS. This programme has grown significantly since 2008, with the number of annual sessions offered rising from 51 in 2008-9 to 76 in 2012-13; participant numbers have increased similarly, from 441 participants in 2008-09 to 844 in 2012-13. SPoRT is coordinated by the University's Research & Innovation team, and runs in close collaboration with the Library training programme for PGRs. The sessions are largely delivered internally by academic staff, R&I development staff, HR, and careers & employability, with a handful of specialist sessions delivered by external facilitators. Review of this provision is conducted annually, based on attendance figures, supervisors' views and student feedback which is collected at each individual training session. Developments in national and institutional strategy relating to researcher development are also taken into consideration. For example, in response to the evaluation of the 2011-12 programme, R&I introduced additional sessions on Getting Started with the PhD as part of induction, an expanded suite of sessions on academic writing, and new sessions on impact, project management, focus groups and personal branding. Using Blackboard Collaborate, R&I and the Library have also expanded the availability of one-to-one online support for students to access off campus.

In addition, the College & School provides over 20 Research Seminar Series to PhD students, covering such areas as "Research Methodology and Methods", "Qualitative and Quantitative Data Analysis"; "Plagiarism in Research"; "Critical Thinking", "Research Ethics", "Managing your Supervisor", "Writing a Thesis", "Preparing for VIVA"; and "A Career after PhD" . All PGRs are also included in the Research Centre seminar series, which are targeted to meeting the needs of PGRs whose research are focused with a particular areas of research and aligned to their research centres (e.g. Knowledge Management in Construction; Disaster Resilience; Value in Construction; Off-site Construction; Building Information Modelling; "Inclusive Design in the Built Environment"; and "Health and Buildings").

The University also runs the Salford Postgraduate Annual Research Conference (SPARC) where students and early career researchers across the disciplines can present their research and gain feedback. SPARC has run for over 12 years and attracts students from many other institutions including the Universities of Reading, Bristol, Exeter, and the Open University. The aim of the programme is to assist researchers in developing effective research skills as well as transferable skills to enhance employability. The programme maps fully onto the national Researcher Development Framework (RDF). We also continue to run our successful International Postgraduate Research Conference (IPGRC), which is now in its 11th year. It continues to provide an opportunity for our postgraduate research students to present their work, build confidence in presentation and communication, and in networking with researchers from different countries. The participants have been growing year by year. In the 2013 IPGRC we had 110 attendees from 15 countries. The Built Environment Journal, which was the first journal dedicated to postgraduate research, and established in 2007 is growing from strength to strength and continue to serve the community for which it was established. It also provides an

outlet for our Postgraduate students to publish the output of their work in a Journal. Our yearly International Food Festival, which was set up in 2009 by our postgraduate research student and run by them, is increasing in popularity every year. The last International Food Festival by Postgraduate Research Students attracted 75 research students and staff. This provides an opportunity for students to show case their culture, discuss research across cultural boundaries, and to network with many other students and establish new friends.

Within the College, a specialist adviser on PGR careers is available. More generally, the Students' Union elects a dedicated postgraduate Vice-President (two previous Union Presidents since 2008 themselves being postgraduates). In the last internal Postgraduate Research Satisfaction Survey carried out by the University of Salford, our students recorded a Satisfaction Score of 87% in terms of the overall experience as students in the University. Details of the variety of technical facilities to which our postgraduate research students have access are given in section d below.

d. Income, infrastructure and facilities

Income between 2008/2009 to 2012/13 stands at £16.9million for UoA16. Research income as reported in REF4b is higher year on year in comparison with the figures reported to the RAE2008. Research Council income grew from a yearly average of £1,342,994 in the RAE period to an average of £2,273,221 over the REF period. Total research income increased from a yearly average of £3,308,684 in the RAE period to £3,379,299 during the REF assessment period. Our strategy in gaining research income is to target a variety of diverse funders to support our research.

High quality/significant achievements in gaining funding include:

- The Framework for Innovation and Research in MediaCityUK (FIRM) (EPSRC - EP/H003738/1: 2010 – 2013; £2,708,997) designs, facilitates and supports the creation of open partnerships and projects among universities and businesses for the discovery and application of digitally-enabled content creation and knowledge exchange tools. FIRM is a vehicle to enable things that would not otherwise happen, including the development of new forms of enterprise, technology and individual talent in the MCUK region.
- Health and Care Infrastructure Research and Innovation Centre (HaCIRIC); EPSRC, value: £911,931.00 (2010–2013). The project's aim was to understand the relationships between the physical infrastructure, technologies and the services needed to deliver high quality and effective healthcare.
- Mistra Urban Futures (M-UF) - Greater Manchester Local Interaction Platform Value: £1,055,457. 2010- 2015; Funding Source: Mistra Urban Futures, Swedish Research Foundation www.mistraurbanfutures.se/. The project aims to improve the relationship between research and practice in creating a sustainable Greater Manchester, and, thereby, to enable a more systematic, integrated and inclusive transition. Its approach involves working with a broad range of bodies across Greater Manchester.
- Re-Engineering the City 2020-2050: Urban Foresight and Transition Management (EPSRC; Value: £575,262 - www.retrofit2050.org.uk/) 2010–2014. The project aims to deliver a step change in current knowledge and capacity for urban sustainability by illuminating challenging but realistic social and technical pathways for the systemic retrofitting of UK city-regions.
- Going Outdoors: Falls, Ageing and Resilience. GO FAR; Medical Research Council (MRC) funding, £246,507 (G1001872/1) 2011–2012. It explored the relationship between older people, outdoor falls and the design of the public realm.
- Holistic Evidence and Design: Sensory Impacts, Practical Outcomes (HEAD) (EPSRC – EP/J015709/1: 2012-2014 - £433,873). This addresses the question of whether evidence can be found for a link between a building's overall design and the performance of the occupants of that building.

- Enhanced Acoustic Modelling for Auralisation using Hybrid Boundary Integral Methods **-** EP/J022071/1 (2012–2015): £249,719. This involved the development of a new acoustic modelling method, ideally suited for simulation of rooms and city squares, which will outperform existing methods either in its accuracy or computational efficiency.
- Reformation of the Curricula on Built Environment in Eastern Neighbouring Area – CEN-EAST, EC – TEMPUS, €78,860 (from €998,601 total grant) - (2012-2015). Capacity building and curricular development to tackle emerging challenges in sustainable building. Consortium includes: Università di Bologna, Italy; Tallinn University of Technology, Estonia; Belarusian State Technological University, Belarus; Yanka Kupala State University of Grodno, Belarus; Moscow State University of Civil Engineering, Russian Federation; Saint-Petersburg State University, Russian Federation; Kaliningrad State Technical University, Russian Federation; Moscow State Industrial University, Russian Federation; National Technical University of Ukraine, Ukraine; National Technical University, Ukraine; SVIMAP, Italy; Association "INFOBALT", Lithuania; Vilnius Gediminas Technical University, Lithuania.
- ANDROID: Academic Network for Disaster Resilience to Optimise Educational Development**,** EU Lifelong Learning Programme, (2011-2014) £536,447. ANDROID is an Academic Network that aims to promote co-operation and innovation among European higher education institutions to increase society's resilience to disasters of human and natural origin – such as earthquakes or the damage caused by ongoing wars. The network has initial funding for three years and is led by Salford's Centre for Disaster Resilience. The network is a consortium of partners from 64 European institutions from 28 European countries, and is joined by three further institutions from Australia, Canada and Sri-Lanka. This is the largest partnership the University of Salford has ever engaged in a research initiative. Helena Molin Valdes, UNISDR's interim Director and manager of Making Cities Resilient, praised the project, saying: "UNISDR has taken part in developing the project proposal and now looks forward to disseminating the results when they emerge. Those results will be especially useful in the second phase of our campaign, where we hope to see more city-to-city learning among our campaign cities that leads to laws and other practical measures to build resilience."
- Community Based Disaster Risk Reduction and Climate Change Adaption, British Council, (2011-2014) £39,921; CEREBELLA is a long-term sustainable and strategic partnership between Patuakhali Science and Technology University (PSTU), Bangladesh and Centre for Disaster Resilience, School of the Built Environment, University of Salford, UK to share skills, knowledge and experience on climate change and disaster management academic learning and research.
- Conflict Prevention through Infrastructure Reconstruction, British High Commission & Foreign and Commonwealth Office – Sri Lanka, (2011-2012); £74,905. The project is part of a longer-term study into the relationship between physical infrastructure reconstruction programmes and social cohesion among conflict affected people in the North and East of Sri Lanka. This phase of the study provided an insight into the critical components of adequate infrastructure and to establish how local people are currently engaged in the reconstruction process. The consortium was the Centre for Disaster Resilience, the Social Policy Analysis and Research Centre, University of Colombo, Sri Lanka, Eastern University, Sri Lanka, University of Jaffna, Sri Lanka and Chamber of Construction Industry Sri Lanka. Shortlisted for the Times Higher Education Awards 2012 International Collaboration of the Year and Runner up in the International Strategy Guardian University Awards.

The University believes that the appropriateness of research facilities and the research environment impacts on the motivation to do research and the quality of research outcomes. All researchers (Staff and PhD students) are provided with the required and suitable space and facilities to conduct their research. We take active steps to ensure that we provide an environment which is supportive of postgraduate activity in order to foster and nurture young talent. Our postgraduate research students have access to a variety of technical facilities which

include, inter alia, technical equipment that was purchased through SRIF, including a VR workbench driver, a 3D scanner, a VR projection system, collaborative working video conferencing facilities and wireless kits to set up wireless networks. In the same vein, items of equipment procured under projects are available to all research students. These include four video conferencing kits and an electronic voting tool. Postgraduate research students also have access to high calibre technical facilities including advanced virtual reality equipment secured through HEFCE funding. In addition, our staff and students are currently exploiting and benefiting from investment in our technical provision from SRIF 2 funded simulation and VR labs (the THINKLab), and the £768k investment in accommodation and social space for PGRs through SRIF2.There are also other dedicated facilities for research, including dedicated Research Rooms, Library, Digital Work Studios, and the THINKLab. The THINKLab provides state of the art facilities in a futuristic environment enabling researchers to engage in research that harnesses the leading developments related to Information and Communication Technologies providing new solutions to current and future challenges faced by industry, commerce and the community. The University has invested £1.2m since 2008 in the THINKlab facility.

The University has also invested £369,000 in the Acoustic Laboratories (including Listening Room) since 2008. In addition, the University has invested £699,000 in the Salford Energy House since 2010. The Salford Energy House is a typical Salford 1919 terraced house that has been reconstructed in a fully environmentally controllable chamber, in which climatic conditions can be maintained, varied, repeated and patterns monitored. The monitoring of the Energy House is facilitated through the use of wireless mesh networks of sensor nodes with protocols and signaling based on the internationally ratified IEEE 802.15.4 standard which operates on the 2.4GHz band. The sensors system comprises three SenzaGate wireless gateways and an array of Senzablock wireless nodes. Wireless nodes are distributed around the Energy House for measuring and continually monitoring the different parameters: temperature, humidity and pressure. Each of the rooms within the Energy House have four temperature sensors located in each corner with probes to measure temperature at three heights. A combined humidity sensor is also located in the centre of each of the rooms. The chamber itself has thermal and CCTV cameras which continually monitor the building. The thermal image cameras are on pan and tilt mountings and are programmed to continually monitor heat loss from House. Consumption of electricity gas and water is also monitored using industry standard ZigbeePro wireless smart meter plug devices, which have continually measure of kWh, kVARh, Watts, Amps and Volts to three decimal places with an accuracy better than +/- 0.5%. In addition, industry standard water flow meters have been fitted to the toilet feed, shower and bath feed, washing machine and kitchen sink. Separate flow metering can be applied at any stage to measure waste water flow. The Energy House therefore provides a unique testing and development facility in which leading researchers can work collaboratively with industry to develop and test new technology and solutions to improve the energy efficiency of existing projects and processes.

e. Collaboration and contribution to the discipline or research base

We have actively sought to engage and collaborate with many stakeholders from private and public sectors, academia, and professional institutions as part of our research. We have collaborated with more than 500 industrial companies and institutions across the demand and supply sides post RAE 2008. For example, we have MoUs with Arup, and Balfour Beatty. This covers research and continuing professional development across a host of research areas in the Built Environment, including Building Information Modelling, and Construction Management. Through funding received from the Royal Academy of Engineering (£80,000 – 2 years), Martin Simpson, Associate Director at Arup, has been appointed as a Royal Academy of Engineers Visiting Professor of Innovation at the University. Professor Simpson promotes building information modelling (BIM) to the construction industry, and supports our Research Centre in Information Technology in Construction. Drawing on his 15 years' experience gained at Arup, he brings to our research work expertise of using BIM in some of the world's most iconic buildings, including the Bird's Nest in Beijing and the Donbass Arena (Euro 2012 venue).

In the same vein, we have actively engaged with other disciplinary groups across acoustics,

disaster and extreme weather events, health, education and policy, and industrial stakeholders. Examples include the Red Cross, NHS, BBC, UN-HABITAT United Nations Human Settlement Programme, The World Bank, UNDP, UNISDR, RICS, CIOB, Carnegie Mellon University, University of Florida, USA , University of Calgary, Canada , University of Peradeniya, Sri Lanka; University of Lagos; Kigali Institute of Technology, Rwanda; and University of Cape Town, South Africa. We have an ongoing MoU with Carnegie Mellon, USA, in which we collaborate on our Professional Doctorate programme for the benefit of both of our doctoral students.

Our research work, including that of **Underwood** has led to the following publications: Government Construction Client Group Building Information Modelling (BIM) Working Party Strategy Paper, March 2011, HMG, London; Bew, M. & Richards, M. & Underwood, J. & Blackwell, B. 2010, 'Investors Report: Building Information Modelling (BIM)', BSI, London; and Constructing the Business Case: Building Information Modelling, BSI, 2010, ISBN 978-0-580-70935-7. In addition, **Underwood** is Chair of UK BIM Academic Forum (BAF). The BIM Academic Forum aims to create a dynamic collaborative group to enhance and promote the teaching and learning (T&L) and research aspects of BIM. The forum is currently focused on exploring the embedding of BIM within Built Environment higher education.

Members of our submission are Editors-in-Chief of the following International Journals: International Journal of Disaster Resilience in the Built Environment (Emerald Publishers - ISSN: 1759-5908 =Professors **Amaratunga** and **Haigh**); Construction Innovation: Information, Process, Management (Emerald: ISSN: 1471-4175 – Professor **Alshawi**); Applied Acoustics (Elsevier - ISSN: 0003-682X – Professor **Lam**); International Journal of 3D Information Modelling (IJ3DIM) (IGI Global: ISSN: 2156-1710 – Dr. **Underwood**); International Journal of Law in the Built Environment (Emerald Publishers- ISSN: 1756-1450 – Dr. **Chynoweth**); Journal of Architectural Engineering Technology (JAET); OMICS Publishing Group (ISSN: 2168-9717 – Professor **Egbu**).

They have acted as External Examiners worldwide with regard to the examination of PhD candidates. They have organised international seminars and conferences; reviewed journal and book publications; acted as examiners on programmes at UG and PG levels; and acted as Visiting Professors to Universities world-wide, Some also sit on Committees of Professional Institutions (including as Fellows of CIOB, Membership of the Research Panel of CIOB (Professors **Barrett** and **Kagioglou**: FRICS, ICE; and as Director and Trustee of the Association for Project Management and Membership of the Research Panel of APM: Professor **Egbu**) , and in so doing contribute immensely to discipline and research base.

On 11th April 2013, the University of Salford signed an agreement to support research, course development and student exchanges with the newly established Royal Institution of Chartered Surveyors (RICS) School of the Built Environment, Amity University in India. We are the only Built Environment School in Europe to work with the RICS in this sort of venture.

We have an active PhD Student Chapter, which is part of the International Council for Research and Innovation in Building and Construction (CIB). Our International CIB Student Chapter is very active and successful. They won the 2012 prestigious CIB Sebestyén Future Leaders Award prize, awarded annually by the International Council for Research and Innovation in Building and Construction (CIB). The 2012 submissions were all based around the theme of 'economics, construction and society' and the Salford team triumphed with a proposal for a cost/benefit analysis of building information modelling (BIM) in the USA, UK, Brazil and Nigeria.

We also host the "Built and Human Environment Review", the first open source journal dedicated to post-graduate researchers working in the Built Environment area.