

<p>Institution: Nottingham Trent University</p>
<p>Unit of Assessment: C16 Architecture, Built Environment and Planning</p>
<p>a. Overview</p> <p>Research that shapes lives and society is central to the University's mission and to the achievement of its aims. The University puts high emphasis on impact arising from excellent research, which underpins its robust learning and teaching strategy and its reputation.</p> <p>The rich diversity of staff returned for the Unit of Assessment C16 (hereafter, the Unit), consisting of <i>architectural historians, construction procurement specialists, real estate economists and technologists of sustainability</i>, are drawn from the School of Architecture, Design and Built Environment (hereafter, the School), which sits within the College of Art, Design and the Built Environment (hereafter, the College). Post-RAE2008, the School has taken significant strides forward in defining the Unit's approaches to research and its governance by focusing on research concentration, strengthening research groupings and by encouraging debate on strategic direction through formal and informal platforms. The researcher community, the Dean of School, the College Associate Dean for Research (ADR), and the School Research Coordinator are all active participants in decision-making.</p> <p>Four groupings structure research within the Unit; these focus on: architecture and heritage (lead: Bandyopadhyay); innovative and sustainable built environment (Al-Habaibeh); lean project management (Pasquire); and, real estate economics (White). These foci are externally facing, reflect the rich diversity of research-active staff, and our commitment to multi-disciplinary research. These groupings investigate: <i>architectural history, theory and design; sustainable and appropriate materials, technologies and renewable energy generation; construction procurement and construction management; urban and regional planning; housing and commercial real estate economics</i>. All the groups have strong international dimensions, which are reflected in esteem, output, income and impact (e.g. impact case studies with Oman, China and Spain).</p> <p>b. Research strategy</p> <p><i>Strategic direction:</i> RAE2008 set the following performance indicators for the precursor UoA30: enhanced quality of research outputs; appointment of senior research staff; and, increased bidding and grant success. It acknowledged NTU's traditional strength in industry-focused research and research-informed teaching. The 3 research groupings established during RAE2008 have evolved from their original subject-specific nature by gaining greater thematic foci (e.g. <i>Lean Project Management</i> from <i>Property and Procurement</i>), and has increased to 4 with the recruitment of internationally reputed academics (<i>Real Estate Economics</i>). It has allowed us to reflect on our core strengths, to reshape coherent, dynamic research groupings, and to resource these appropriately.</p> <p>The 5 key areas of emphasis established for REF2014 are:</p> <ol style="list-style-type: none"> strengthen research groupings to articulate key thematic thrusts responding to important global grand challenges and sectorial needs (heritage and cultural interaction; low carbon and sustainable technologies; innovation in construction industry; real estate economics); increase interdisciplinary and collaborative approaches to the understanding of issues and problems while maintaining individually-driven world class discipline-specific research; collaborate closely with industry and governmental bodies – both nationally and internationally – to increase presence and enhance impact; develop robust grant capture strategies in response to the grand challenges that ensures sustained funding support for focus areas; and, consolidate research student intake aligned with the key thematic foci and enhance PGR quality. <p><i>Governance:</i> The REF period has seen the strengthening and clarification of research governance within the Unit. Governance of research takes place through the College Research Committee (CRC), which works closely with the ADR (Chair), the School Research Coordinator and the subject area Academic Team Leaders to set strategies, monitor progress and establish investment directions for research. Complementing this, the <i>informal Researchers' Forum</i> – a monthly meeting of professoriate and research-active staff – has enabled the development of innovative research ideas and a shared direction. It has acted as a forum for continuous self-improvement, debating such diverse topics of currency as the Unit's strengths and weaknesses,</p>

Environment template (REF5)

output enhancement and bidding strategies, open access, web presence of individuals and research groupings, etc. The two fora input into the School's academic business planning process via the **Research Planning Framework**. The mechanism monitors strategic alignment between the Unit and the University, keeping in mind both internal and external target setting agendas. It helps set target KPIs to assess performance in income and bidding, proportion of 3*/4* outputs, PGR completion, embedding impact in research and establishing international profile indicators.

Research groupings: Post-RAE2008, reflecting on the strengths in areas of output and impact, a strategy of targeted recruitment in key areas of development was established, leading to the appointment of 6 new professors into Unit 16. These complemented the existing established and emergent internal research leaders, to enhance research concentration. The 4 research groupings are as follows:

- Centre for Architecture, Heritage and Global Difference (AHGD)
- Innovative and Sustainable Built Environment Technologies (iSBET)
- Lean Project Management (LPM)
- Real Estate Economics, Investment and Development (REEID)

Involved in both theoretical and applied research, the groupings are focused, self-governing communities of individual and collaborating scholars, with QR fund support and time allocated for targeted research. The groups have established vision, and output and income generation targets, which provide the basis for QR allocation. Each research group has identified a small number of ECRs and emerging researchers for formal mentoring. They have web presence highlighting their key thematic concerns, membership, research projects, impact initiatives, and external collaborators – both academic and industrial.

To provide advisory direction the groupings are guided by steering committees consisting of both internal and external advisory members (from international industry and academic base – US, Spain, Denmark, Middle East). The groups meet regularly and provide peer support to both staff and research students, and organise events, e.g. international conferences (*Lean in Public Sector Construction*, 2013; *European Real Estate Society*, 2012; *Multiple Faces of Identity*, 2009; *Nationalism and Architecture*, 2011; workshops (*Designing Futures* 2013; *Failed Architecture*, October 2012) and colloquia (*Historical Built Environments: Between Permanence and Change*, 2011). Maximising impact is central to the groups' agenda; at least 4 new areas of impact are emerging (lean project management, real estate, sustainable materials and bio-mimicry, digital design tools in construction), alongside 2 established ones (*Sustainable Technologies*; *Managing Heritage*). Outputs are wide-ranging, characterised by a large number of collaborative publications (some with postdoctoral research fellows and doctoral graduates/ students), appearing alongside single-authored major monographs, book chapters and journal outputs.

Internationally, the research groups are actively connected with overseas partners through the work of their members. *Architecture, Heritage and Global Difference* collaborates in Oman with Heidelberg University, an internationally regarded centre for Semitic studies, together with links with other major partners in Europe, Middle East, India and the Hispanic world (e.g. government bodies, national museums, NGOs). *Innovative and Sustainable Built Environment Technologies* collaborates in the Middle East (Jordan, Saudi Arabia), in Europe (Poland) and with partners in China. *Lean Project Management* collaborations have extended to Australia (University of Western Australia), USA (Berkeley) and European bodies (European Construction Institute). Strong EU collaborations are present in *Real Estate Economics, Investment and Development*. The groups work alongside NTU-wide research networks and centres offering opportunities of cross-disciplinary work (e.g. Low Carbon Group; Materials Research Network).

The Centre for **Architecture, Heritage and Global Difference (AHGD)**; lead: Bandyopadhyay), originally established in 2003 as Architecture, Design and Global Heritage (ADGD), focuses on built heritage and the humanities-based study of architecture and the built environment within a fast evolving context of simultaneous globalisation and heightened awareness of difference. The two key areas of interest are, a) architectural and urban history, and b) place identity, memory and modernity. A third area – architectural design – is an emergent one, likely to strengthen beyond the REF census. Within the REF period the Centre has undertaken research that has produced 3 monographs/edited books, 20 journal papers, 9 book chapters, 32 conference presentations, 8 government reports, 7 exhibitions and 9 design outputs. It has produced outputs funded by the AHRC, RIBA, Historical Association of Oman and the US and Omani governments. The internationally acclaimed architectural and urban history and heritage

related research has led to the emergence of the **ArCHIAM Centre** (Architectural and Cultural Heritage of India, Arabia and the Maghreb; www.archiam-centre.com/), with a current emphasis on collaborating with governmental and learned bodies in Oman to study oasis settlements, including World Heritage Sites, influencing national policies and master-planning the salvage of heritage settlements at risk ('Managing Heritage' Impact Case Study). The Centre, productive in excellent output, impact and significant reach, consists of 3 postdoctoral and 12 doctoral researchers investigating themes, including cultural topography, settlement morphology, social history, and technology. The work on identity has resulted in high-profile international conferences (*Multiple Faces of Identity*, 2009; *Nationalism and Architecture*, 2011) and significant outputs related to architectural design theory, memory and memorials, and non-Western identity and modernity.

The **Innovative and Sustainable Built Environment Technologies (iSBET)**; lead: Al-Habaibeh) research group is a leading investigator of the technical, economic, management and equity related performance of a range of sustainable and innovative technologies, broadly focusing on the low-carbon agenda. The research interests of this group include: (a) Low-impact buildings – reducing energy consumption through monitoring and smart building technologies; and improving sustainability through new materials and improved building fabrics; (b) Developing better understanding and technologies for renewable energy generation, e.g. wind turbines and district heating; and (c) Innovation in Design and Management by developing innovative management systems and approaches for sustainability. This has led to product development and support for several innovative SMEs (see 'Sustainable Technologies' Impact Case Study) and relationships with a number of international countries, including China, Libya, and Jordan. The group hosts a funded cross-Atlantic project with MIT and India (Soar), to study breathable building façade using bio-mimicry and additive manufacturing technologies. In the REF period the group has produced 4 books, 58 journal papers, 2 book chapters, 73 conference presentations and 2 patents.

Lean Project Management (LPM); lead: Pasquire) research group focuses on developing the new "*project production*" philosophy and methodologies for its implementation across all project based sectors. These include all forms of construction and could develop to include the production of other high value assets such as trains, satellites and ships, TV and film production, ICT systems and even aspects of medical treatment. This provides a strong platform for cross-sectoral learning. Within this overarching field of study are a number of sub-themes: (a) Strategic procurement for integrated production systems that builds on 21 years of procurement research at NTU (b) Design of new project production systems within specific contexts arising from 12 years of research in lean construction, and (c) Deployment of human engagement systems that facilitate continual improvement at all levels of the production system and organisational enterprise with roots in more recent work in understanding and learning new ways of working. The research group operates through the externally facing **Centre for Lean Projects (CLP)** and has a particular focus on learning from action in partnership with industry to find answers to real world problems and issues. The group has produced 2 books, 4 book chapters, 19 refereed journal papers, 33 conference papers and 9 other outputs, some of which arise out of EPSRC and TSB funded projects.

The **Real Estate Economics, Investment and Development (REEID)** research group (lead: White) focuses on real estate market analysis. It provides leading intellectual input into the understanding of property market behaviour that is grounded in econometric modelling of markets linking theory to evidence. This underpins much of the group's world leading research that include, a) commercial real estate market analysis and forecasting, b) housing and commercial property economics, c) real estate financing mechanisms and products, and, d) spatial and regional analysis of markets. It also investigates a range of issues of interest to the property industry, the policy community, and professional planning bodies, including, a) residential and commercial property market modelling, b) property valuation and appraisal, c) investment performance, measurement and strategies, d) conservation of the built heritage, d) surveying education, and e) mortgage finance. In this REF period, group members have produced 20 academic journal articles, 8 conference proceedings, 4 books, 2 government reports, 2 reports for private sector bodies, and 1 EU report. Research undertaken by group members covers the main theoretical and empirical debates in real estate and planning and much of the research has been funded by private and public sector bodies for which reports have been produced.

Building on key emphases during REF2008-14, our next five years' ambitions are:

- Use the research groupings' international profiles to develop a stronger research culture to optimise proportion, diversity and interdisciplinarity of internationally excellent (3*/4*) outputs

and become self-sustaining research communities through enhanced grant capture. The School has implemented strategies for allocating sufficient time for academics to focus on sustained, excellent research, internal and external sharing of good practice, peer reviews and peer enabling/support, and regular monitoring. The robust grant capture strategy has resulted in a step change in securing funding leading to, and beyond REF.

- Groupings adopt a holistic approach to impact, embracing economic regeneration. The aim is to approach with imagination the relationship between researchers' aspirations and the grand challenges shaping research directions within society and industry, including sustainability and the low carbon agenda, and future and smart cities initiatives. We will focus on international and national government and industry partners to achieve this (e.g. strong partnership dialogues with the Local Enterprise Partnership – LEP, and Nottingham City).
- The Unit maintains focus on increasing the number of PhD students and continuing to improve the quality of PGR culture and experience. The Unit and the Graduate School are focusing on providing excellent student research environment (e.g. new Creative and Virtual Technology Lab), enhanced supervision capacity, achieving closer correlation of staff and students' research interests.

c. People, including:

i. Staffing strategy and staff development

Staffing strategy: The University's commitment to a robust staffing and staff development policy has contributed to a positive and vibrant research environment, including support for ECRs and emerging researchers. As part of a commitment to continued development of research and teaching provision the School has recruited academic staff to support strategically important areas of research and research-led teaching. The School has undertaken this by, a) expanding research leadership through the appointment of new professors (6) and reader (1) within the School, b) making a number of early career appointments (5), c) recruiting Research Fellows dedicated to research projects or groups (5), and d) developing a highly regarded body of Visiting Professors (8) from professional and academic backgrounds to provide research development advice (e.g. Paul Morrell, ex-chief construction advisor; Peter Bishop; Simon Pepper). One researcher has been promoted to Reader (Al-Habaibeh).

The Professoriate has been instrumental in developing research culture for both staff and students. The research-informed and research-led approaches to teaching has meant that the Professoriate do take an active role in teaching and providing academic direction to the programmes, shaping our new Masters programmes (e.g. International Real Estate Investment and Finance, Master of Architecture). Regular input and contribution comes from the Visiting Professors and Research Fellows through guest lectures, tutorial seminars and workshops. Informal discussion fora have been also established; these include regular research surgeries to peer review output and bidding proposals, the monthly researchers' forum as an advisory group consisting of research active staff and an annual 'research away day' to discuss the school's research and impact strategies.

About 80% (10 out of 12.2 FTE) of those returned for the REF are post-RAE2008 recruitments, highlighting this unit's research-conscious strategy. This has also provided an important boost to the recruitment of postgraduate research students, which is envisaged to enhance output in the medium and long term, creating a strong and evolving research culture. The demographic mix of research staff is reflected in our submission and includes early-career (2), mid-career (4) and experienced researchers (7). Part-time research staff are an integral part of our research strategy; Morledge, for example, provides mentoring and research continuity, while Soar strengthens our Innovative and Sustainable Built Environment Technologies (iSBET) group and enhances international engagement. The sudden untimely death of Professor Dino Bouchlaghem on 21 October 2013 was a significant loss to us all. His immense contribution towards fostering a research environment through the mentoring of emerging researchers sat alongside his own international research profile established through world class outputs, grant success, doctoral supervision and esteem. Bouchlaghem was the founding editor of the *International Journal of Architectural Engineering and Design Management* and chaired events such as the 7th International Conference on Innovation in Architecture, Engineering and Construction (AEC, Brazil 2012).

The School, in consultation with research leaders, has increased research time allocation of staff based on their track record in producing high quality publications and impact (e.g.

Bandyopadhyay) but also of ECRs and emergent researchers working on specific research projects (e.g. Allin; Souto; Koblyakova). The University-wide Management of Academic Workload (MAW) planning tool has been reviewed and improved to allow allocation of research time. The MAW exercise offers the opportunity to reflect research performance in the annual Personal Development and Contribution Review (PDCR) process undertaken by staff with line managers.

Staff development: The University has adopted the Concordat and RDF (Researcher Development Framework) championed by Vitae, to support researcher career development across the university. This system is being implemented and embedded into core university systems. NTU has an Equality and Diversity Champion who participates as part of the Vitae Equality and Diversity Champion Network. A range of case studies informed by NTU's work in this area are available on the Vitae website. The NTU Graduate School focuses on PGR development, training and supervisor training, while the College focuses on improving the quality of the publications, impact and income generation. Research Fellows are encouraged to contribute to graduate and postgraduate teaching in their areas of expertise.

The quality of publications is addressed through early intervention and continuous peer reviews and consultations via *research surgeries*, engaging with prominent visiting professors, and annual external reviews of research outputs. ECRs and a significant number of emerging researchers – the building blocks of the future – benefit from a semi-structured mentoring process as part of their research group membership. We have adopted a combination of semi-formal and informal mentoring mechanisms, which have added value by being supportive and enabling, flexible, cost effective and organisationally sustainable.

The Unit's impact enhancement strategy is linked to College staff recruitment and third stream income generation. The Unit is shaping the impact agenda through high-level networking and identification of opportunities (e.g. discussions with the Local Enterprise Partnership on establishing an NTU-based economic regeneration centre on Smart Cites). The Unit has identified key industrial gaps and research questions in emerging research areas (e.g. in district heating, which is an integral part of the City's energy strategy). Staff training sessions have taken place for PR and press engagement, and investments have been made in the promotion of research (production of videos, etc). The dedicated team in the College Research Office understands the research directions of individual staff and provides regular targeted updates for funding calls and submission deadlines. It supports the application processes by providing direct assistance and through the maintenance of relevant databases. While the NTU Research Grant Capture Team support and coach staff on bid writing. These efforts in the past couple of years have started to have a visible influence on transforming cultures and improving income generation.

Activities such as the annual College Conference, Wednesday lunch-time and late-afternoon research seminars and the regular university Low Carbon meetings, as well as one-off lectures and research presentations, provide opportunities for cross pollination and cross disciplinary development of ideas.

QR funding provides support for staff through seed research initiatives and infrastructure grants. Priority areas are identified annually in the School's research strategy, based on research groupings' target KPIs. The QR funds support a range of activities including the Short Study Leave scheme, travel grants, short-term employment of research and support staff, bridging funding for RAs, equipment purchase, and providing seed funding support towards development of products and artefacts (e.g. exhibitions - Bandyopadhyay; software - White; virtual modelling and visualisation - Mejdoub; web-based repositories - AHGD). The Study Leave provision makes possible short-term funding of replacement teaching to allow staff to focus on discrete output- and result-driven projects (books, research papers and other output completions, targeted impact-related tasks, meeting grant deadlines). Travel grants support key researchers to attend explorative and project-defining meetings (White; Souto), while short-term appointment of project staff (RAs/ support staff) has enabled projects to meet deadlines (Impact Case Study: Managing Heritage). Funding has also supported organisation of workshops and seminars, and in supporting research seminars with external/industry attendance (Al-Habaibeh).

QR income supports 3*/4* research, while additional Staff Development Funds from the School supports embryonic research areas through seed funding, and a wide range of scholarly activities that provide the basis for new researcher development: research-informed and research-led teaching; participating in or attending conferences/workshops; continued professional development a requisite of a number of professional bodies to retain membership status; and,

further study opportunities such as subject, discipline or teaching related PG programmes, PhDs and DBAs for staff. Prominent national and international speakers are invited to participate in the School seminar programme and these introduce a wealth of external experience. The programme provides a forum for emerging researchers and postgraduate research students to test questions and theses and receive advice.

ii. Research students

The establishment of the University's Graduate School in 2011 has enhanced PGR experience, while the establishment of the cross-university Research Grant Capture Team has had an important impact on income generation activities and PGR recruitment. The commercial directorate has played an important role in developing and sustaining links with industry and stakeholders. The PGR student recruitment has risen steadily over the REF period, growing from 16.5 FTE in 2008 to 28.4 FTE in 2012-13 providing a total of 84.73 FTE over the REF period; this represents a healthy growth in both full-time and part-time students. A total of 13 doctoral degrees have been awarded in the same period. The very significant increase in PGR numbers, associated partly with the greater prominence provided to research areas through recruitment of new research leaders, are likely to place the Unit in an excellent position beyond this REF. 36 academic staff across the School are currently involved in the process of supporting and managing the students either as supervisors or as independent 'chairs' in annual monitoring, project approval and transfer processes, representing about 50% of the School's academic staff.

The University and the College have encouraged the intake of high quality postgraduate research students, working on 3* and 4* research projects through the fully funded Vice Chancellor's Bursary and the School Research Studentship awards. The Unit was successful in attracting 2 VC's Bursaries each in 2011-12 and 2012-13 (total 4). Research students are also encouraged to contribute to the delivery on taught programmes, developing their teaching ability under supervision and mentoring. Research Fellows and students take an active (paid) role in the functioning of the research groups and in organising conferences, field trips (Malta) workshops and seminars. A Real Estate doctoral researcher is student representative on the board of European Real Estate Society, providing links with the international real estate student network.

The number of doctoral students delivering papers at refereed national and international conferences has increased, often taking advantage of the Dean's research student support fund allocation (£600 per student). They have collaborated also with staff in journal publications. They are playing an active role in organising informal research debating fora (e.g. Space and Humanities, AHGD), helping research leaders in the updating of research groups' websites. Two students attended AHRC workshop for research skills enhancement (archival research).

d. Income, infrastructure and facilities

The annual income for the Unit has grown from c. £115,500 in 2008 to c. £183,500 in 2012-13 peaking in between at c. £235,000 in 2010-11, indicating a sustained increase in earnings and providing a total earning of c. **£900,000** over the REF period. Individual initiatives have been supported by regular research surgeries, mentoring by senior researchers and information sharing about opportunities at the monthly Researchers' Forum. Bid writing has been supported by the College team of 2 administrators and a research grant specialist, and the College finance team; research fellows associated with projects also assist with follow-up bid writing. With the recent establishment of the NTU Research Grant Capture Team funding applications submitted in 2012-13 have totalled c. **£2.5 million**, indicating the immediate impact of this strategic initiative.

Research income within the REF period has come from over 30 prestigious and competitive sources. RCUK funding through an AHRC grant (Bandyopadhyay, £84,000) completed at the start of the REF period resulted in subsequent outputs. UK and EU governmental bodies have provided funds to develop alternative energy sources (Al-Habaibeh), and sustainable materials and products (Ilanakiev; Al-Habaibeh). A number of Knowledge Transfer Partnerships (Pasquire; Ilanakiev; Al-Habaibeh; KTP 006872; KTP00780; KTP009032) have also contributed to both research outputs and impact-related activities in this area. Bandyopadhyay has been the lead investigator in 3 Government of Oman funded projects (totalling c. £210,000) investigating aspects of architectural history and heritage, and has co-investigated the Iraq Delphi Project funded by the British Council (£90,000). Consistent with the Unit's close collaboration with UK industry and private stakeholders, funding support has also come from those sources (Al-Habaibeh; Pasquire; Ilanakiev; White) to develop technological readiness, in addition to support from professional (RIBA Research Trust Award 2010) and academic bodies (CEBE: Hoxley) to investigate design thinking and built

environment pedagogy.

Over this last academic year the School has invested over £250,000 in new capital equipment to support the further delivery of research strategy. The investments support all academic subject areas and will further enhance the student academic experience, and increase research and consultancy capacity. The capital equipment budget will be £100,000 in 2013-14. The purchase of specialised equipment (microcopter) and software has aided detailed aerial photography and surveying in Oman (Bandyopadhyay). The School is supported by an excellent dedicated workshop and IT support, including additive manufacturing and 3D printing, providing facilities and technical expertise available to our researchers and students.

With the arrival of the new professor of digital architectural design (Mejdoub), the School has established a new **Creative and Virtual Technology Lab (CVT)**, c. £300,000 additional investment). This Lab is an interdisciplinary and exploratory research environment where architects, artists, designers, engineers, computer scientists collaborate to explore new visualisation techniques, digital design models and processes to sustainably enhance design quality. Equipped with cutting edge technologies for advanced visualisation (augmented reality, virtual reality), real-time tracking systems, 3D scanning, fabrication technology, and human computer interaction systems. The workshop and the Creative Media Lab have contributed significantly to the 2 selected REF Impact Case Studies. CVT has enabled 'Managing Heritage' to develop visualisation of Bahla World Heritage Site, which is to feature as a permanent display at the National Museum, Oman. 'Sustainable Technologies' has received significant technician support to develop alternative energy generation prototypes.

e. Collaboration or contribution to the discipline or research base

Esteem: Al-Habaibeh is currently a technical member of the AHRC's Peer Review College (from 2008). Bandyopadhyay was invited to advise the *Ministry of Heritage and Culture* (2011-13) and the *National Museum* (2013) in Oman, and the *Abu Dhabi Authority for Cultural Heritage*, UAE (2009) on heritage documentation, its management policy, and the curation of artefacts of material culture. He has delivered public lectures on the invitation of the *American University of Sharjah*, *Architectural Heritage Society of UAE* (both 2009) and the *Historical Association of Oman* (2011).

Editorship of leading academic and professional publications: Bandyopadhyay is on the editorial panels of the *Encyclopaedia of Vernacular Architecture of the World* and *Proceedings of the Seminar for Arabian Studies*. Pasquire and White are on the editorial committees of high impact journals, *International Journal of Financial Management for Property & Construction* and *Journal of European Real Estate Research*, respectively. White is also economics advisor to the *International Journal of Housing Policy*.

Industry collaboration: The School has signed 11 MoUs with major industrial partners around research and skills development, e.g. partnership with Vinci UK (around BIM and Smart Cities), Gleeds (BIM). In addition, the majority of funded projects have their industrial partners (e.g. Alkane; Scottish Widows Investment Partnership).

Collaboration with academia: There is an impressive number of active partnership with 9 international institutions (including, MIT: Pasquire, Soar; Heidelberg: Bandyopadhyay) and 12 UK universities on funded research projects. In addition the School has MoUs with 10 international universities (China, Malaysia, Japan, Turkey), in PhD recruitment, joint PhDs and exchanges.

Awards: Pasquire received the Enterprise Award for Knowledge Transfer Partnerships (2010) and Al-Habaibeh a high commendation at Institute of Engineering Technology's Innovation Award.

Professional bodies: Sarshar leads IET Smart Cities initiative. Staff are Fellows of several professional bodies (e.g. RICS, RIBA, CIOB, IET) and chair various boards (CIOB: Education, Qualification, Standards and Practice; RICS: Planning & Development Professional Board).

Conference organisation: Pasquire: Lean in Public Sector Construction (2013); White: European Real Estate Society (ERES, Edinburgh 2012); Bandyopadhyay: *The Multiple Faces of Identity* (Nottingham 2009).

Future innovation and economic regeneration: In line with government agendas, the unit has made high level links with industry and government. Strategic relationships with LEP and NCC (Nottingham City Council) allow the Unit to support the economic regeneration of the region. The LEP is proposing to set up a *Centre for Smart Cities* at NTU, an agenda which lies at the heart of the Unit's strategy. NCC's energy strategy includes the extension of a major district heating system, and NTU offers research partnership in this area. Al-Habaibeh has been invited to the advisory committee for feasibility of the next phase of development.