

<p><b>Institution: Anglia Ruskin University</b></p>
<p><b>Unit of Assessment: 16 Architecture, Built Environment and Planning</b></p>
<p><b>a Overview</b></p> <p>The submitting Unit integrates interdisciplinary expertise to focus its research upon enhancing the sustainability of the built environment. The unit sits within the Department of Engineering and the Built Environment, part of the Faculty of Science and Technology.</p> <p>Our research draws upon expertise in Architecture, Spatial Planning, Surveying, Construction Management and Engineering, as well as cognate disciplines. Our research clusters seek solutions to challenges in the built environment that are sustainable, integrated, inclusive, and responsive to threats and opportunities. In pursuing these research objectives, we collaborate closely with stakeholders nationally and internationally, including community and third-sector organisations, businesses, and professional bodies and networks. Our specific areas of focus include reduction of energy consumption; optimisation of natural resource usage; employment of recycled materials; loading, corrosion and appraisal of reinforced concrete structures; policy and standards for sustainable construction and development; and health and well-being of building occupants.</p> <p>Key research during the REF assessment period includes that into Planning Precinct Design Standards (PPDS), these being used internationally, by developers and planners to minimise the environmental impact of large-scale construction projects; and raising the awareness of older people's needs among developers and planners. Our research is rooted in collaborative industry-based impact generation adding vitality and sustainability to our research community.</p>
<p><b>b Research Strategy</b></p> <p>Our research strategy is shaped by and directed towards achieving goals set out in Anglia Ruskin's Corporate Plan 2012-2014, its Research and Scholarship Strategy 2012-14, and by the equivalent Faculty and Departmental strategic documents. Although the Unit was not submitted to RAE 2008 our strategy over the past five years has been driven by the overarching goal of achieving national and international recognition for our research. To this end we have sought to:</p> <ol style="list-style-type: none"> <li>1. <b>Recruit appropriately qualified staff.</b> In line with institutional policy that all newly appointed staff hold doctorates, the proportion of staff in the Department of Engineering and the Built Environment holding a doctorate rose from 25% in 2008 to 53% in 2013. Within the submitting unit, 75% of staff hold PhDs and the remainder are very near to completion.</li> <li>2. <b>Increase the volume of research income.</b> As reported in REF4b, annual income has risen from £56k in 2008/9 to £94k in 2012/13. This included a key role in FP7-funded projects such as Echo2Eco (€2.1m overall, completing 2014), allowing the formation of strong relationships with international organisations on which we can build in the future.</li> <li>3. <b>Develop and enhance the research culture</b> in the Unit. Anglia Ruskin has set a clear institutional expectation that 'every member of staff engages in research or current professional practice in their academic discipline.' Staff are encouraged to present their research at research seminars, at the annual Faculty Research and Scholarship Conference and the annual University Research Conference. The Faculty produces a monthly newsletter, <i>FIRST</i>, providing a platform to recognise and disseminate staff achievements, and reinforce and disseminate our research culture.</li> <li>4. <b>Extend our professional expertise and networking.</b> We set up the Anglia Ruskin Surveying and Construction Employer Liaison Group as a conduit to ensure effective partnerships with professional collaborators. Established in September 2009, it now features over 16 industrial representatives providing a platform for identifying innovation and disseminating research outcomes.</li> </ol>

5. **Develop postgraduate research**, especially in recruiting and supporting doctoral researchers (including professional doctorates). We have doubled doctoral completions from two per annum in 2008-9 to four per annum in 2012-13. The number of postgraduate researchers within the Unit has grown from 14 in 2008-9 to 46 in 2013-14.

Looking forward to the five years following submission, the Unit's Research Strategy specifies a number of objectives and targets, both building on existing strengths as well as to developing new areas. We aim to:

1. **Further develop our research culture.** To increase by at least 10% per annum the number of internationally excellent papers published.
2. **Expand our research income generation.** We will identify and bid for income from a more diverse range of external sources. We will increase our research income by 20% year on year. We will make Eco-Innovation and Vision 2020 bids focussing upon the optimal use of finite resources and the development of sustainable technologies. *SwitchAsia* funding applications will continue to target sustainable development planning, construction management, asset management and optimal use of resources throughout the life-cycle process. We will continue to set specific external income generation targets for staff, in line with these aspirations, as part of the appraisal process.
3. **Further emphasise postgraduate research.** In line with departmental targets, we aim to grow our doctoral community to 76 by 2015, and will continue to increase our recruitment thereafter.
4. **Implement effective research management processes and structures.** Our Research Strategy defines research roles, knowledge sharing processes and dissemination routes amongst staff to engage all new staff in research. We will form flexible, centrally serviced research clusters aiming to maximise communication, enable cross-fertilisation and optimise our national and international knowledge base to enhance our research capabilities. These clusters will be overseen and coordinated by our Research Director and Research Coordinator. This will ensure that the Unit's developing research capability is appropriately directed and ensure that tangible, measurable impacts are achieved. Our mentoring system integrates and supports new and existing staff in developing the Unit's research capacity.
5. **Engage effectively with our user communities.** Every research cluster will identify and develop relationships with direct and indirect beneficiaries in order to ensure that research projects are developed with user needs in mind. Each cluster will collaborate with at least one external academic or industrial partner. We will develop and promote new CPD courses drawing on our research and engage in Knowledge Exchange programmes such as the KTP and Low Carbon KEEP schemes.
6. **Formally establish a Centre of Excellence for the Built Environment.** Already in embryonic existence, the Centre will provide a mechanism for promoting our research, and developing our research capability. We aim to attract new consultancy, knowledge transfer, research and development commissions and income. This will enhance existing research and collaboration with other academic and industry organisations to identify and achieve further output.

Revised twice yearly (along with the Unit's Research Impact Strategy) the document will identify actual and potential changes to built environment sustainability practice in the UK, Europe and globally providing the context in which our research takes places, set out modes of engagement and define measures of success. Our strategic objectives will be further informed by Faculty and institutional research strategies and targets.

Strategic aims are monitored at the individual level through appraisal. At departmental level we

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contribute to the Faculty Strategic Plan which includes research targets. The targets above with respect to income and PhD recruitment come under special scrutiny at monthly external income meetings and tri-annual Faculty Research-Degree Sub-committees.

Our research and scholarly activity in pursuit of our objectives during the assessment period, and our progress in the future, was and will be managed through the Department Research Committee, led by the Director of Research who is a member of the Department Senior Management Team (SMT), reporting to the Head of Department and Faculty Research Committee. Our progress is and will be formally reviewed monthly (within the Faculty), quarterly (by members of the Corporate Management Team) and annually (by the institutional Research Committee).

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

The submitting Unit enjoys a mix of new academics through to experienced researchers. This mix ensures a vibrant research culture. The submitting Unit's staffing policy supports our research strategy by recruiting and retaining high quality candidates qualified to doctoral level. The proportion of staff qualified to doctoral level in the parent department has risen to 75% over the last three years. Staff are supported by compulsory and elective training to become research active and contribute to our income, output, and individual research and scholarship plans. The effectiveness of the programme is evidenced in the growth in volume and quality of research outputs and income generation. The Department is seeking to recruit a Professor of Engineering to further develop the Unit's research capabilities.

Emphasis is placed on providing colleagues at the outset with the right foundation to develop their careers. Newly appointed staff must have a doctoral qualification. Mentors are identified to support colleagues and all new staff have a mentor. The one-year probation period for new staff has a focus on research as well as learning and teaching.

Anglia Ruskin's Corporate Plan emphasises the importance of the institutional equality and diversity policies, stating that these 'apply to our staff and students and are for everyone, whatever their backgrounds or personal beliefs. Everyone at Anglia Ruskin is expected to comply with them.' The institutional Equality Policy Framework was last updated and revalidated by our Board of Governors in 2010, in preparation for the passage of the Equality Act. All staff must undertake mandatory online equality and diversity training, and specific workshops are available to colleagues involved in, for example, recruitment and selection. The submitting Unit adheres to these requirements and the expectation espoused in the *Concordat to Support the Career Development of Researchers* that 'diversity and equality must be promoted in all aspects of the recruitment and career management of researchers'. In May 2013, Anglia Ruskin achieved the European Commission's 'HR Excellence in Research' award in recognition of our strategy for improving the career development and management of our researchers. As part of that process, we undertook a gap analysis which we are now working to address, ahead of the review of the award in 2015. The institution also subscribes to the principles of the *Concordat to Support Research Integrity* and the *Concordat for Engaging the Public with Research*.

Feedback from staff who participated in the Careers in Research Online Survey (CROS) 2013 showed that Anglia Ruskin staff feel their contribution to a variety of research activities is more highly valued and recognised than the sector average, and that they were better integrated into their research community. Similarly, Anglia staff felt better informed about key research strategy and policy in the national environment, such as the REF, the RCUK's 'Pathways to Impact' expectations, the three Concordats on Research Integrity, Public Engagement and Research Career Development, as well as the HR Excellence in Research Award.

The Unit makes use of the annual appraisal process to identify career aspirations and implement and support staff development, research and scholarly activity. All academics agree

a Research and Scholarship Plan as part of their appraisal which sets 'SMART' targets around income generation, and research and scholarly outputs, commensurate with the career stage of the appraisee. Early Career Researchers within the unit are supported to develop their research capabilities, promote their key strengths, and are trained and mentored to prepare them to become research degree supervisors. A mentoring system is in place to support all staff: mentors are mandatory for all new staff, while academics seeking promotion to reader or professor are strongly encouraged to have a mentor to advise on the development of their application, for which clear guidance is published.

A comprehensive suite of in-house or contracted-out staff development and training is available. Internal staff training is provided by the Faculty, Human Resources Services and Research, Development and Commercial Services (RDCS). Online research training courses, hosted by Epigeum, are also available to all staff. The Unit contributes through organising successful departmental away-days, focused training and development sessions. A series of weekly research seminars in an informal setting runs from October to June every year, whilst more formal research conferences are held annually at the Faculty Research Conference and the University Research Student Conference. The Department supports all staff and research students by funding and facilitating attendance at these events, as well as supporting staff to present at externally organised national and international conferences. Staff have access to annual writing retreats, funded by the Faculty, to support them in writing papers and developing bids.

Centrally funded sabbaticals, awarded competitively, of up to six months are available in support of research and scholarship. Since 2008 three such sabbaticals have been held within the Unit. Through the 'Enterprising Academics' scheme there is opportunity to develop relationships with businesses or other research users in cognate subject areas. Furthermore, colleagues are encouraged to participate in professional networks and bodies.

The Unit subscribes to the principles of the *Concordat to Support Research Integrity*. Our research is underpinned by the highest standards of rigour and integrity. All our research is subjected to ethics approval at Departmental or Faculty levels before commencement. Financial management and advice for researchers is provided by Faculty Bid Managers and Faculty Finance Administrators to ensure best practice and accountability. All research bids are peer reviewed. Research quality is maintained through a Departmental review process, one success of which, for example, was Henjewe's 2013 'Emerald *Literati*' Outstanding Paper award (his output 2 in REF2).

## ii. Research students

The unit has successfully supervised seven PhD and three research-based Professional Doctorate (DProf) candidates to completion during the assessment period, as noted in REF 4a and currently supports 46 research students. We have financially supported some research degree candidates by appointing six Graduate Teaching Awards since 2010. Our Professional Doctorate (DProf) in the Built Environment is the first of its kind in the UK and offers an innovative and flexible alternative to the traditional PhD, tailored for built environment practitioners, who are already working full-time in the industry and have acquired substantial professional experience, to undertake real world research in their specific field. The interdisciplinary approach enables staff and candidates to make a significant contribution to the development of their profession and guarantee research impact through deployment of their findings in industry.

Research degree candidates within the Unit are supported by up to three supervisors and, additionally, an academic advisor. Clear guidelines on the expectations of supervisors are published by the institution, and staff are supported by specific training and development. All staff new to supervision at Anglia Ruskin must attend supervisor training and all supervisors are required to undertake relevant CPD, including through ARU-run workshops and an annual Research Supervisors' Conference. Compulsory training is also provided for all Chairs of *viva-voce* examinations and for Convenors of student monitoring meetings.

All research degree candidates, with the support of their supervisors, prepare a Personal Development Plan (PDP) each year. This identifies their training needs using the Vitae 'Researcher Development Framework'. In developing their research skills, all candidates receive mandatory training provided by RDCS appropriate to the different stages of their studies. Additional elective training is provided by RDCS. This includes training on writing the research proposal, ethics, intellectual property, academic presentations and writing, and preparing for the viva. Staff from our Unit contribute to some of these RDCS training events, such as Research Design and Methodology. Epigeum's online research skills training modules are also available. All research degree candidates who teach must also take a three day 'Learning and Teaching in Practice' course. Within the Faculty, further support includes independent Confirmation of Candidature assessments, mock *viva-voce* examinations and career development support. Dedicated weekend workshops, intended primarily to meet the needs of DProf candidates, are also open to PhD candidates.

Research degree candidates are expected to present and defend their work at one of the weekly research seminars, open to staff and research degree candidates, organised from October to June each year. All candidates are expected to attend, and in due course supported to present, at our annual Research Student Conference. Research active staff present at our Annual Research Supervisors' Conference. The research experience is enhanced through the use of our Virtual Learning Environment, arising from our DProf programme, providing online material, discussion forums and assessment tools.

Anglia Ruskin's Research Degree Regulations, reflecting the QAA's Quality Code, provide a clear regulatory framework. Annual monitoring review meetings (bi-annual in the first year) are convened, usually in person, by an experienced supervisor external to the supervising team. At these meetings, candidates are required to present their PDP and a log of their supervisions. Progress is closely monitored at Faculty level by a Research Degrees Subcommittee, where the outcomes of these annual review meetings are reported; reports are also made to the institutional Research Degrees Subcommittee. Candidates intending to take a doctorate must also be successful at a 'Confirmation of Candidature' review, at which they must show they have the potential for a successful outcome at doctoral level. The University has recently implemented the use of 'Progress Platform' monitoring software which allows the student, their supervisors and research administrators to have access to all the progress reporting and tracking of data, thus improving information flow across the various offices responsible for research degree candidates. Within the Faculty, our monitoring processes resulted in a 97% retention rate of research degree candidates in the 2012-13 academic year.

Feedback from Anglia Ruskin students participating in the Postgraduate Research Experience Survey (PRES) (2009, 2011, and 2013) has shown that the student experience improved significantly between 2008 and 2013. In both PRES 2011 and in 2013 our respondents rated their overall experience of their research programme at Anglia Ruskin more highly than the sector average.

#### **d Income, infrastructure and facilities**

The Unit's research income has risen consistently since 2009. REF4b demonstrates a modest but growing profile of research income between 2008 and 2013, including from prestigious grants awarded to research consortia in which we have participated. These include 'Older People's Use of Unfamiliar Spaces' (OPUS), a joint venture funded by RCUK with the Universities of Glamorgan, Kingston and Swansea, which resulted in a number of the research outputs reported under REF2 and impact of international significance, reported in REF3b. We have also had success in Europe, particularly the €2.1m 'Echo2Eco' project in consortium with six European SME and research partners. Over the five year period REF4b also presents the steady increase in Knowledge Transfer income demonstrating growing industry engagement.

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We have implemented specific strategies to enable the generation of research grant income. Some of these (such as the inclusion of income generation targets in staff appraisals) have already been discussed above. In addition, we have made available seed-corn funding to support research bids, with pro-active mentoring support and training as required. We have promoted collaboration with other universities, research groups, bid funding consortiums and private-sector organisations. That these strategies are successful is evidenced by the engagement with, for example, the FP7 project "Echo2Eco".

A Faculty Research Income Manager was employed in 2012 to support external income generation; more recently, a Faculty Commercial Manager has been appointed. Both roles lead to increased research and commercial funding across the Faculty portfolio, including in our Unit's area of activity. Institutional-level support for bidding is provided through RDCS. Protection for Intellectual Property is supported through the University's Secretary and Clerk's Office.

The Unit's research is largely carried out in the £15m Marconi Building, on Anglia Ruskin's Rivermead Campus, Chelmsford. The facilities were officially opened by Princess Elettra Marconi in September 2010, housing state-of-the-art seminar and break-out rooms and networked office space, equipped with 'SmartBoards' throughout. Serviced by seven dedicated technicians (whose activity was thoroughly reviewed during the assessment period with a view to empowering technicians to take greater responsibility for the management and operation of laboratories and support facilities), the Unit has an extensive fully networked AutoCAD design suite and a separate Macintosh computer design suite within our Architecture Studio. It features a 3D digital virtual-modelling laboratory. Our architectural modelling workshop benefits from an AutoCAD laser cutter and 3d prototype-printer. Our test facilities include hydraulics, soil, concrete and heavy-materials test laboratories with compression, bending and tensile loading equipment. Light-microscopy, scanning electron microscopy and emitted particle analysis facilities are available through collaboration with the Department of Computing and Technology.

Anglia Ruskin has recently invested £6m in a new Medical Business Innovation Centre (MedBIC). This new research and innovation facility, due to open in Spring 2014, will contain 1000m<sup>2</sup> of new office and engineering laboratory space to be occupied by the Faculty's medical, mechanical and civil engineering researchers, including the submitting Unit. Alongside this research space, new Business Development Incubator Units will bring fledgling businesses and entrepreneurs into close proximity with our research. Our strategy will maximise our use of this facility.

All researchers have their own networked working space in an open plan academic office. Similarly, research degree candidates have access to their own office space, also open plan and fully networked. Investment in our 3000m<sup>2</sup> library, with our dedicated subject librarian, provides state-of-the-art digital resources and 363 days per year physical access. Collaboration with colleagues based at our Cambridge campus is enabled by the provision of University-wide telecommunications using dedicated, secure, teleconference and videoconference facilities.

Finally, all researchers and support staff have read-write access and contribute to a central 'Research Hub', a virtual environment that enables process documents (ethics, bids, publications, and protocols), project updates, and information files to be readily shared within the confines of a secure intranet. This enables researchers to identify and coordinate research efforts to achieve international impact.

***e Collaboration and contribution to the discipline or research base:***

**Research Collaborations and Networks:** Internationally, the Unit's 2013 SwitchAsia bid confirmed the Unit's presence within Asia-Pacific networks and continues to foster commercially rooted sustainability research collaboration. As already mentioned above, the submitting Unit is involved in a €2.1m FP7-funded project 'Echo2Eco' with six other European partners. This collaboration aims to conceptualise, realise, develop and promote an innovative energy saving

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acoustic product that improves occupants' wellbeing. In addition to the external collaboration, the project draws the built environment team together with researchers from elsewhere within the Faculty's Departments of Engineering and the Built Environment and Computing and Technology, along with specialist acoustic researchers from the Faculty of Arts, Law and Social Science.

We have collaborated extensively with commercial, governmental and third sector organisations. In 2012 the Unit collaborated with Northern Ireland surveying Application developer GoReport. Through the close partnerships with industry encouraged in by our distinctive DProf programme (described above) our Unit has worked closely with CalfordSeaden and MalvernTipping LLP. The Unit has also undertaken multi-disciplinary collaboration with Acermetrics, an SME, on innovative use of modular timber framing systems. Our 'SmartLife' project involves Cambridge County Council, Fenland District Council, Luminos Housing Association (Huntingdonshire District Council) while the 'Delivering Renewable Heating Premium Payment Scheme (RHPP)' involves The Energy Savings Trust, the Department of Energy and Climate Change and Mid Suffolk District Council. We also collaborate with Communities Homes & People (CHP) and Essex County Council. The Unit has also undertaken research commissioned by the RTPi and the RICS Educational Trust since 2008.

**Academic Collaboration:** Civil Engineers in our Unit collaborate with the Universities of Athens and Patras. As noted above, the Unit's Older Peoples Use of Unfamiliar Spaces (OPUS) spatial planning research includes collaboration with the Universities of Glamorgan, Kingston and Swansea. We collaborate with University College London in research on energy usage in the built environment. We retain links with the University of East Anglia's 'Science Society & Sustainability' (3S) research group, while internally the unit collaborates with Anglia Ruskin's Global Sustainability Institute (returned under UoA 17), to research energy use within buildings. These relationships are at an early stage but have already resulted in funding applications being made.

**Contribution to Journal editorship, conferences and CPD:** Peer review within the Unit has been carried out for international journals including ACI (American Concrete Institute) Structural, Engineering Structures, Construction and Building Materials. In 2013, the Unit launched a series of 23 research-based continuing professional development (CPD) short-courses, each of which run twice per year. These CPD courses reach a diverse built-environment focussed client-base (see <http://www.anglia.ac.uk/ruskin/en/home/prospectus/cpd.html>) featuring: conservation, engineering, energy efficiency and sustainable construction, project management, and town planning. To date, each delivery has engaged around 10 delegates per session.

**Collaboration for PGR training:** Our Professional Doctorate in the Built Environment (DProf) programme includes regular collaborative research workshops with the University of Salford.