

Impact template (REF3a)

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| Institution: | University of Northumbria at Newcastle |
| Unit of Assessment: | 16 - Architecture, Built Environment and Planning |
| <p>a. Context: The Unit's main research audiences and beneficiaries are industry, professional practice, and government agencies/regulatory organisations in the UK and abroad. There are, however, ensuing impacts on creativity, culture and society in general. This is summarised below, through specific examples related to specific research groups, abbreviated as follows: BIM (<i>Building Information Management</i>); SES (<i>Sustainable Energy Systems</i>); URAD (<i>Urban Regeneration and Architectural Design</i>); VRV (<i>Virtual Reality and Visualisation</i>).</p> | |
| <p>b. Approach to impact</p> <p>Engagement of user groups and beneficiaries has been inherent in our approach to research. More than half our research is industry-funded and almost all of it is orientated towards industry and professional practice. There is a strong institutional steer towards research impact. Personal networks are an important contributory factor; 90% of staff returned have worked in industry/practice and several hold external board/advisory positions.</p> <p>1. Main beneficiaries and users (<i>with examples of approaches to impact of Research Groups</i>)</p> <p>1.1 Industry and professional practice in the built environment:</p> <p><i>BIM Group:</i> transformed the capacity of 4Projects Ltd (with next-generation BIM model server technology) and National Building Specification Ltd. (with authoring of National BIM Library).</p> <p><i>SES Group:</i> created new business for Dunelm Geotechnical (with mobile ground-source heat laboratory and test facility) and Thermacore Europe Ltd. (use of nanofluid coolants in production).</p> <p><i>URAD Group:</i> enhanced capacity of five architectural firms; and seeded concepts for innovative industrialised, low-impact building (Lincolnshire Observatory, 2012) from design competition wins;</p> <p><i>VRV Group:</i> changed architectural design practice through support of 12 major urban development projects using the Virtual Newcastle Gateshead (VNG) City Model, thus producing more efficient and effective designs and increasing usable space. VNG is the result of a partnership created with the two municipalities.</p> <p>1.2 Governmental agencies and regulatory organisations in the UK and overseas:</p> <p><i>BIM Group:</i> engaged with the UK Government BIM Task Group, Regional BIM Hubs and Singapore's Building and Construction Authority to promote awareness and attitudinal change.</p> <p><i>SES Group:</i> transformed evaluation policy and practice of North Tyneside Council through a sustainability evaluation tool for building designs – originally developed during a KTP.</p> <p><i>URAD Group:</i> influenced policy formation for EU Programme for Cultural and Natural Heritage; changed conservation policy in S.E. Europe; and effected integration of the legal and regulatory frameworks in Balkan states. This was initiated through a research secondment.</p> <p><i>VRV Group:</i> influenced Gateshead and Newcastle City Councils' planning/development processes which now have explicit recommendations to use the VNG model within their Planning Guidance.</p> <p>2. Specific routes to impact: Various funding bodies and research activities have enabled impact. These include the <i>Technology Strategy Board (TSB)</i>, <i>Knowledge Transfer Partnerships (KTPs)</i>, <i>RCUK</i> and <i>EU-funded collaborative projects</i> that have involved industrial, NGO and local authority partners. In addition, <i>BIM Academy</i> and <i>VNG</i> have been key pathways to impact. Our successful TSB projects have created valuable relationships with industry collaborators. Examples are <i>BIMCity</i> (£98k, start 2010) with Z Mapping Ltd. (provider of digital city model data) <i>iCIM</i> (£550k, start 2011) with AEC3, BSRIA, Faithful and Gould, RIBA Enterprises, and Autodesk; and <i>4BIM</i> (£1.2m, start 2012) with Vinci, AEC3, 4Projects, and Kingspan PLC. Each project tackled industry needs using research of the Unit, resulting in:</p> <ul style="list-style-type: none"> • Integration of BIM model-creating methodologies with larger-scale city model authoring; • A design tool for carbon reduction in buildings; • An online cloud-based tool for project data interchange by extranet provider 4Projects Ltd.; • A lifecycle costing tool for asset management services provider KyKloud; • Development of automated manufacturing processes for steel-framed walling by international product manufacturer Kingspan. (Case Study 2 refers to these TSB projects). | |

Impact through KTP-type projects dates back to an award-winning Teaching Company Scheme on *Post-Occupancy Evaluation* (2003-6) that launched a new service product for TCS partner, Ryder Architecture. KTP projects completed since 2008 have resulted in:

- Adoption of design quality assessment methods by North Tyneside (REF: 6998; 2008 – 2011, KTP ‘Outstanding’ Award) and Gateshead (REF: 7705; 2009 – 2012) Councils (both Giddings).
- An evaluation tool adopted by North Tyneside Council for setting and assessing the environmental sustainability of alternative building designs (REF: 6997; 2008-2011; Hope).

From Agnew’s **EPSRC** (EP/E028705/2) and **EU** (NanoHex EU 228882) funding a relationship with Thermacore Europe Ltd. has brought Ph.D. sponsorship and an industrial secondment (Ng) and resulted in development of a Miniature Refrigeration System for Electronics Cooling. Underwood and colleagues, working with **Dunelm Geotechnical Ltd.**, have developed a novel mobile thermal response testing facility that is now used commercially by Dunelm to measure mean earth thermal conductivities and assess the potential of geothermal sites throughout the UK.

BIM Academy (www.bimacademy.ac.uk) is an industry-facing joint venture with Ryder Architecture. It has drawn on its research work to enable the authoring of the National BIM Library for The National Building Specification. As an international centre of excellence, BIM Academy has shaped the Industry’s uptake of BIM internationally. Demand for BIM Academy’s consultancy services led to the creation, in 2013, of a joint-venture spin-out company (Case Study 2 refers).

Virtual NewcastleGateshead (<http://virtualng.northumbria.ac.uk/>) is a research-led project that has developed, hosts and sustains a 3-D city model of the urban areas of both municipalities. Its work has had impact on the planning processes of the two municipalities and upon developers and architects of 12 major urban development projects. (Case Study 3 refers).

3. Specific support for staff

Support to enable individuals to achieve impact through their research comes in the form of:

- *Sabbaticals*: We expect around 5% of staff to be on sabbatical at any one time, and there is specific provision for *enterprise* as well as *research* sabbaticals. Recent beneficiaries have been Greenhalgh (2012: preserving RDA assets/archives and developing a property market ‘vitality index’), Pugalis (2013: developing cross-sector relationships) and Richardson (2013: developing a patent from research into concrete mixes);
- *Secondments and attachments*: Pickard’s influential work in S.E. Europe was primed by a two-year secondment to the European Commission in Strasbourg. Our early career researchers, in particular, are encouraged to apply for attachments in industry and practice, and a recent beneficiary (2012/13) has been Ng, who completed a 12-month industrial attachment with Thermacore Europe Ltd (nanofluids in server centre cooling applications);
- *Institutionally-funded competitive PhD studentships* of which a proportion are specifically designated for collaboration with, and matched-funding from industry;
- A researcher development programme and a targeted scheme for conference and visit support.

4. Institutional support and direction

User-led research, commercialisation, knowledge exchange and public engagement are supported through institutional HEIF allocations. The Unit is supported by a Public Engagement Manager, a Business Development Manager, and an academic Enterprise Champion (currently Professor Lockley). Since 2011, we have used CRM software to manage external collaborations and identify potential partners for knowledge exchange activity. We host the regional offices of the RIBA, RICS and Constructing Excellence, and the Unit benefits from the contributions of senior industrialists and professionals in Industry Advisory Panel meetings, where research is a standing agenda item.

c. Strategy and plans

Our objective for maximising research impact is to ensure that the Unit:

- Creates tangible benefits for our main potential beneficiaries;
- Is sensitive to the needs of users and able to identify opportunities to meet them; and
- Has the ability to promote the uptake of appropriate research outcomes for this purpose.

The strategies for achieving these goals are to ensure that staff are aware of opportunities for collaboration and impact in their areas of research work, and of how best to ensure that the

Impact template (REF3a)

outcomes of all research and enterprise projects are fully disseminated and achieve maximum impact. To effect this we ensure that:

- Impact strategies are discussed at each research group's meetings and periodic reviews;
- Impact strategy and pathways to impact are assessed in the internal peer review of all research proposals, and all enterprise proposals are reviewed for research potential;
- New staff attend introductory impact workshops and public engagement and media training is available for all staff;
- All staff have opportunities for enterprise-linked sabbaticals and industrial secondments;
- Research impact will remain an important standing agenda item for our professional/industry advisory panels, and industry-based Visiting Professors will discuss research impact with staff when they visit;
- HEIF funding is used to support knowledge exchange and research impact;
- Support is given for the creation of intellectual property rights and spin-out companies.

The following areas of likely impact have been targeted for future attention and investment:

BIM Group: further uptake of xBIM by users and developers of BIM software and of iCIM and other TSB project outcomes; exploitation of *Virtual Project* training module in the UK and overseas (e.g. in Dubai, Iran, Qatar, Norway, Saudi Arabia, Turkey) through our spin-out company.

SES Group: collaboration with Thermacore Europe Ltd., Sustainable Engine Systems Ltd. and TWI Ltd. to develop novel self-regulating heat pipe thermal storage systems; novel energy modelling software 'DBSim+' with DesignBuilder Software Ltd.; increased uptake of GeoLab North facility.

URAD Group: potential patents of architectural designs with off-site, low-energy lean production, and BIM information content. These include 'Chameleon House' panelised system (with NEBS Projects Ltd) and demountable building system for Chapel-St-Leonard coastal visitor centre, Lincolnshire (completion due 2014).

VRV Group: extension of VNG-type city model service to region (discussion in progress with Sunderland, South Tyneside, Durham, York) and beyond; increased uptake of VNG by developers and designers; exploitation of outcomes of *NSR e-Mobility*, *Subway Climatology* and *Usability of Spatial Environments* projects (featured as future potential in Case Study 3).

d. Relationship to case studies

Case Study 1 (Policy, legislation and funding...in South East Europe) exemplifies the value of a researcher secondment. Professor Pickard's work with the Council of Europe was initiated by the University's support for a two-year research secondment to the Council's HQ, in Strasbourg. The results of this, and of his continuing work have contributed significantly to the Council's Institutional Capacity Building Plan in South East Europe and influenced the national legal and regulatory frameworks of individual Balkan states.

Case Study 2: (Transforming the Built Environment through...IPD and...BIM): Research led by Professors Greenwood (joined 1980) and Lockley (joined 2009) has been supported by around £150,000 of HEIF grants and internal capital investment and by RCUK and TSB grants. Recent TSB projects have resulted in innovations for our industry research partners. The University has supported the formation of *BIM Academy* - underpinning the Government's 'BIM 2016 Agenda' through research-led development in technical and organisational interoperability- and a spin-out company *BIM Academy (Enterprises) Ltd.*, to step-up the impact of our research in this area.

Case Study 3: (The multi-use of co-ordinated virtual city models...) Activity in this area was built on an initial £50,000 capital investment, a further £100,000 from external partners of *Virtual NewcastleGateshead* (at its formation in 2009), and around £250,000 of institutional HEIF funding in the period. There have been three senior academic appointments, four PGR studentships, two RA appointments and increased levels of support from technical staff. The impacts are primarily: (i) upon the planning processes and assessment methodologies of the two local authorities; and (ii) upon the professional practices of developers and architectural and other firms. There are additional artistic and cultural impacts, including support for arts exhibitions and archaeology.