

**Institution: The University of Edinburgh & Heriot-Watt University (the Alliance)**

**Unit of Assessment: 16 – Architecture, Built Environment & Planning**

**a. Context**

The strategic alliance between the University of Edinburgh (UoE) and Heriot-Watt University (HWU), committed to aligning research and knowledge exchange effectively across a full range of relevant disciplines, is given tangible expression in this joint submission; it is between the Edinburgh School of Architecture and Landscape Architecture (ESALA) at UoE and the School of the Built Environment (SBE) at HWU, hereafter referred to as the **Alliance**.

The Alliance is a collaborative group of researchers occupying a unique and prominent position in Scotland and the UK for facilitating multi-disciplinary research across a wide range of areas of interest and influence related to UoA16. Our success in engaging key user groups and in cutting across disciplines has extended our impact globally. We have established a Knowledge Exchange Partnership in 2009 for outreach to non-academic bodies to help make this happen.

Our research addresses a wide range of challenges in architecture, built environment and planning. As such, it impacts upon various stakeholders, from the policy makers who shape the context of our environments to those who plan, design and maintain them and all of us who use them. The Alliance works at a range of scales - from global to local, strategic to grassroots - often with a sequential pathway from macro to micro impact. One example is our work in Sub-Saharan Africa, where our recommendations for more sustainable urban land development have fed into regulation and international guidance, led to collaboration and training with an overseas NGO and culminated in the creation of new private enterprises and residential settlements.

**b. Approach to impact**

Collaboration has been a cornerstone of impact creation in the Alliance since its formation. We operate a single "Research and Commercialisation" office model with 10 support staff expert in promoting all forms of research and routes to impact, including IPR agreements, dissemination and knowledge exchange. Since 2009, this has been strategically managed through the Edinburgh Knowledge Exchange Partnership (EKEP), organised around five themes related to the sustainable lifecycle of the built and natural environments: Designing & Creating; Constructing & Producing; Regulating & Guiding; Using & Evaluating; Interpreting & Challenging. These themes are 'audience-facing' in that they are commonly understood across academia, policy, industry and the wider population, enabling a shared understanding of technical concepts.

The aim of EKEP is to encourage more users to benefit from our research outputs and knowledge exchange. Users comprise stakeholders from all tiers of government, professional practice, industry and the not-for-profit sector. The partnership has consolidated the Alliance's strong, mature and continuing relationships with user groups that our researchers have developed, individually and in consortia, over the years. A new impetus has been achieved by linking across our diversity of existing relationships. Across the Alliance, we have worked with:

International government departments and NGOs, including the World Health Organization, United Nations, European Federation of National Organisations Working with the Homeless (FEANTSA), Development Workshop, the International Council on Monuments and Sites and UNESCO.

National government departments, directorates and agencies, including the Cabinet Office of Japan, Australian Government, Housing NZ, US Federal Government, United States Agency for International Development, Angola Government, HABITAT Angola, UK Department of Energy and Climate Change, UK Department for Communities and Local Government, UK Department for International Development, Carbon Trust, Scottish Government, Architecture and Design Scotland, Homes and Communities Agency, English Heritage, Historic Scotland and RCAHMS.

Local and regional authorities, including the City of Vancouver, Huambo City Administration, Maputo City Administration, Ontario Government, The Highland Council, Western Isles Council, West Lothian Council, South Ayrshire Council, Argyll and Bute Council, East Ayrshire Council, North Lanarkshire Council and the City Councils of Edinburgh, Manchester, Bristol and Westminster.

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Charities, social enterprises, housing associations and schools, including Oxfam, Age UK, Sustrans, the Joseph Rowntree Foundation, Greenspace Scotland, Homeless Link, Thames Reach, Shelter, ARK Housing Association, Castleview Primary School and Portobello High School.

Museums, arts organisations and science festivals, including DOCOMOMO, National Museums Scotland, British Science Festival, London Festival of Architecture, WHALE Arts, the Scottish Mental Health Arts and Film Festival, FutureEverything and the Cockburn Association.

Professional institutions, including the Royal Institute of British Architects, UK Green Building Council, Chartered Institution of Building Services Engineers, Royal Academy of Engineering, Construction Industry Training Board and Chartered Institution of Highways and Transportation.

Industry partners and SMEs, including Mott McDonald, Wylie Shanks Architects, John McAslan + Partners, Michael Laird Architects, Arup, Paul Hensey, SUSTaim, FES Ltd, Anderson Bell + Christie, Mayer Brown, Watson Stonecraft, Fischer GmbH, Navimbuando Lda. and J&D Wilkie.

In close collaboration with these key user groups, we have had an impact on:

- More sustainable land use, including contributions in rapidly urbanising countries, and equitable access to resources, particularly housing.
- More inclusive access to buildings and public spaces for people of all ages, backgrounds and abilities, promoting their better social, physical and mental health.
- Better performing materials and buildings, which offer enhanced social and environmental comfort and resilience, are economic to build, aesthetically pleasing and easy to maintain.
- Better awareness of our existing building stock and heritage, its social and cultural importance and its potential for adaptation and contribution to our low carbon future.

Through EKEP, the Alliance has taken a ‘whole life’ approach to impact, recognising that it is not an ‘add on’, but that it unfolds over the full course of a project. Research Council-funded projects have engaged Advisory Board members as user representatives from the bidding stage, through the research process itself, to dissemination and beyond (as in the Inclusive Design for Getting Outdoors (I'DGO) project, see Case Study 6). Industry partners and researchers have collaborated on solving particular challenges in government-funded projects, such as the HWU project with Wylie Shanks Architects (funded by SEEKIT / CIC Start Online) to demonstrate the feasibility of using Sustainable Building Information Modelling for post-occupancy evaluation. The Partnership has also stimulated industrially co-funded Knowledge Transfer Partnerships (KTPs), for example with Watson Stonecraft (see Case Study 5 on Fabric Formed Concrete), ARK Housing Association and FES Ltd, the latter delivering an energy monitoring system for Facilities Managers in Private Finance Initiative (PFI) schools.

EKEP's emphasis on early collaboration has also led to greater awareness of our research and researchers by those outside the HEI environment, as more users become involved and interactive. A number of Alliance academics are now regarded as expert advisors on ‘real world’ policies, strategies, initiatives and standards, for example: Catharine Ward Thompson on design for health and wellbeing; Glen Bramley on equitable housing allocation; Suzanne Fitzpatrick on homelessness prevention; and Paul Jenkins on Sub-Saharan urban development. Under the Scottish Government Communities Analytical Services Framework 2012, we successfully bid for seven of the eight areas identified in the competitive tender. Our studies have also entered the ‘mainstream’, for example, through publications for the general public (e.g. *Architecture's Evil Empire? The Triumph and Tragedy of Global Modernism* by Miles Glendinning, 950+ copies sold).

Skills and capacity among our early career researchers, as our future ‘experts’, have been developed by promoting internal, inter-disciplinary collaboration. Professionally-oriented teaching and continuing professional development (CPD) activities are supported together with the provision of internal ‘kick-start’ grants. Researchers have accessed facilitation funds – either devolved to research institutes (SBE) or held at college and school level (ESALA) – which are either specifically for knowledge exchange or include KE as an integral component. Alliance funding of some £180k a year is available to support research and knowledge exchange. An example of EKEP supported work is the project by Moffitt (ECR) with Wang, on visualising thermodynamics in design processes, resulting in a competition entry, *An Exothermic Landscape*, for a site on the largest landfill in the world (Fresh Kills on Staten Island, NY), and a publication on how to convey

**Impact template (REF3a)**

computational fluid dynamics steady state modelling and thermal comfort calculations graphically.

Both Alliance institutions provide PhD scholarships that engage non-academic users with direct impact potential. Both also provide dedicated central expertise on IP and company formation. The £6.5m Converge project, with £3m ERDF support (2009-2013), provided 11 KE and support staff for training and business development. One outcome, for instance, has been a £75k studentship funded by Johnstons of Elgin to study energy use in textile production.

The Alliance has also worked with non-academic professionals with expertise in policy liaison and communications. These professionals have been directly embedded in teams (i.e. not employed as consultants), working on Research Council-funded projects such as KT-EQUAL. The strategy has led to a more sophisticated and creative approach to developing and sustaining impact, e.g. creating briefing notes for politicians (I'DGO TOO), as has UoE and HWU membership of the Edinburgh Beltane Public Engagement Network. For example, Jenny Roe was awarded a Beltane Public Engagement Fellowship in 2013 to encourage a more socially diverse range of visitors, especially children, to the Royal Botanic Garden, Edinburgh.

**c. Strategy and plans**

With the formation of EKEP in 2009, the Alliance adopted knowledge exchange as a basic *modus operandi*. The growing number of research users opting for the Alliance as a collaboration partner (evidenced through EKEP event feedback) is testimony to the success of this strategic approach, together with the track record and stature of our researchers. The plan is to build on the five-point EKEP framework. Wherever it is relevant to do so, all projects will move along a sequential impact pathway (either macro to micro, or vice versa), allowing impact to gain momentum and diversify over time. Further synergies between the lifecycle of the built and natural environments will be developed – as reflected in the five EKEP themes – and engagement with the processes strengthened through which evidence-led policy-making trickles down, through local government guidance and legislature, to industry implementation and everyday use.

In support of the broader research strategy set out in REF 5 – a vision to address national and international priorities – we will continue to form strong, multi-disciplinary research teams which address global challenges and which can compete for research funding from a broad range of sources, seeking out funding pathways that encourage and enable impact generation. We will continue to engage users early in the research process, ensuring that all types of stakeholder are involved, from those who use research to make policy to those who need evidence to campaign for change. In order to manage the process effectively, we will formulate impact strategies for each project which identify known and potential stakeholders and routes to engaging with them over the course of the research, from shaping questions to discussing and disseminating findings. We will also identify the most relevant methods, from the provision of expert 'in person' advice, to the production of design and construction exemplars (including digital tools), planning and design guidance, articles in professional journals and the mainstream press, and blogs on online forums.

Our approach relies on our continued investment in maximising the potential of various media (print, broadcast and online) to reach audiences in different ways and to make our resources as useful and user-friendly as possible. We are also committed to consolidating the relationships established with external experts in knowledge exchange, communications and policy liaison, seeking to involve them in the preparation of impact strategies and to embed them, where possible, in research teams. This pathway has already been secured for *Mobility, Mood and Place*, a three-year research project involving Alliance academics from both UoE and HWU which runs from autumn 2013 until 2016, funded by the cross-council Lifelong Health and Wellbeing programme. The inclusion of non-academic practitioners in the team has already engaged additional policy makers at parliamentary events in Brussels and London and at the Local Government Association annual conference in Manchester (July 2013).

The Alliance benefits from access to the University of Edinburgh's Innovative KE fund and Innovative Initiative Grants and from Heriot Watt programmes such as Converge (see above) and the Annual Industry Day (which in 2013 focused on Sustainability in Energy, Water and Quality of Life). Targets for the coming period include conducting regular knowledge exchange events and programmes to cement Edinburgh's reputation as a major centre for architecture, built environment and planning research in Scotland, the UK and internationally, including the Memory Friendly Neighbourhoods project, in partnership with the University of Stirling (recently awarded funding by the Scottish University Insight Institute). Another initiative is to develop Edinburgh as a 'living

laboratory' for new ideas in green design and construction, e.g. through the 2012-funded Projects Office, which supports research-led competition entries and other community engagement.

The Alliance will continue to develop impact skills and capacity among early career researchers through CPD activities, 'kick-start' grants and participation, at all stages, in knowledge exchange events and a 'living laboratory' approach, such as is being used in the Learning Energy Systems programme working with schools across Scotland. We will continue to promote our senior academics as experts, building on, e.g., the success of Speed in winning the Royal Society of Edinburgh's Innovator's Prize for Public Engagement (2013). Indeed, Speed's recent project, *Creating trust through digital traceability: sustainable food chains and new ways to connect producers and consumers* (EP/K012126/1, 2013-14), is an excellent example of the Alliance's future strategic approach. Working with partners such as DEFRA and Red Tractor Assurance from the outset, a range of digital tools will be designed to help stakeholders understand the passage of food 'from field to fork' – a way of linking environment, design and construction that is truly of the digital age.

#### **d. Relationship to case studies**

The case studies included in this submission provide a broad overview of the types of impact the Alliance has achieved, typify its strategic approach to doing so, reflect our wide range of methodologies and partners and demonstrate that the Alliance looks at architecture, built environment and planning through a social lens. They demonstrate that even projects which are essentially 'technical', such as Tarbase (Case Study 4) and Fabric Formed Concrete (Case Study 5), have impacted significantly on societal challenges because of our collaborative, user-centred approach to impact. In both these case studies, the research has involved school children; developing their understanding of construction and the effect it has on climate and the environment. The studies are representative of a larger body of work by the Alliance with the 'users' of tomorrow.

Participatory methods underpin the work of, for example, TOTeM (Case Study 7), which have engendered local community ownership of concepts such as inter-generational storytelling by digital media. At the other end of the scale, TOTeM demonstrates how the Alliance has levered the support of high-level partners, from Oxfam and National Museums Scotland to the BBC, to reach and influence audiences. I'DGO (Case Study 6) is another example, with its network of almost 40 partner organisations from local and national government, industry and the not-for-profit sector.

One of I'DGO's chief successes has been in the production and dissemination of good practice guidance that, with the help of partners, has been taken up locally, nationally and internationally. This type of output is characteristic of Alliance projects, including the work on Homelessness Prevention (Case Study 1), Affordable Housing (Case Study 2), and Rapid Urbanization in Sub-Saharan Africa (Case Study 3). In many cases, such as Affordable Housing, projects combine input into generic guidance with refining tools for specific sites and contexts. Again, the case studies represent a larger body of Alliance work, including the Countryside Wayfinding project by OPENspace, in which a toolkit, when applied to a particular site (the Durham Heritage Coast), trebled visitor numbers, won two awards and attracted £3.5m additional investment.

Guidance and tools help make evidence-based policy meaningful and practicable to industry and front-line agencies. Another Alliance method, reflected in the case studies, is training and continuous professional development. I'DGO (Case Study 6) has provided this for transport engineers, for example, and Jenkins et al (Case Study 3) for urban planners. Other Alliance examples include the collaboration between Abdel-Wahab and the Construction Industry Training Board on providing an immersive training environment for craftworkers.

The case studies demonstrate that institutional support for Alliance impact has allowed our academics to participate in international programmes. It has enabled us to advance the concept of action research, the integration of research with teaching and the pursuit of opportunities such as prizes for design innovation and our Royal Academy of Engineering fellowship. Overall, this has strengthened our global networks and stimulated high-level take-up of our recommendations outside the UK. Reciprocally, projects such as I'DGO have informed routes to impact development for subsequent research proposals within ESALA and beyond.