The Edinburgh Strategic Alliance (ESA)

Research Projects 2017

A joint research endeavour between The Edinburgh School of Architecture and Landscape Architecture, University of Edinburgh and The School of Energy, Geoscience, Infrastructure and Society, Heriot-Watt University.
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INTRODUCTION: THE EDINBURGH STRATEGIC ALLIANCE

The Edinburgh Strategic Alliance (ESA) is the joint research endeavour of The Edinburgh School of Architecture and Landscape Architecture (ESALA, University of Edinburgh) and The School of Energy, Geoscience, Infrastructure and Society (EGIS, Heriot-Watt University).

The ESA is built on interdisciplinarity and on maximising the benefits gained from working at a range of scales and approaches regarding the built environment and the urban. It enables complementary as well as collaborative research by incorporating under one umbrella a diversity of research approaches and fields that are vital for understanding and transforming our built and natural environment. We explore processes, places and spaces over the whole life cycle, from planning to design, construction and usage. Together, we investigate the social, economic and political forces and processes which shape our world and the impact that our built and natural environments have on our health, wellbeing and resilience, our ability to understand our past and to plan our sustainable futures.

For REF2014, ESA prepared a first joint submission, which is the point of departure for the forthcoming REF2021. The joint submission was second in the UK for research power. The ESA has a joint Alliance Research Committee to foster excellence in research and support a range of techniques and approaches to enquiry. We have strategy-formulating away days and focused meetings for the early exchange of information on particular research themes. We are dedicated to developing the talent of postgraduate research students and early career researchers. Opportunities range from working on large, multi-institutional, Research Council-funded studies to taking a leading role on our Kick Start projects. First announced in 2011, the Kick Start programme was developed to stimulate innovative cross-university and multidisciplinary research, and with each project involving both Edinburgh and Heriot-Watt researchers.

This booklet is the first iteration of a research annual, a compendium of current research carried out across the ESA. In its current state it is partial – it does not reflect in a comprehensive manner the entire breadth of research carried out in our two schools. It does not present our research centres and their activities nor does it include all relevant researchers or research projects. However, it does provide an overview and detailed sampling of much of the research at the ESA in 2017. Further information including a comprehensive list of research outputs can be found on the schools’ websites.
CHAPTER 01

Innovative Design
On the Surface is a major retrospective exhibition of the work of metis, the research atelier for art, architecture and urbanism founded by Mark Dorrian and Adrian Hawker and based in ESALA.

On the Surface presented seven projects by metis, which range from installations to large urban restructuring proposals. Working between two contrasting scales, the exhibition examined the complex topographies of the surface in metis’s architecture.

Visitors entering the exhibition encountered a vast drawing on which they walk, carpeting the floor of the gallery. Through this, an internal terrain was inserted within the display space, which was then inhabited by glass display tables that held detailed drawings and models.

The viewers of the exhibition thus not only saw a series of projects, but found themselves – as they travelled across scale and space – active participants in a speculative architectural imaginary, one in which the architectural object is always incommunication with the broader historical, cultural, material and representational conditions of the city or landscape within which it is positioned.

Related Outputs:
STREAMLINES, VORTICES, AND PLUMES: ENVIRONMENTAL MODELS AND THEIR SHIFTING TARGETS

This research by design project uses case study analysis and model prototyping processes to investigate how physical models that materialise fluid environmental processes such as air and water flow act as generative architectural design tools.

Environmental models such as heliodons, wind tunnels, and water tables are generally understood as distinct from the architectural models they test. Architects conventionally design building models that are tested within environmental chambers, built and operated by building scientists or engineers, to yield quantitative insights about environmental performance. This research collapses the distinction between the apparatuses simulating environmental processes and the architectural models they test and explores the potential for both combined to act as contemporary environmental design tools.

Three historic environmental case study models – Étienne-Jules Marey’s wind tunnels (1900-2), Victor and Aladar Olgyay’s thermoheliodon (1955-63), and Alan Berger’s Wetland Machine model (2008) – contextualise the sources of certain persistent issues that continue to inform environmental design in architecture today. Physical prototyping of wind tunnels, water tables, and filling tanks, which simulate pressure and buoyancy driven airflow, give shape, form, and force to fluid environmental processes in turn allowing them to give shape and form to architectural designs. Both text and design-based research investigate the dialogic relationship between environmental representations and their targets, the environmental systems they represent.

Related Publications:


Image courtesy of Lisa Moffitt.
CHAPTER 02

Hybrid Design Processes and Digital Media
DIGITAL CULTURES AND CRISIS ATHENS

The aim of this project is to examine how digital cultures have interacted with the phenomena of the crisis in Athens, Greece – in the context of mass immigration and homelessness, from new forms of community and social spaces, to mass assemblies and street riots, and even the rise of the Right – and have become key facilitators and instruments of these.

The project examines how digital technologies bring together the subjects of the crisis with the global processes with which it is connected and it questions how new technologies could help develop new imaginings and even transform the self and the city in times of crisis. Methodologically, this study moves between on-site and online research in order to examine the physical spaces in which the above conditions take place in relation to their digital projections and therefore it explores the ways in which these phenomena are manifested in the city along with their circulation as images around the world and the impact that these images have.

The simulation of the spaces involved in this process and their online experience gives yet another dimension to all these happenings: the placement of oneself in the body of the ‘other’ along with both the distance and the close connection between the physical and the avatar body creates the space for the further understanding of the public, the common, the political, the other.

Related publications:
In my work, I bring the related themes of place and digital technologies into collision with recurrent topics of global concern. Since the 1990s I have addressed artificial intelligence, technoromanticism, e-commerce, sound, emotion and now nature.

Nature is on the side of the independent, the hopeful, the free, the good and the healthy. Some digital device users think that technology gets in the way of direct access to nature. It is as if urban dwellers are burdened by relentless connectivity, work stress, boredom, and poor health. So, they look to nature to deliver the opposites of these detrimental conditions. It is easy to succumb to the view that nature is what is left in the crucible of human experience purged of bothersome technology and artifice. From this observation I launch into a discussion of the nature-artifice divide and situate it within the world of digital networks, with an emphasis on semiotics, the communicative structures within all things, according to the philosopher Charles Sanders Peirce and his followers.

The books takes us on a journey through attunement, biophilia, big data, bio- and geo-semiotics, bio-hacking, biomimetic design, nature games, zoo-space, refuge, numinous nature and myths of self-reliance. If we have learned anything from politicians skilled at manipulating and trading in populist opinion, it is that words and meanings really do matter, as does truth. Signs are crucial in understanding the environment and the complex discourses it entails. Semiotics supports this challenge. The stakes have never been higher, considering the threats we face, and how much we depend on the natural environment.

Related publications:

Prototypes of dissent: subverting data-based design practices to reconstruct the public domain(s)

A critical analysis of technology-oriented design practices, grounded on the notion of ‘sensing’ and focusing on the development of physical, real-time responses to ‘sensed’ data streams within the context of urban public space.

This project critically addresses techno-informational practices gravitating around the notion of ‘sensing’ and focusing on the development of physical, real-time responses to ‘sensed’ data streams within the specific context of urban public space. The processes and outputs of these practices are interrogated from both a representational and a socio-political perspective, highlighting the affordances and limitations emerging at the intersection of both domains. This foregrounds the critical agency of these modes of collective representation in both the production and the transformation of urban public space, and also emphasises the non-neutral role of digital technologies in shaping these processes.

Further to this, ongoing work attempts to articulate a methodological counter-project to the predominantly top-bottom, technocratic incarnations of these practices, thus subverting the prevalent discourses of the ‘urban sensing’ project – such as optimisation, efficiency, atomisation and ‘smartness’. These counter-methodologies operate within the same technical domain – actively engaging with available digital data sensing and processing techniques. However, they explicitly foster the emergence of both individual and shared human subjectivities through the critically informed development of a sequence of operations hybridising materiality and data: Sensing Instruments, Maps, Games and Responsive Prototypes.

These subjectively ‘sensed’ materials and the resulting ‘responsive prototypes’ tackle issues concerning friction and collectiveness, and formalise design narratives that explicitly re-situate the locus of operation in the domain of the commons.

This take on digital, data-based design endeavours to open a space for critical reflection on terms such as ‘flow’ or ‘network’, acknowledging their non-neutral political nature but also their potential to inform creative strategies that actively resist the mainstream discourses of public space governance.

By: Miguel Paredes
University of Edinburgh

Funding: Erasmus + Staff mobility grants
External funding from the Università degli studi di Cagliari

Year: 2015 – 2019
Advanced immersive VR Hub at Fife College for training wind turbine maintenance apprentices.

This project develops an innovative immersive VR technology called immersive Hybrid Reality. This system effectively blends the local real world within the virtual environment experienced by the user. This particularly enables users to see themselves (hands, legs) but also their tools, etc. This system uniquely responds to the need to develop VR technology that is compatible with the demands of trade training, mainly physical contact and manipulation, while providing the means to safely locate trainees in challenging environments.

The system is deployed in two colleges, but particularly here at Fife College for the training of wind turbine maintenance apprentices.

The project received numerous awards, and mobile versions of the system have been deployed for us in public engagement events, e.g. to engage young people on careers in STEM subjects.

Related outputs:
Digital visualisation solution for in-field visualisation of Building Information Models from any location, in real-time.

UrbanPlanAR

The solution is a disruptive technology providing a 21st century alternative to desktop-based or VR assessment without outsourcing, remodelling or expensive proprietary systems. UrbanPlanAR solves problems of:

- Accurate urban location positioning – without the reliance on GNSS and only using affordable off-the-shelf consumer tablets
- Disenfranchised stakeholders – by creating visualisations (impact assessments) personalised to their location in real-time
- Late stage visualisation after design completion – by enabling integration and viewpoints throughout a project lifecycle at no additional cost
- Remove expensive duplication in modelling – by providing a data pipeline integrated with existing tools and flowlines from major vendors

In order to:

- Maximise reuse through existing investment in BIM and digital design
- Provide accessible understanding of impact from within local communities
- Deliver and share data for immediacy and relevance
- Create trustworthy visualisations to enable better decision making

We use localisation, augmented reality, BIM and 3D mobile technology to create software that delivers contextual information at the point of need. Our software aligns with the beliefs and vision of leading organisations such as Architecture and Design Scotland (ADS) whose objectives are to:

- Help create better buildings, streets and sustainable places
- Encourage more people to get involved in making sustainable places
- Increase the understanding of architecture and design within the planning system
- Promote architecture and design nationally and internationally
- Provide leadership for our sector
- Deliver high-quality services which are continually improving

Related outputs:


Bosché projects are at https://web.sbe.hw.ac.uk/fbosche/index.html
CHAPTER 03

Health, Wellbeing and Environment
Wearable and wireless body area network system for body motion tracking with a view on enhancing health and productivity performance among trade workers.

This project, initially funded by CITB, aims to develop a wearable wireless body area networks composed of inertial sensors. The sensors are worn on the limbs of the user and enable tracking in real-time of its motion without location restrictions (no wires on the body or connecting the system to a computer or battery). The system is developed to more effectively assess the motions of trade workers, e.g. in construction, and provide them with feedback to help them better manage their body to sustain a long career.

This is critical because MSDs are significant source of sick days or lower productivity in sectors like construction. Furthermore, colleges hardly teach anything on the topic, and do not provide ergonomics feedback to their trainee.

The system has been trialled at Forth Valley College where the students and staff provided very positive feedback, and wish to identify a way forward to more systematic use of the technology. Trials have been made with Scottish Water as well, regarding trenching works.

Related outputs:
CYCLE IMPACT
ASSESSMENT OF
ORTHOPAEDIC SURGERY

An environmental input-output analysis of total knee and total hip replacement surgery at Borders General Hospital.

This project aims to carry out a short (3 month) pilot study of the Life Cycle Carbon Assessment (LCCA) of orthopaedic surgery at Borders General Hospital.

Specifically, it will carry out a pilot LCCA of a typical knee replacement operation, with a view to expanding this pilot to other orthopaedic or surgical procedures, wider environmental impacts, and possibly to understanding better the social and financial burdens of an ageing population on orthopaedic and surgical services.

This research proposes to use the Process LCA methodology to assess the marginal CO2e impact of a typical knee replacement operation in terms of the implant and materials required, packaging, theatre energy environments, water use, commercial waste, clinical waste and medical resources necessary. At this stage it excludes inputs like transport to and from the hospital, impact of bed-nights occupied, physiotherapy and after-care etc, although these may be added to a larger future bid.
IMPROVING WELLBEING THROUGH URBAN NATURE (IWUN): INTEGRATING GREEN BLUE INFRASTRUCTURE AND HEALTH SERVICE VALUATION AND DELIVERY

IWUN studies the interaction within Sheffield between people, their local natural environment and their health and wellbeing.

Improving Wellbeing through Urban Nature (IWUN) is a three-year research project as part of the Natural Environment Research Council’s Valuing Nature Programme. The project aims to find out more about how a city’s natural environment can improve the health and wellbeing of its residents, and especially those with disproportionately high levels of poor health. The city of Sheffield, UK, will be the city wide case study and we will use a range of methods, to investigate people’s relationships with Sheffield’s parks and green spaces. These include secondary data analysis, interviews, arts based focus groups, a specially designed smartphone app, economic analysis, and a review of existing nature based solution interventions. This will culminate in providing evidence-based decision aids for place ‘makers’, ‘keepers’ and ‘prescribers’.

IWUN consists of four work packages ranging from determining relationships between place based geographic, biodiversity, and health data; examining nature values; the power of apps to enhance noticing nature, and developing a new green paradigm to improve planning and health and social care.

Dr Sarah Payne at Heriot-Watt University contributes on work package two, which explores cultures and values of nature and health and wellbeing with a specific aim of reflecting upon a diverse society and subsequent range of values towards all forms of nature.

Website
www.iwun.uk/

Twitter
@IWUNproject

Sarah Payne, IWUN.
Courtesy of Sarah Payne.
MOBILITY, MOOD AND PLACE (MMP)

A research project exploring what makes mobility easy, enjoyable and meaningful for older people.

We are also exploring how places can be designed collaboratively to support outdoor activity, health, wellbeing and community engagement as people age. Being able to get outdoors is essential for maintaining health and wellbeing into later life, but many older people find it becomes less easy, enjoyable and meaningful as they age. The Mobility, Mood and Place (MMP) research project has been exploring how places can be designed collaboratively to support older people’s outdoor activity, health, wellbeing and community engagement.

Drawing on the participation of over 900 people, most of whom were aged 60+, our research shows how innovative neuroscience methods and co-design techniques offer new opportunities to understand older people’s response to place.

Among other findings, it reveals that four qualities of places really make a difference to quality of life: access for all, access to nature, access to others and access to light, that green spaces seem to be restorative, and that even a short walk can lift the mood if the environment is sufficiently varied.

Particularly through our life course and archival work, MMP suggests that healthy ageing begins much earlier in life than we currently plan for, meaning that we need to take very long term views on fostering resilience for healthy older age.

The research has made a particular contribution to research-led teaching within ESALA, involving 84 students across four years of studio and site-based co-design work in London, Manchester, the Scottish islands of Orkney, and Copenhagen.

The project has been supported by a Study Steering Group of five external advisors. Impact Acceleration Award partners include Forestry Commission Scotland and Scottish Government Public Health Research Programme (project number 10/3005/18). The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the Public Health Research Programme, NIHR, NHS or the Department of Health. Impact Acceleration Award (IAA) funding: The Economic and Social Research Council (ESRC). Partners include Forestry Commission Scotland, Scottish Government and Scottish Natural Heritage.
Related outputs:


Website
www.mobilitymoodplace.ac.uk
Working towards developing age-friendly cities and communities that support older adults right to age in place.

Given the rapid growth of ageing populations in many cities, the importance of developing appropriate design interventions to enable active and healthy lifestyles for older residents is more urgent than ever. *Place-Making with Older Adults: Towards Age-Friendly Communities*, through a comparative study of cities in Brazil and the UK, explores the role of sense of place in promoting age friendly urban spaces. Drawing on a total of 18 neighbourhoods in 6 different Brazilian (Brasilia, Pelotas and Porto Alegre) and British cities (Edinburgh, Glasgow and Manchester), the project will undertake surveys, interviews and a range of experimental methods such as ‘go along’ walks, video diaries and community mapping. The findings will help provide a clearer picture of how sense of place is experienced by older residents and how this can be incorporated into improved design and service delivery.

The results will also be integrated into a variety of tools and resources to support communities, policy makers and practitioners in the development of age friendly cities.

**Related outputs:**


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**EaSA Lead:** Ryan Woolrych  
*Heriot-Watt University*

**With:**
- Harry Smith
- Soledad Garcia-Ferrari
- Judith Sixsmith
- Michael Murray
- Jenny Fisher
- Rebecca Lawthom
- Meiko Makita

**Funding:** £384,745 for UK component  
ESRC Urban Transformations in Brazil (Newton)

**Year:** 2016 – 2019
Ryan Woolrych, participatory mapping. Image courtesy of the author.
**Woods In and Around Towns (WIAT): Influences on Psychological Wellbeing in Deprived Urban Areas**

Do physical interventions to improve the appearance and usability of local woodlands, accompanied by community activities in the woodlands, reduce stress levels and increase physical activity and connectedness to nature in deprived urban communities?

Woods In and Around Towns (WIAT) is a Forestry Commission Scotland initiative to improve quality of life in Scotland’s urban and post-industrial areas through community access to new or regenerated woodland. In ten years, WIAT has brought 11,000 hectares of neglected woodland back into active management, created 1,400 hectares of new urban woodland and created or upgraded over 300 miles of footpaths.

Building on evidence that green spaces may positively influence mental health, our study has looked specifically at WIAT’s impact on the psychological wellbeing and stress levels of people living in deprived communities. It was designed to take advantage of WIAT as a natural experiment along Scotland’s ‘central belt’.

The controlled study has involved a repeat cross-sectional survey of residents living within 1.5km of six Scottish sites: three where local woods have been changed, through new paths and signage, for example, and social programmes to encourage woodland use; and three where no changes have been made. Data has been collected in three waves: before any changes were made (2013); after physical changes were made (2014); and again after further social interventions had taken place (2015).

A health economics analysis has assessed the cost consequences of each stage of intervention in relation to outcomes such as mental wellbeing, and self-reported levels of physical activity, perception and use of the woodlands, connectedness to nature and social cohesion.

The impact project, *Public landscapes for public health*, increases our capacity for sharing findings with relevant stakeholders, from Government departments, to public agencies, local authorities and private landowners.

The project has been supported by a Study Steering Group of five external advisors. Impact Acceleration Award partners include Forestry Commission Scotland and Scottish Government.

The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the Public Health Research Programme, NIHR, NHS or the Department of Health.
Related outputs:

MEDELLIN URBAN INNOVATION

Harnessing innovation in city development for social equity and wellbeing – a critical proposal to build on Medellin’s experience as a model for Colombian future cities.

After decades of internal conflict, Colombia is experiencing a period of rapid economic growth and urbanisation. It remains, however, one of the most socially unequal countries in Latin America. Medellin has pioneered innovative forms of city planning and management and was acclaimed the most innovative city in the world. Hosting the World Urban Forum in 2014 allowed it to showcase its approach, key elements of which have been: creation of innovative transport infrastructure linking poorer peripheral districts to the city centre; culture-led regeneration; strong support of local development from the local business sector; and a successful municipally-owned utilities company.

However, an initial study of the implementation of this planning approach undertaken by Edinburgh and Heriot-Watt Universities with Universidad Santo Tomas shows that: the city is spreading outwards without services and employment being provided; new low-income developments are replicating high-rise models which failed worldwide; there is limited intervention in the existing informal areas, many being in highly vulnerable locations where the level of risk is likely to increase with climate change; development has little regard for topography and ecological considerations; investment in accessible and good quality public space is restricted to some areas; the quality of the public realm does not always support health and wellbeing of the ageing population.

The proposed institutional links collaboration will identify means to make Medellin a more socially equitable and environmentally sustainable city, through two interlinked components:

1. A research programme focusing on developing expertise in:
   (a) local heritage and culture; 
   (b) public realm, green infrastructure and wellbeing; 
   (c) housing; and (d) mobility and socio-economic integration.

2. A knowledge exchange and training programme open to Colombian practitioners, policy makers and students based on the themes above.
ORDER AND DISORDER IN URBAN SPACE AND FORM

Order and Disorder is a joint-author research and publication project which will result in a significant monograph (80,000 words) to be published in 2018 by Routledge.

This book critically reviews the development of the concept of spatial order in modern urban form from the European Enlightenment, how this has been translated into precepts of urban design, how in turn these have been translated to very different political, economic, social and cultural contexts and how these are now significantly challenged in the emerging cities of today. It argues that social order has more fundamental importance than ordered urban form in creating places in cities, and that urban designers, planners, architects and engineers and other built environment professionals need to base their approach to the moulding of urban space and new urban forms into urban places on deeper inter-disciplinary understanding of underlying social order.

The Enlightenment was the basis for a new attitude to the production of the built environment, stressing the role of the individual in design/planning, within the social control of professional and stylistic peer-groups. From this historical point perceptions of the relationship between space and society became increasingly institutionalised, albeit the actual development of space has continued to elude this conceptual ordering. This is no more obvious than in the rapidly urbanising Global South, where contemporary perceptions of space and form emphasise disorder, although what produces urban space and form is collective social order beyond the above institutionalisation processes. Despite this, perceptions of city space worldwide continue to be focused on attempts at institutional ordering based on concepts of ordered form.

The book argues that these attempts to institutionally order space and form are actually negative in most rapidly urbanising contexts despite their overlay of social betterment, and are often the basis for political and economic exploitation. A different approach to emerging urban space and form therefore needs to start from an understanding of the cultural imaginaries and social constructs that underpin the production of most city fabric and engage with these concepts and organisational forms to improve urban life for the majority.
RESILIENCE OR RESISTANCE?
NEGOTIATED MITIGATION OF LANDSLIDE RISKS IN INFORMAL SETTLEMENTS IN MEDELLIN

Exploring and testing community-led approaches to negotiated mitigation of landslide risks in informal settlements in Medellin, Colombia.

This project explores the scope for, and acceptability of, landslide risk-reducing strategies for informal settlements from the community and state perspectives; to understand the barriers to landslide risk-reducing strategies; and identify politically and practically viable approaches to landslide risk-reducing strategies within a wider and more complex context of social and physical risk. It does so in the city of Medellin, Colombia, which has received many accolades for its urban planning and design and has become a ‘model’ for cities elsewhere. Despite the city’s successes, informal settlement growth on land at risk of landslides continues to be a major problem due to its topography.

Lessons learnt about landslide risk management in this city have the potential to be easily disseminated across the developing world.

The project will provide:

1. A functioning pilot community-managed landslide risk mitigation monitoring scheme, which will serve as a model to be replicated elsewhere after improvements based on the evaluation;

2. Pilot individual house risk-mitigating improvements as exemplars in the (informal) community;

3. Raised understanding and awareness of perceptions of risk and techniques and strategies that can mitigate landslide risk in informal settlements through collaborative action;

4. Identification of key questions around the interaction between technical, social, cultural and organisational knowledges to address in further research on landslide risk mitigation.
Inequalities in distribution of resources, questions of democracy, justice and fairness have dominated the urban agenda.

This research project takes a close look at Edinburgh and Scottish Planning, with the intention to problematize the current urban processes and conditions, to expose the power structures and forces shaping the city.

Cities have been the key site of protest by mass social movements in recent years; but they are also the object of protests and contestation regarding urban development and redevelopment.
**WATERFRONT REGENERATION IN SCOTLAND**

Exploring the potential for successful place-making in Scotland’s major waterfront regeneration projects.

The 2008 financial crisis and the subsequent recession have had a great impact on the economic development of Scotland, as well as of other parts of the UK and Europe, causing a dramatic slow-down in urban regeneration and urban development activities. Urban policy-making during this period has not stalled however, with new strategies, policies and guidance being formulated at both national level (e.g. the Scottish Planning Policy, National Planning Framework 3, etc.) and local level (e.g. City of Edinburgh Council’s Proposed Local Development Plan and the Edinburgh Design Guidance). With the expected upturn in the economy there is a need to understand how these policy and guidance frameworks can be best implemented to unlock the social, economic and environmental potential of urban regeneration in Scotland.

With the current major waterfront regeneration projects across the three Central Belt cities of Glasgow, Dundee and Edinburgh accounting for a large proportion of overall urban regeneration in Scotland, these provide a key opportunity to test the aspirations and strategies proposed in policy and guidance against the practical drivers and barriers of institutional arrangements and socio-economic conditions. Lessons can be drawn from past experience in waterfront regeneration in Scotland as well as internationally. In addition, such lessons may be applicable to new and future waterfront regeneration initiatives elsewhere in Scotland, including in less urbanised areas such as in the Highlands and Islands.

This project builds on earlier action-research on waterfront regeneration around the North Sea funded by the European Regional Development Fund Interreg III B North Sea Programme 2003-2007, http://archive.northsearegion.eu/iiiib/projectpresentation/details/?tid=19&theme=6

**Related outputs:**


EDUCATION, TECHNOLOGY AND PLAY: THE DEVELOPMENT AND TRANSFORMATION OF JOAN LITTLEWOOD’S FUN PALACE PROGRAMME DURING THE 1960S AND 70S

This research represents a new kind of critical investigation of the renowned Fun Palace as an emancipatory educational and civic cultural programme developed in London between 1961 and 1975.

Crafted though the interdisciplinary collaboration between the radical theatre entrepreneur Joan Littlewood, architect Cedric Price, cyberneticist Gordon Pask amongst others, it aimed to construct situations in which self-directed and playful exchange could activate audiences. By 1964 the Fun Palace had gained momentum, and a giant cybernetic infrastructure was depicted within the Civic Trust’s plans for Lea Valley. However, by the end of the decade, its social ambitions were conveyed in a series of community-led temporary and local playgrounds emergent in Stratford East. Constantly struggling for a site in the institutional map of London, the Fun Palace would be realised as a media event, through the different representations designed to promote the ambitious idea during the 1960s and 70s.

Paying close attention to the crucial role of Littlewood in the development and transformation of the programme, this study aims to analyse this mobile educational idea in its full complexity. Significantly, this research will contextualize historically the ideological investment in the concepts of pleasure and play informing the project, and the hopes attached to them. A close examination of the specific representations held in the archives and their related media contexts, will unveil the role played by communications technology in distributing democratic ambitions amidst an affluent Britain. Ultimately, the research enquires into the critical role of play and technology, in advancing informal and self-directed educational ideals as routes to the constitution of new kinds of subjectivity, at a time of momentous social, political and economic change.

Related publications:
The focus of the book is the reception of US visual art in the writings of non-Anglophone art historians, artists and critics in Europe between 1945 – 90.

This timespan opens up exciting opportunities to re-think and explore the ideological, social, economic, aesthetic, and didactic positions on which European responses to American art were grounded. This timespan opens up exciting opportunities to re-think and explore the ideological, social, economic, aesthetic, and didactic positions on which European responses to American art were grounded. The starting point of 1945 marks the division between what has been called ‘Historical American Art’ and ‘Contemporary American Art’ (see Barbara Groseclose and Jochen Wierich, eds., Internationalizing the History of Art, 2009). As the latter was more internationalist in outlook, it naturally stimulated a more vigorous response across the globe in non-English-speaking cultures.

Related publications:
Publication is scheduled for February 2019, to coincide with the annual conference of the US College Art Association.
HISTORIC DIGITAL SURVEY II

Enhancing performance and objectivity of historic building surveying using modern reality capture technology, machine learning and BIM.

This on-going project is developing new solutions to enhance the performance (time) and robustness of defect detection, classification and recording when surveying a historic building. Focus to date has been stone masonry. The project particularly investigates laser scanning and photogrammetry as modern reality capture technology, innovative algorithms for stone segmentation, machine learning as a robust and objective way to classify defect, and integration with BIM technologies and processes.

Related outputs:


‘Loudoun’ explores landscape design and architecture in Scotland c.1700. It uses various film techniques – animation, aerial photography, dramatisation, still photography – to communicate inaccessible fragile archives and complex history with greater immediacy to non-expert audiences.

An atmospheric, narrative driven film that explores new possibilities for various film techniques to communicate complex ideas with greater immediacy to non-expert audiences. To present fragile, inaccessible drawings of great historical value to a wider public, and to enhance awareness of landscape design c.1700.

Two boys – Lord Mar and Lord Loudoun, aged 11 and 15, at Loudoun Castle in 1690 grieve the death of their parents. Both inherit aristocratic titles but they struggle to meet social expectations. How can they commemorate their lost parents and do their duty?

They read 17th-century metaphysical and Latin texts, play games of cards and dice, tell tales of ancient victories – sadness and hope inspire them to design a garden commemorating their dead parents? Later, Mar becomes the principal designer of this new style in Scotland.

Academic sources will be cited throughout. Authenticity will contrast with imaginary animated sequences of authentic early 18th century drawings but treated in a whimsical and entertaining way. The film begins with the boys at Loudoun Castle, Ayrshire discussing their design.

This is followed by aerial and drone photography of existing designed landscapes, images of maps, plans and original drawings to explain the characteristics and style of these formal landscapes.

To enhance audience engagement, Mar’s drawings are animated – a drawing for banqueting house has talking statues who play a jig and a sketch of peasants who dance to it; on another drawing, figures of Highlanders converse in Gaelic (translation supplied) and play a lament on their bagpipes.
MASS HOUSING. MODERN ARCHITECTURE AND STATE POWER: A GLOBAL HISTORY

Mass Housing will provide a comprehensive global history of the interaction of modern architecture and state power round the cause of ‘homes for the people’.

Mass Housing is a single-author research and publication project which will result in a major (500 pages+) monograph to be published in 2020 by Bloomsbury Academic Press. Its focal subject is the vast drive after 1945 to provide “homes for the people”, which was one of the world’s most ubiquitous modern architectural programmes, and a central legitimizing pillar of nation-states worldwide; yet it also reflected the strong transnational cultural theme of egalitarian Modernist transformation. Recently, in most European and Western countries, this national/international legacy has undergone waves of disillusionment and attempted revitalization. But its sheer scale and controversial character have seemed too overwhelming to allow any effective global historical overview. There is growing interest in the story of mass housing, but historical accounts are so far restricted to a national/regional/local level.

This book will, for the first time, tie these fragmented sub-themes into an authoritative narrative of the global movement of Modernist mass-housing production, from its European roots around 1900 to its recent dramatic resurgence in Eastern Asia, acknowledging both its linking themes and its diversity. It traces a century of furious campaigning, focusing on intense high-production “hotspots” in the post-1945 years, but contextualising these with backdrop phases. Its overarching theme is the interaction of Modernist ideology and expansive state power in the ‘housing-drives’ of the ‘long 20th century’. Reflecting mass housing’s regional diversity, the book’s overriding narrative incorporates a geographically-arranged secondary structure. Framed by chronological introductory and concluding sections (Parts I, III), the central section (Part II), covering the focal 1945-1989 era, outlines the world’s key mass-housing ‘campaigns’, spanning all continents and all major countries.

The book firmly integrates the architectural and city-planning practices of Modernism with the key contextual factors shaping housing production, such as politico-cultural ideology, socio-economic influences and building construction/organisation. This, in turn, will allow exploration of broader meta-narratives, such as the relationship of architecture as a whole to state-building and cultural/political ideology. This represents a ‘globalised’ expansion of the chronological/geographical/thematic formula of my 1994 book on UK housing (with Stefan Muthesius), Tower Block. Compiling this story involves literature-surveys and extensive fieldwork in all continents of the world.

Related Outputs:

Tower Block: www.fields.eca.ac.uk/gis/ TowerBlock.pdf
Between the 1950s and the 1980s, a wave of theatre-building led to the construction of often substantial new theatres across the length and breadth of England, Scotland, and Wales. The vast majority were – unlike pre-1939 theatres – supported by public subsidies, both in terms of their construction and operation. In this respect, the introduction of a system of public subsidy in the late 1940s had recast culture as an arm of the nascent Welfare State, in which access to the arts was understood as a basic right and a way to counterbalance the potential materialism of an increasingly affluent society.

Britain’s new theatres were shaped by a range of individuals and organisations, including local theatre companies whose newly subsidised status allowed them to improve their work and expand their horizons. Local authorities were often keen to promote theatre building as an expression of their ambitions and to stimulate civic pride: many theatres were included in larger ‘civic’ developments and comprehensive redevelopment schemes. Architects, meanwhile, embraced the possibilities of what Peter Moro – one of several designers who specialised in the type – dubbed the ultimate building for its balance of public and private functions, its symbolic potential, and its technical complexity.

This project has led to journal articles, magazine contributions, conference presentations, and a Knowledge Exchange project with The Theatres Trust. The principal output is a book of 120,000 words (Oxford University Press, 2018), which, by setting these buildings in a wider context, also sheds new light on the architectural and social histories of post-war Britain.

Related publications:


Eden Court Theatre, Inverness (1976), photograph by A. Fair.
PUBLIC HOUSING IN HONG KONG: AN ARCHITECTURAL AND POLICY HISTORY

A History of Public Housing in Hong Kong will provide an in-depth history of the political, organisational and architectural aspects of the world’s most daring public housing programme.

How did this astonishingly bold building campaign come about – so different from anything before it in the century-long global saga of public housing? While some existing books deal with fragments of this subject, this is the first to address it in its entirety. This is a subject of high intrinsic historical interest: one of the most dramatic episodes in the history of the building of the modern, post-1945 world, and one which, remarkably, still continues today. Here, the book establishes what was built and why, based on methodical historical explanation of archive sources and recollections of key participants as well as field-based inventorisation of the built patterns. And it contextualises the programme within the wider global narratives of mass housing and of late British colonialism, especially through comparisons with the parallel housing drive in decolonising Singapore.

In the process, the book counterbalances the portrayals, in most Western countries, of public housing’s story as a pre-ordained ‘failure’.
Scotch Baronial: The Architecture of Scottish National Identity

Scotch Baronial (co-authored with Aonghus MacKechnie) will fill the longstanding gap between architectural and politico-cultural analyses of Scottish ‘national identity’ through a politically-framed examination of Scotland’s ‘castellated’ architecture, especially during the ‘unionist centuries’ from 1603 onwards.

Scotch Baronial is a joint-author research and publication project which will result in a significant (85,000 words+) monograph to be published in 2019 by Bloomsbury Academic.

Scotland’s politics have always been expressed in its architecture, but nobody has narrated that connection. Architectural and documentary historians have avoided each other’s ‘territory’. This book fills that gap through a politically-framed examination of Scotland’s ‘castellated’ architecture, especially during the three ‘unionist centuries’ from 1603.

During those years, Scottish nationalism was assertively maintained, in a form very different from today, focused on parity of esteem within Union and Empire – and the monumental forms of architecture played a central role within that discourse. Our book encompasses all the principal public architectural works of 16th-19th century secular ‘castellated’ Scottish architecture, from the palaces left behind by the ‘lost’ monarchy to the story’s climax – the proud ‘Scotch Baronial’ country mansions and town halls of the Victorian age. The book will ‘introduce’ to an international audience the world’s first self-consciously ‘nationalist’ architecture, and we do so from a strongly document-based research angle, referencing both manuscript and contemporary publications.

None of this has been done before. We begin with the wider context of early-modern European politics, moving on to address the growth of Romanticism and nationalism at an international level, explaining the pioneering architectural role played by ‘Imperial’ Scotland. We finish with the shock of World War I, and a new and paradoxical age in which an independence-orientated political Scottish nationalism emerged while the ‘Castle Age’ finally expired.
SCOTTISH RENAISSANCE AND BAROQUE ARCHITECTURE, C. 1370 – 1750

The book consolidates and extends twenty years of work challenging the dominant inferiorist interpretation of Scottish early modern architecture.

Scottish Renaissance and Baroque Architecture comprises nine main chapters: the Indigenous Renaissance; Italianate influence; French fashion; the Northern Renaissance: Iberian currents; the Salomonic theme; Baronial revivalism; Scottish Baroque; Scotland’s influence on European architecture. Some of the ideas chapters have been published in articles. After some initial scepticism, they have been well received by scholars and appear in standard works such as Glendinning and MacKechnie’s Scottish Architecture. Bringing them together in a book with new research is intended to ensure that these ideas enter the mainstream and make Scots and the rest of the world recognise significance of the architectural achievements of their early modern ancestors.

This book sets out to change the paradigm that Scottish architecture was backward and provincial until the union with England. It demonstrates that Scotland was the first country in northern Europe to participate architecturally in the Renaissance and was fully engaged in receiving and transmitting the latest currents of architectural fashions.
The National Health Service: Towards an Architectural History

The National Health Service was a fundamental component of the post-war British Welfare State. It was implicated not only in the transformation of public health but also, in its architecture, the image of a modern country.

This piece of research examines the architectural consequences of the 1962 Hospital Plan, which called for a major programme of construction. Few hospitals had been built during the 1950s; after 1962, the pace substantially increased, prompting research and debate in all aspects of hospital design and construction. To date, however, architectural historians have not seriously engaged with these buildings. Few were designed by well-known architects; few were ever completed as intended.

The work has three objectives:

• To contextualise the 1962 Hospital Plan within a wider programme of state-led technocratic modernisation

• To examine the hospital architecture of the 1960s and 1970s, exploring how developments in Britain were informed by such work as the 1955 Nuffield study, practice abroad, and developments in other spheres.

• To identify key examples of the period and to understand how national policy and debate shaped local practice.
CHAPTER 06

Culture and Theory
Drawing is central to architecture and allows us to discern/discover the essentials of design. This project examines the informal architecture of mobile street food vendors (in SE Asia) and celebrates the aesthetic and societal value of a myriad of nomadic stalls as the antithesis of the sanitized food court.

South East Asia, and Bangkok in particular, is justifiably renown for its vibrant street food, and books such as David Thompson’s epic *Thai Street Food* (2009) have catalogued individual recipes but the means by which street food is delivered seems to have been largely overlooked. This project focuses on the mobile architecture of the vendors’ trollies, carts and wagons. Each stall holder’s wagon is highly personalized and bespoke to the particular food/snack for sale. Each stall is a small-scale (temporary) intervention in the public realm which connects to a wider network.

Having spent a month in Bangkok, Mark Cousins completed 31 drawings (one for each day in January 2017) and took some 1,800 photographs. The drawings employ pencil, pen and crayon and endeavour to capture something of the small scale dynamism which the city authorities seem determined to expunge (see article in *The Guardian*, dated 18th April 2017).

**Related output:**


**ARCHITECTURE IN SOUTH EAST ASIA**
THE ARCHITECT’S SKETCHBOOK:
HISTORIES, MATERIALS, TECHNOLOGIES

Studying the historical conditions of emergence of the architect’s sketchbook as a material object, a disciplinary tool, and an instrument of self-fashioning; its transformations across the modern period; its relation to changing technological, material and ideological networks.

Architects’ sketchbooks have usually been considered in relation to specific bodies of work as evidence of particular experiences, design processes and suchlike. This study moves away from what have to date been primarily biographical readings of the sketchbook in order to address it in its own right as a historical, material, and even technological form.

It is interested in questions of the historical conditions of emergence of the architect’s sketchbook as a material object, a disciplinary tool, and an instrument of self-fashioning; its transformations across the modern period (taken here as the early-eighteenth century to the present); its relation to changing technological, material and ideological networks (involving, for example, paper manufacture, drawing instrumentation, technologies of travel – but also aesthetic ideologies, concepts of self-edification, markers of cultural authority, etc.)

The research, which will develop through close readings of selected examples of sketchbooks held in archives, takes a broad cultural-historical approach to its material, informed by recent critical work on historical forms of media and representation.

The outcome of the study will be a major illustrated paper that opens up a new approach to scholarship on the architect’s sketchbook. While the paper will be a stand-alone piece in its own right, it will stimulate and orientate furtherwork on the topic and thereby engage both specialist interest groups (architects and architectural scholars, curators, etc.) and broader publics.
COLOUR IN SPACE:  
MYTHS AND 
MISUNDERSTANDINGS

Revisiting the persistence of dogmas in colour design – an international collaboration to enhance and inform the practice, industry and teaching of colour in architecture.

The project will investigate, question and distil current research and presently accepted / perpetuated norms in relation to the perception of colour in space, using examples predominately drawn from architectural settings. The perception of colour in space is known to be a complex phenomenon experienced through a range of factors and influences: human, intellectual, physiological, psychology, cultural and social. Colour design cannot therefore follow universally applicable rules, yet there is an apparent demand for guidance. In the absence of clarity, dogmas for colour design proliferate, often based on misunderstood or limited factors. Are any of these valid?

The aim of the research is to enhance and inform the practice, industry and teaching of colour design.

Research on colour in three-dimensional settings is understood to be relatively neglected in comparison with graphic design, product design, textiles and digital media. Colour needs to be considered in an holistic, situated context of time, place, function and culture. In a post-positivist age of ambiguity and uncertainty, how do we understand colour in space? Often colour is a loosely used term for hue, but which properties of colour (lightness, chromacity, quantity, material surface) and which properties of space, (light, function, neighbourhoods) are most significant?

Relevant publications:

An archaeology of the ways in which late-modern technoscientific culture has addressed itself to – and has imagined projecting itself into – the deep future.

This book aims to develop an archaeology of the ways in which late-modern technoscientific culture has addressed itself to – and has imagined projecting itself into – the deep future.

Developing out of a background within which theories of the earth, natural history, speculative fiction and military-industrial advancement are closely entwined, far-futures thinking developed through the Cold War era as a complex arena in which geopolitical antagonism, competing ideologies, and technological progress met with military strategy, emergent discourses of risk, and assorted visions of the society-to-come. Importantly, the deep future is a condition that extends beyond any verifiable empirical calculation – and so it is often figured as taking place on the other side of some catastrophic occurrence that marks the threshold of knowability.

Deep futures never sit within narratives of continuity with present conditions, but it is exactly this that makes them such peculiarly symptomatic sites for understanding the latter (how the present assembles or ‘designs’ itself for the future; what it selects for salvage; its criteria of inclusion or exclusion; its imagined ethical responsibilities toward those to come; etc.)

This is to say that the postcatastrophic deep future is where the present, any present, meets its limit conditions – where not only material endurance but also the possibility of any communication comes into question. We see this, for example, in contemporary dilemmas over the marking of radioactive waste sites, which will remain toxic for so long that even the species-condition of the future addressees of the signs is uncertain. In this way thinking about the deep future critically folds back into, and poses questions to, the constitutive limits of contemporary cultural practices and artifacts, even as they are assembled and organised to make claims upon – and even to colonise – that future. The container, as the vessel through which the present conveys or transmits something to the future, is the characteristic technocultural artifact of this story and the book will build up through a series of case-studies that examine and expand upon specific, although interconnected, cultural histories of such projects of containment.

Related outputs:


In reaction to the rise of architectural interest in the political, in citizen participation, in everyday life and in societal transformation, this research studies architectural agency.

A significant ideological transition has taken place in the discipline of architecture in the last years. Originating in a displeasure with the ‘starchitecture’ system and the focus on aesthetic innovation, a growing number of architects, emboldened by the 2007-8 economic crisis, have staged a rebellion against the dominant mode of architectural production. Against a ‘disinterested’ position emulating high art, they have advocated political engagement, citizen participation and the right to the city. Against the fascination with the rarefied architectural object, they have promoted an interest in everyday life, play, self-build and personalization. At the centre of this rebellion is the call for architecture to (re-)assume its social and political role in society. This research project supports the return of architecture to politics by interrogating theories, practices and instances that claim or evidence architectural agency.

It studies the political theories animating the architects, revisits the emergence of reformist architecture in late-nineteenth-century, and brings to the fore the relation of spatial organization to social forms. In the process, a clearer picture emerges of the agency of architecture, of the threats to as well as potentials for meaningful societal transformation through architectural design.

Related publications:


PETER WILSON – DRAWING AND NARRATIVE

A sustained scholarly consideration of the work of Peter Wilson.

Emerging from the Architectural Association in the 1970s, Peter Wilson’s work has displayed a very particular and finely tuned graphic sensibility involving a heightened condition of architectural figuration. Yet despite his significance, the range of his production and his publications, there has been no sustained scholarly consideration of his work.

This project addresses this through a two-day symposium during which key scholars and practitioners – from the UK, Europe and US – will come to ESALA to reflect upon Peter Wilson’s work. The event will be held in collaboration with the Drawing Matter Trust, and Peter Wilson will himself attend and speak. An edited volume of essays will be developed based on the presentations.
THE PLACE OF SILENCE:
ARCHITECTURE / MEDIA / PHILOSOPHY

An exploration of the poetics and politics of silence in architecture and related media.

This edited collection – which incorporates contributions by internationally recognised scholars in architecture and the humanities, including Gernot Böhme, Paul Carter, and Alberto Pérez-Gómez – explores the poetics and politics of silence in architecture and related media through a series of thematically interlinked chapters. What counts as silence in specific situations is highly relative, and the term itself – which is often linked to some condition of cessation or interval – carries complex and varied significations that make it a revealing field of study. Thus while, on one hand, the often-remarked upon contemporary ‘loss of silence’ has been frequently linked to a disappearance of reflection or inwardness, silence has also, on the other, been understood as a condition of intensified outwardness – of heightened attention, anticipation, suspense or expanded listening. At an extreme, silence is often the sign of a limit condition – the silence that falls at the point of exhaustion, catastrophe or technological breakdown – or else is taken to mark the traumatic limits of experience, as that which testifies to an event beyond any possibility of adequate expression or symbolization. And yet at the same time, silence inheres in the everyday, appearing as the very precondition of communication, as the gap or delay that acts as the support of speech, or the spacing that forms the condition of legibility of written text. Divided into four thematic sections – Mediating Silence, Material Silences, Practicing Silence, and Silence and the Senses – the chapters of the book unfold a rich and complementary array of perspectives on architecture and silence. Together, these build into a volume that will form the key scholarly resource on this topic.
The project, a co-edited book, builds on the work of the Saturated Space research group at the Architectural Association, London. The proposed book will be an edited volume of essays bringing together a uniquely broad range of disciplines fusing art and science.

Colour as a metaphysical phenomenon, enlightens and invigorates, yet is frequently misunderstood or neglected as an instrument in the design of space. The book will present personal reflections from neuroaesthetics, chemistry, earth science, mathematics, physics, chemical biology and nanoscience; specific works from practitioners in art and architecture and insights from commentators, theoreticians and critics in art and literature – each in their own field, a ‘saturated space practitioner’. Together they demonstrate a search for this unique and optically chiasmic space of saturation, one that is contingent to the practice of colour and architecture at urban, interior, object and molecular level.

These observations will offer the reader a narrative journey of poetry and precision focused on the sublime experience of colour as a sensual spatial modifier. Saturated Space: Architecture of Colour represents an, as yet, unseen engagement with a world of numerous thresholds in which colour and architecture interact.

Relevant outputs:
- www.saturatedspace.org
- www.issuu.com/saturatedspace
- Saturated Space Symposium
- London, November 2016:
  - www.youtube.com/watch?v=BjONz7x5NSg&t=938s
DRAWING-OUT THE UNINTENDED CONSEQUENCES OF BUILDING STANDARDISATION

This PhD explores the messy interaction of political and architectural questions within processes of building standardization. It studies the governmental intent of such processes; the problems they respond to, the rationales they employ, their particular ways of seeing, and the roles and responsibilities they define. It also studies the practical effects, and the unintended side-effects, of such processes; the ways in which those caught up in legislative frameworks re-direct them to their own purposes.

The research employs concepts and methods drawn from Infrastructure Studies. It understands such codes, standards and regulations as both discursive and material formations; processes through which governmental ways of thinking are constituted and mediated through practical application.

The methodology followed is one of an ‘Infrastructural Inversion’; the research aims to uncover the assumptions and sidings embedded within our built environment by focussing on its embedded standards and codes, making them visible through both historical and by-design analysis. The research topic is framed through a focus on fire-safety regulation, and operates through comparative case-studies. These studies analyse a number of cities; Edinburgh, Lagos, Tokyo and London. In each case, they study the formative effect of a single specific regulatory requirement; travel distance, set-back, fire-walls, egress time.

Looking for discrepancies between the stated intention of the regulations and their consequences on the ground, the thesis argues that as mode of ‘reflexive modernization’, the collateral consequences of regulatory processes are in fact central to their governmental effect. On this basis it suggests architects realise the capacity for building design to engage with and re-shape governmentality.

Related outputs:


UGLY, USELESS, UNSTABLE: NEW MATERIALISMS AND PROJECTIVE PROCESSES IN ARCHITECTURE

A monograph presenting three different takes on the contemporary discourses of New Materialism, deployed through the perspective of architectural design and aimed at an architectural readership.

This value structure is confronted with a non-binary framework of development and evaluation, which destabilises the axiomatic character of the classical by repositioning it as an occasional occurrence within an extended landscape of potential productive processes. This framework is developed throughout the three main chapters of the monograph, tapping into a theoretical lineage that conjoins the work of Henri Bergson, Gilles Deleuze, Bernard Cache and Manuel de Landa (among others) through the notion of possibility spaces. Each chapter endeavours to tackle one classical trope – Beauty, Utility and Stability – and dissolve it into a broader continuum of heterogeneous production, ultimately articulating how this non-hierarchical space of potentials can be mobilized as a methodological approach to both design and judgement in architecture.

Related publications:


Ugly, Useless, Unstable is a monograph presenting a series of contemporary takes on Neo-Materialist thought, deployed through an architectural design perspective and aimed at an architectural audience.

This book traces relevant strands of 20th century post-structuralism and their gradual evolution towards 21st century neo-materialist ontologies, investigating their potential to challenge the classical canonical framework for both the description and the production of the built environment. The starting theoretical argument develops a reassessment of the classical apparatus, exposing it as a contingent value structure that has been inherited from comprehensive conceptualisation efforts carried out throughout the Western Enlightenment.
This co-edited book sets out visual methodologies for architectural research. Contributors use visual texts including drawings, diagrams, paintings, visual devices, photography, film and hybrid forms of visualisations through which to research architecture, landscape design and interior architecture. The visual methods intersect those used in ethnography, anthropology, visual culture and media studies. This book offers a distinctive approach to the use of visual methodologies for qualitative architectural research. It presents a diverse, but not comprehensive, selection of ways for the architect or architectural researcher to use their gaze as part of their research practice for the purpose of visual literacy. Its contributors explore and use, what we term, ‘Critical Visualisations’ which employ observation and socio-cultural critique through the creation of visual texts, drawings, diagrams, paintings, visual devices, photography, film and their hybrid forms. The book positions these in relation to visual methods practiced in ethnography, anthropology, visual culture and media studies. The emergence of studies in visual culture has changed the research methodologies practiced by many humanities disciplines, and we expose critical positions on these (Krauss in Art History, Pink in Ethnography, and Rose in Cultural Geography etc.), and reflect on how architecture might use ‘visuality’ as a research method so as to increase the architectural researcher’s visual literacy. It aims to present a range of inter-disciplinary approaches which open up territory for new forms of visual architectural scholarship. The visual is understood as always connected with our embodied experience. The experience of architecture is a multi-sensorial one involving our bodily perception of space, engaging all of our senses. In order to design, architectural practitioners produce a range of visualisations that capture some of these. The representation of future reality requires that the visual is used as part of the architect’s repertoire in working with spatial, material and temporal conditions. However, because illustrated textual exposition is the most common method of producing and disseminating scholarly research, it is less common for architectural researchers to produce exploratory visual, aural, tactile or oral visualisations of their research – whether static or moving image – or to explore language and text as visual material. In the context of architecture’s shift from fixed object to moving project and with practice-based and design research gaining momentum in architectural scholarship, there is now a need to define sensorial research methods for architectural scholarship so as to redefine the visual, vision, and ways of looking at and seeing architectural research. The research for this book has been developed from a symposium chaired by Troiani and Ewing at the All Ireland Research Group (Dublin, 2014), presentation at the AHRA Postgraduate symposium (Sheffield, 2016) and is also informed by their ongoing collaborative work on publication of interdisciplinary research and criticism as co-editors of peer-reviewed journal, Architecture and Culture.
‘Voices of Experience’ is a collaborative project which choreographs site-based conversations between architects at different stages of their career.

The contextual focus is late twentieth century Scotland, at a time when building Scotland again offers a foregrounded clarity to the social and public purpose of architecture (Building Scotland, Alan Reiaich and Robert Hurd, 1938; Rebuilding Scotland, The Postwar vision 1945-1975, Miles Glendinning, 1997). Contributors to the project have included architect Margaret Richards (formerly of RMJM), conservation architect Fiona Sinclair, architect/historian Dorothy Bell, teacher/architect Anne Duff, architect/planner Kirsteen Borland, architect Denise Bennetts and conservation architect, Jocelyn Cunliffe. They have been joined by Mairi Laverty, Nicola Melachlan, Cathy Houston and Emma Fairhurst of Collective Architecture, Glasgow, Heather Claridge of Glasgow City Council, Melanie Hay, conservation architect and Grace Marks, coordinator of RADIAL project.

Over a series of autumn and summer site days, they discussed their work and shared their experience of working within Cumbernauld New Town, the Clyde Valley, Glasgow Necropolis, Linlithgow, and Edinburgh’s historic centre and University quarter. Insights include how architects discover their preoccupations, strengths, range and niche through different working relationships and formats; resonating experiences of women entering into architectural education decades apart; and the making and remaking of homes and work at different stages of life and outlook.

Motivated by the lack of experiential (hi)stories of architectural practice and projects, and with ambition to steward new practice-based disciplinary stories, the project constructs a series of conversations between a highly experienced architect and an architect at the outset of their career who have a project site or thematic concern in common.

The project formed part of the Glasgow Women’s Library’s 25th Autumn and Spring Programme (2016-17) and is developing an oral and material archive in partnership with GWL, Architecture Fringe 2017, Collective Architecture, ESALA and Panel. The project asks how role models and built environment histories might be re-thought and accessed in new ways through listening to experienced architects, planners, designers, engineers who have not been written into professional myths, mainstream history and public consciousness.

VOICES OF EXPERIENCE: WOMEN MAKING MODERN SCOTLAND
The original *Destitution in the UK* study, conducted in 2015, established the first firm evidence base on the scale, causes and experience of destitution in this country. It had been hoped that the 2015 study would also be able to identify recent trends in destitution in the UK, but this was severely hampered by the lack of reliable time series data. A follow-up study now seeks to provide an up-to-date, deepened and more comprehensive account of the current position on destitution in the UK (see further below). Moreover, by documenting changes in those services included in both surveys, we hope to comment on trends, though it should be noted that our estimates will remain subject to significant margins of uncertainty.

**Related outputs:**


ERADICATING ‘CORE HOMELESSNESS’ IN EDINBURGH, GLASGOW AND ABERDEEN: PROVIDING AN EVIDENCE BASE

The overall aim of this research project is to provide an evidence base for the disbursement of an estimated £4 million to relevant service provider organisations in Scotland’s four largest cities to work towards the eradication of the most extreme forms of homelessness.
A quarter of a million people experience SMD in a typical year, and they cost the government £4bn in excess costs of public services, while experiencing some of the worst quality of life of anyone.

In January 2015 the report *Hard Edges: mapping severe and multiple disadvantage, England*, was published by the Lankelly Chase Foundation. This report attracted considerable notice and has continued to attract interest from Government and a wide range of organisations. It sought to provide a statistical profile of one key manifestation of ‘severe and multiple disadvantage’ (SMD) in England, in this instance using this as a shorthand to signify the problems faced by adults involved in the homelessness, substance misuse and criminal justice systems in England while underlining the strong links with poverty and mental ill-health.

The central part of the Hard Edges research involved interrogating a range of datasets, both administrative and survey based, to look at the characteristics and experiences of people in touch with services and experiencing combinations of those issues. It presented new estimates of national numbers with different combinations of problems, of their demographic and geographic profile, background circumstances, current quality of life, service costs and outcomes. In its initial scoping stages the research also explored the definition and delineation of the group of interest, the underlying causes, circumstances and triggers to their condition pathways in and out, mainly through literature review and interviews with experts and service users.

**Related outputs:**


See: [www.lankellychase.org.uk](http://www.lankellychase.org.uk)
HARD EDGES SCOTLAND: DEVELOPING A PROFILE OF SEVERE AND MULTIPLE DISADVANTAGE IN SCOTLAND

This project which follows the Hard Edges study in England and aims to produce a similar profile of severe and multiple disadvantage.

Based on secondary datasets, but with a somewhat wider definitional remit to encompass mental health and domestic violence issues. The project will also involve engagement with key actors on policy issues, focus groups and qualitative interviews with people with lived experience and service users.
HARD EDGES 2: AN ADDITIONAL PROFILE OF SEVERE AND MULTIPLE DISADVANTAGE IN ENGLAND

The project is a follow-up to the ‘Hard Edges’ study conducted by I-SPHERE in 2012 – 2015.

The project will provide a gender-sensitive statistical picture of people who experience severe and multiple disadvantage (SMD), defined as a combination of at least three of the following problems: homelessness, substance misuse, poor mental health and being a victim of abuse or violence. It will look at the most suitable data sources currently available, including four general household surveys and four service/administrative datasets. Similarly to the predecessor study, this study’s findings will be used by the Funder to lobby policy-makers for changing the way in which services for people with SMD are organised and funded. The study’s Funder has been a strong promoter of a holistic response to SMD (in terms of the coordination of support services), but its efforts have been hindered by the lack of quantitative evidence showing that the SMD group is substantial in numbers. The original ‘Hard Edges’ project has been a major contributor to changing this situation.

This follow-up study aims to further expand the evidence base. In particular, the current study will provide:

1. New evidence on a slightly different combination of disadvantages than in the original Hard Edges study;
2. Will provide insights as to whether services for SMD women should be configured in the same way or differently to services for SMD men.

Having more evidence in this area will be beneficial both for policy makers and managers of public and third-sector organisations delivering support to people with SMD, such as the NHS.

See: www.lankellychase.org.uk/multiple-disadvantage/publications/hard-edges/
HOMELESSNESS PROJECTIONS

143,000 households were experiencing core homelessness in England in 2016, up 45% in 5 years. These numbers are likely to increase further in the future.

The project entails developing a new definition of ‘core’ and ‘wider homelessness’, measuring the scale of the components of these phenomena for England, Wales and Scotland, and developing a forecasting model to make conditions forecasts of future trajectories of homelessness across the UK, building on an earlier ‘policy modelling’ project undertaken with Joseph Rowntree Foundation.

Project is ongoing but has been presented at major national conference marking 50th anniversary of CRISIS, sharing platform with government ministers etc.
MONITORING THE IMPACT OF HOMELESSNESS

Providing an analysis of the homelessness impact.

The homelessness monitor is a longitudinal study, providing an analysis of the homelessness impacts of recent economic and policy developments in the UK.

**Related outputs:**


**Funding:** £741,107

**Year:** 2011 – 2021

**Lead:** Suzanne Fitzpatrick

*Heriot-Watt University*

**With:**
- Glen Bramley
- Beth Watts
- Hal Pawson
- Steve Wilcox
- Jenny Wood
QUALITATIVE PILOT EVALUATION OF PHARMACIST INPUT INTO CLINICAL CARE OF HOMELESS PEOPLE

Evaluation of dedicated (prescribing) pharmacist input into the healthcare of homeless people.

This qualitative study will assess homeless people’s perceptions and personal experiences of dedicated clinical (prescribing) pharmacist input into their clinical care. It will focus on the delivery of services to homeless people who are recruited to the service via specialist homelessness health centres, in hostels, and via street outreach. The study will also seek homeless people’s views regarding the outcomes that should be assessed and means of recruitment employed in a proposed Randomised Control Trial (RCT) which will measure the effectiveness of the approach at a larger scale.

The information gained will be used to improve user uptake and the effectiveness of the pharmacy service itself, as well as to maximise the proposed RCT’s relevance, recruitment and retention.
RESILIENT BORDERS PROJECT

Using speculative design proposals in community consultations to propose sustainable infrastructures for our towns.

*Resilient Borders* is about empowering communities to propose and communicate ambitious development plans at the scale of the town. The project was based on the premise of putting together an ambitious plan for Galashiels in 2040 following the catalytic effect of the Borders Railway.

As a starting point, the project utilises work completed by postgraduate design students in a series of workshops that provoke and encourage communities to think about themselves in a spatial and infrastructural way. The project methodology helps stakeholders to understand their own settlements as networks of energy, resource and communication.

Community workshops asked participants to look at all the work, rate the projects to a series of sustainable metrics, and ultimately agree on a series of themes. Specifically, the second workshop embedded these themes in the town as a series of ambitious and far-reaching proposals. These were then refined as a vision of how that town can be 25 years in the future. In this we adapted techniques such as appreciative enquiry to provide a series of narrative that is then translated into an array of spatial infrastructures.

The project is important because it lifts expectations of what a sustainable town might be. Resilient Borders provides the means to a vision and ambitious blueprint for sustainable development.

It is designed to inform and influence existing planning and development processes for the town.

Outputs included a public exhibition of the work and the preparation of a project toolkit circulated throughout the Borders region [October 2016]. Further outputs in the form of peer reviewed articles are in preparation that chart how academic – educational – community partnerships can be sequenced in a way to maximise benefit to all parties.
John Brennan, Resilient Borders. Photograph: Stephanie Crane.
Youth homelessness has historically been addressed via congregate hostel-type supported accommodation. This can hinder young people’s capacity to address their support needs, maintain healthy lifestyles, and/or develop independent living skills.

The high costs of these models are known to dis-incentivise engagement in paid work. In this context, there is strong sector support for developing a spectrum of ‘community hosting’ models for this group. Such models involve young people living with private host households, with support to the host and young person provided by a specialist organisation.

Existing services in this area in Scotland are limited: a small number of emergency ‘Nightstop’ schemes have recently been established and longer term ‘Supported Lodgings’ models are used in some areas for care leavers, but longer-term community hosting models targeting the broader youth homeless population do not currently exist.

This project aims to explore the potential opportunities and challenges associated with pursuing such an approach ‘at scale’ for young people experiencing or at risk of homelessness in Scotland. The study is particularly well timed giving pressures on public finances, temporary accommodation and other homelessness provision, and young people’s benefit entitlements, which combined with housing market pressures have made it increasingly difficult for many young people to access and maintain appropriate accommodation.

I-SPHERE researchers will work closely with Shelter Scotland to: review the international evidence base on ‘community hosting’ models; understand the success and challenges of existing Supported Lodging schemes in the UK; explore the feasibility of pursuing Supported Lodging schemes in Scotland, from a business and financial sustainability perspective and by investigating the attitudes and perspectives of potential ‘host households’ and young people in existing forms of homelessness accommodation to such models.
Supporting Oak’s Evaluation and Research on Homelessness

The project supports the development of a stream of early career researchers equipped to undertake high-quality, policy and practice-applied research on homelessness, via establishing and managing a bespoke Oak Foundation internship scheme.

It also provides expert advice and support on the research and evaluation elements of Oak’s homelessness and related projects, both to Foundation staff and directly to organisations holding grants from Oak.
TIME FOR CHANGE

Evaluation of an innovative peer mentor project assisting homeless people with multiple and complex needs.

Shelter Scotland’s ‘Time for Change’ project, based in Dundee, will establish and train a network of volunteer peer mentors with lived experience of multiple and complex needs. The peer mentors will assist homeless people experiencing severe and multiple disadvantage to access and maintain engagement with support services relevant to their needs.

They will aim to ensure that support is relevant, improve choice and control, and help those involved develop skills and resilience. Using qualitative methods, a team based at I-SPHERE will evaluate the impact of the project on both peer volunteers and those helped, in order to assess the effectiveness of this model as a mechanism for sustainable change within the homelessness sector.
WELFARE CONDITIONALITY: SANCTIONS, SUPPORT AND BEHAVIOUR CHANGE

Evaluation of the effectiveness and ethicality of welfare conditionality.

The use of conditional welfare arrangements that combine elements of sanction and support is an established element within welfare, housing, criminal justice and immigration systems.

This five year research project creates a collaborative, international and interdisciplinary focal point for social science research on welfare conditionality by exploring the efficacy and ethicality of conditionality across a range of social policy fields and diverse groups of welfare service users.

Heriot-Watt is leading on three of the total nine ‘strands’ of work, including assessments of the impacts of sanction and support on homeless people, lone parents, and social housing tenants.

Related outputs:


CHAPTER 08

Housing and Property – Planning, Design and Market Operation
DEVELOPING AFFORDABLE HOUSING IN URBAN ENVIRONMENTS FOR OLDER PEOPLE

Designing affordable housing to meet the needs of older adults living in urban environments.

As the population ages, affordable housing in urban environments is needed to support low income, vulnerable seniors. Solutions and strategies must involve tenants in their design, maintenance and sustainability. The research explored housing transitions of older adults who were relocated from subsidised housing into redeveloped affordable housing in Richmond, British Columbia, Canada. 25 interviews, 6 participatory mapping workshops and 16 photo-voice sessions were conducted to understand how:

(i) sense-of-place is experienced by older people relocating into an affordable housing development;

(ii) lived experiences can be translated into formal and informal supports; and

(iii) to involve older people and other community members as active ‘place-makers’ in community planning and development. The project developed a set of guidelines for how to integrate sense of place in affordable housing developments for older adults.

Related outputs:


Place-Making with Seniors Research Team (2014) ‘Our Place, Our Space: Resident Stories and Place Priorities’, Gerontology Research Centre, Simon Fraser University. Available at: www.gvss.ca/PDF-2014/Sense%20of%20Place%20English.pdf
This is a longstanding project/research interest examining the anatomy of commercial property cycles.

The research has looked at the changing relationship between rents and capital values through a cycle, the associated variation in market transaction activity and the influence of the scale of investment funds and bank lending.

Bank lending for investment and development through a cycle is considered. The impact of the property boom on green office development has been assessed. It has also examined the changing relationships between the yields on government bonds and commercial property yields. This particular research was funded by the Investment Property Forum.

The research has focused primarily on the UK but has taken a global perspective, examining the experience of Australia, Europe and the USA.

**Related outputs:**


Over the last thirty years or so a new dispersed sub-regional urban system has emerged in many developed countries.

Key accessibility relationships have been transformed inevitably leading to a ‘rationalisation’ of the national and local retail hierarchies.

Out of town centres and retail parks together with superstores have become common features of the urban landscape. Some of the long term culminations of these trends have been stressed in a series of well publicised reports, notably The Portas Review. This research seeks to assess the underlying economics and quantify the changing form of retail hierarchies, including the consequences for rent patterns and the spatial pattern of shops. In particular the impact of online sales and the role of planning has been examined.

Related Outputs:


A collaboration with the Saltire Society to record and reflect on distinctive developments in Scottish rural housing.

This is a project that reflects on how the best in rural housing design makes a vital contribution to cultural, social and economic life in Scotland as a series of rural housing studies drawn from recipients of the Saltire Award for Housing.

Our themes include:

**Local Production**
Distinctive procurement methods such as self-build and housing co-operatives devolve power and resources to a local level. How can housing contribute to rural economies and societies? These homes are often resources of art, literature and performance that define and explain the places around them.

**Ecological Response**
Many homes are exemplars to use resources sparingly and live a life less dependent on fixed infrastructure. They push boundaries exactly because of the challenges and opportunities that their contexts bring.

**Landscape Relations**
The rural landscape is often untouchable for development, even if to sustain and nurture communities. Many successful rural housing projects have an intelligent and mutually beneficial relationship with their host landscape. The research builds a comprehensive resource to illustrate the regenerative potential of good housing design in the countryside to include:

- Record drawings to a common template and format
- Interviews with architect/occupiers
- A photographic survey of the building
- A publications and media bibliography
- A text for each project

The project will help mark the Society’s Housing Awards anniversary. The work will be launched as a digital publication and website towards the end of 2017. We wish to secure a print publication of the work.

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**OUT OF TOWN**

**ESA LEAD:** John Brennan  
*University of Edinburgh*

**WITH:** Stephanie Crane  
*The Saltire Society*

**FUNDING:** £10,000  
*Scottish Government*

**YEAR:** 2017 –

John Brennan, Out of Town.  
Credit: Stephanie Crane.
Analysis of quantitative datasets and qualitative/quantitative case studies to learn lessons for delivery of genuinely affordable housing in the South West of England.

In the context of national problems of housing affordability and delivery, the study examines the specific issues in the South west of England, including low wages, high house prices and popularity of second homes. The study seeks to enable planners and others to get a better idea of what has been happening to housing delivery and house prices in the South West with an aim of increasing understanding about the ways in which the housing market is changing and to assist in the adoption of more appropriate approaches in the delivery of housing that is genuinely more affordable.

The research analysed a range of data sources to track issues of affordability and housing supply in the South West, in comparison with other parts of England and the country as a whole. It also investigated six case studies of large scale developments in the South West.

The study found a range of approaches to delivery of large scale development around a basic model. It highlighted the importance of securing external funding for infrastructure and affordable housing. It also discussed the skills and approaches necessary for delivery and the availability of alternative delivery models.

Related outputs:
Report (July 2017) and presentations to RTPI.
Compilation of annual review of housing policy and markets in the UK, including commentaries and extensive set of statistical tables; as well as an annual Briefing.

The UK Housing Review celebrated its 25th edition in 2017. The Review has become an authoritative record and analysis of housing policy and markets in the UK, assessing a wide range of policies and housing outcomes, including Right to Buy, housing in devolved nations, homelessness, affordability, welfare reform as well as contextual chapters on issues such as the economy and public spending.

It contains more than 100 statistical tables drawn from a wide variety of government and non-government sources.

A shorter Briefing is also published usually in the summer. The Review was founded and led by Steve Wilcox until 2017, when Mark Stephens assumes this role.
The project will evaluate the policy to restructure social rents in Wales and test the effect of reforms.

Following the Essex Review of social housing in Wales, the Welsh Government adopted its recommendations to review rent policy in the social rented sector which was subject to anomalies between social landlords and different parts of Wales. A new rent standard was adopted and the 2014 Housing (Wales) Act required social landlords to set average rents within band limits.

This project reviews the progress and experience of landlords to date through a scoping review, survey of all social landlords and case studies. It will examine the perceived fairness of the new system and its impact on the capacity of social landlords to deliver new affordable housing. Potential reforms will also be modelled.
CHAPTER 09

Project Management and Construction Technology
Flexible formwork offers an alternative perception to the production processes of concrete and other materials.

Concrete has been described as a material without history. Without the crafts associated with metalwork, carpentry or stonemasonry, but reliant on elements of each of these. A forlorn mongrel that now dominates much of the built environment. Sometimes seen as a process rather than a material itself. Its character and expression conditioned by the carpenter using rigid timber to give form to the compliant fluid.

Using flexible formwork challenges the existing paradigm initially seen as counter intuitive in comparison with conventional rigid systems. It is a disruptive technology that is now gaining traction in mainstream practice. ESALA has been involved in the study flexible formwork for concrete for over 12 years and has undertaken many different studies exploring: construction process, complexity of form, precision and material behaviour through a series of research led workshops with architecture and design students. The first book that explored fabric in conjunction with University of East London was based on these workshops. Since then further studies have been undertaken including various live projects such as the Fenchurch Garden at the RHS Chelsea in 2009 and more recently the installation of panels and landscape elements at Edinburgh Gateway in 2016.

Current research includes: experiments in the use of cement replacement, GGBS and PFA in conjunction with fabric texture and permeability for contrasting tonal variation; a series of workshops in exploring construction process in practice: in Austria with DOKA GMBH, comparing with rigid systems, in Switzerland with Creabenton Materiux AG on the use of highly flowing concrete in architectural elements and introductory workshop into fabric forming techniques in conjunction with the Royal Danish Academy at South East University, Nanjing, China; the completion of a doctoral study into the use of grid-shells as re-deployable formwork; the culmination of an extended study into the behaviour of non-prismatic columns.

Very little information exists on the behaviour non-prismatic columns in concrete, most probably due the complexity of construction using conventional rigid formwork. Flexible systems are simple to construct. Over 80 structural tests on varying geometries of column and results show that relatively subtle changes in shape can influence the strength significantly. It is possible to optimize geometry to improve performance whilst simplifying construction process.

Related publications:


Using Building Information Models to smartly process point cloud data produced by modern reality capture technology.

This highly influencing work aims to integrate novel reality capture technology like terrestrial laser scanning with Building Information Modelling to speed up the processing of the point cloud data produced by the former.

The goal is: by aligning the 3D point cloud data with the Building Information Model, the geometric and semantic information of the model can be used to smartly interpret the data. This technique has been shown to have potential to objectively track construction progress, and more interestingly to robustly and automatically conduct dimensional quality control.

Related outputs:


Social Life Cycle Assessment methodology for the construction industry.

The main aim of this PhD research is to support the practical implementation of the social impact assessment in the construction industry in order to improve the social performance of architectural projects. This research will look closely to the Environmental Product Declaration (EPD) system that, in environmental terms, is helping the construction industry to communicate transparent and comparable information about their products in order to propose a similar declaration in social terms.

With this objective, the research will also develop an S-LCA model, based in the UNEP/SETAC framework proposed in the “Guidelines for social life cycle assessment of products” that will be focused in the social performance of construction materials. This double action will boost the understanding of the social repercussions of the construction industry, will raise awareness about the social impacts linked to this sector and will help with the practical and methodical implementation of social considerations in the construction industry by providing useful information to the design teams and to policy makers.
CHAPTER 10

Environmental Sustainability and Low Carbon
ASSESSING THE EFFECTIVENESS OF KYLE OF SUTHERLAND’S COSY HOMES EAST SUTHERLAND SCHEME (CHESS)

Assessing the validity of fuel poverty-related data collected by a social enterprise partner, and suggestions to improve their work.

The Kyle of Sutherland development trust, a social enterprise in the Highland and Islands region of Scotland, has been collecting data on its approach to reducing/mitigating fuel poverty in an area where this problem is widespread (up to 80% of the population in some sectors).

We were hired via Interface to assess the statistical robustness of data collected on fuel poverty and health/wellbeing outcomes for the population in relation to measures implemented to combat fuel poverty by the organisation.

Due to problems with the data collection methodology and the small scale of data collection (as well as other factors), we were only able to produce limited results.

We also came up with recommendations to KoS in order to improve data collection and methods in the future, and are currently applying for another grant to advance this.
Modelling and understanding UK energy systems for future scenarios.

An ‘energy system’ is a network comprising energy demand, distribution/infrastructure and energy supply. Across such a system, there are different terminologies, metrics and models use to help guide efficient and robust design. CESI is looking at applying a ‘system of systems’ approach to integrating different models together (informed by real data and case-studies), such that genuinely low-carbon and resilient systems can be created within a context of future change.

Heriot-Watt will be focussing on Energy Demand, particularly that from the built environment. This will include understanding how the energy characteristics of buildings can be upcaled to that of communities of buildings.
ENERGY EFFICIENCY RETROFITTING SERVICES (EERS) SECTOR CHARACTERISTICS AND ROUTES TO INCREASED ACTIVITY

Breaking down barriers to achieve UK domestic energy efficiency at scale.

Within the UK, energy efficiency improvements within the existing housing stock is a key area in which governments have attempted to increase rates of activity to boost carbon reduction and end user cost savings. The most recent UK policy, the Green Deal, was a pay as you save scheme, linking the capital cost of improvements to ongoing energy bill payments. The success of this policy was limited, with minimal uptake in comparison to expectations. This research investigates the viewpoints of retrofit industry practitioners, to assess their experiences of working under the Green Deal, and evaluate what pathways could be available to move forward into the future. UK and German based individuals interviews were used to compare experiences, along with UK group interviews and focus groups to develop findings via a grounded theory approach, to illuminate possible future strategies for UK retrofit.

Key findings suggest EERS expansion is most successful if policies are designed more holistically; UK policies show strategies which focus on simply the property and not the occupants have their disadvantages. Therefore, a move away from marginal financial incentives, such as the Green Deal’s loan structure, to a wider consideration of how policy tools interact with supply chains and end users, would enable increased impact.

Related Outputs:


SMART CONTROL OF RURAL RENEWABLE ENERGY AND STORAGE (SCORRES)

Making better use of renewable electricity in Indian rural areas through an understanding of supply and demand.

This project will demonstrate the benefits of demand management strategies in distressed grids in developing nations. It will use energy storage in the form of batteries and demand scheduling to improve energy security and to reduce curtailment of renewable generation.

The project will develop research that has been demonstrated in a European context and prove its value in the context of developing nations. It will address the challenges of providing rural communities in developing nations with access to reliable, clean, affordable energy, particularly where the electricity provided via the grid is unavailable or unreliable.

See: www.ncl.ac.uk/cesi/
Characterising supply and demand mis-matches in India.

A series of workshop were carried out in India to understand the concerns of householders, policymakers and local government towards energy use in the built environment, and the use of available renewable electricity to help alleviate these concerns.
Impact of ground albedo on the performance of PV Systems.

The total incident irradiation on a surface such as a photovoltaic (PV) module is the sum of beam, sky-diffuse and ground reflected radiation. Ground albedo or ground reflectance is defined as the ratio between the ground reflected radiation and the global incident radiation. A constant albedo value of 0.2 for bare ground and 0.5 for dry tropical localities is widely accepted and is used in the modelling of PV systems.

The real albedo values of foreground surfaces are different and hence using a constant value may be unsuitable to accurately predict the output of PV systems. This research investigated the real albedo values of various foreground surfaces and how it is affected by the factors such as ageing, solar altitude, rain and cloud cover (sky conditions).

To investigate the impact of such factors, an experiment was setup to measure the albedo of conventional foreground materials (grass, sand and cement) and non-conventional materials (white pebbles, white paint, white tiles and aluminium foil). Research has shown that non-conventional materials, increased the slope irradiation and ultimately the energy generation of PV modules.

These results were validated using the long-term data from the Garston and Edinburgh database. A new computational tool was developed, which considers various albedo values of foreground materials simultaneously for any tilt angle of a PV module to compute the ground-reflected component.

Related Outputs:


STOCHASTIC MODELLING OF ENERGY DEMAND IN FINDHORN ECO-VILLAGE

Statistical aggregation of high temporal precision electrical demand datasets of dwellings.

High resolution electrical demand data can help characterise specific activities in buildings, that correlate with behaviour, heating technology and construction. However, to understand energy demand at a regional or national level, it is necessary to convert this information into a different spatial and temporal scale.

Through statistical aggregation procedures, this project takes individual building data from Findhorn Eco-village and synthesizes virtual demand profiles that can be aggregated to, for example, a sub-station level for a community of buildings. This is also validated against real sub-station electrical data to check the success of the method.
Analysis of current building systems’ ability to produce truly low carbon, sustainable buildings.

Low energy/low emissions buildings are vital in an economy which is to thrive despite tightening emissions targets, fossil fuel depletion and a more challenging climate. This research project aims to evaluate the whole life energy and carbon performance of buildings procured and delivered with pre-defined Building Research Establishment Environmental Assessment Method (BREEAM) targets; delivered using the Soft Landings (SL) framework; and using Building Information Modelling (BIM) tools.

The Riccarton campus at Heriot Watt University is undergoing unprecedented change with the construction of three new large developments. These include: Student Residences 2016; the Centre for Earth and Marine Technology (CEMT); and the National Performance Centre for Sport (NPCS).

These developments will be delivered using BIM and SL, and will be designed to meet BREEAM Very Good or Excellent criteria, providing a rich source of data to test the aims and hypothesis of this proposed research.

The relationship between energy consumption, carbon dioxide (CO2) emissions, building design, cost, procurement, occupant satisfaction, building performance and management will be analysed to establish the reliability of BREEAM, SL and BIM in delivering low energy/low emissions, sustainable buildings.

Related outputs:

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