

Research at the

DEPARTMENT OF ARCHITECTURE





Director of CRAUCGS



Director of ADCRU



Director of CRiDS



Director of CRiDS



Director of CRiDS



Director of CLCR



Director of UDSU



Director of UDSU



Director of DiCRU



Director of DiCRU

At the forefront of knowledge in architecture & urbanism

It gives me a great pleasure to introduce this volume that celebrates some of our key achievements in research and knowledge development, production, exchange, and dissemination in architecture and urbanism at the Department of Architecture, University of Strathclyde.

The Department has a legacy of built environment research that has expanded to reflect the multi- and trans-disciplinary nature of architecture and urbanism, focusing on real-world problems and improving peoples' lives.

With a distinguished and growing postgraduate research community, research at the Department is leading the way to a more sustainable future in response to government, industry, and societal and environmental needs. We are at the forefront of research on how people and cities interact in a rapidly globalising world. Our competence manifests in the international reputation our research leaders enjoy and the endeavours of clusters and units within our two key research areas that include Sustainability and the Built Environment and Urbanism and Global Cities.

Whether a prospective research student, a potential research partner, or a funding agency seeking to engage with the breadth and depth of knowledge in architecture and urbanism, we are always delighted to hear from you.

Prof Ashraf M. Salama

Head of Department of Architecture
University of Strathclyde

RESEARCH UNITS IN ARCHITECTURE



**Architectural Design & Conservation
Research Unit (ADCRU)**

pp. 04-19



**Construction Law Research Cluster
(CLRC)**

pp. 20-35



**Cluster for Research in Architecture &
Urbanism of Cities in the Global South
(CRAUCGS)**

pp. 36-51



**Cluster for Research in Design &
Sustainability (CRiDS)**

pp. 52-67



**Digital Constuction Research Unit
(DiCRU)**

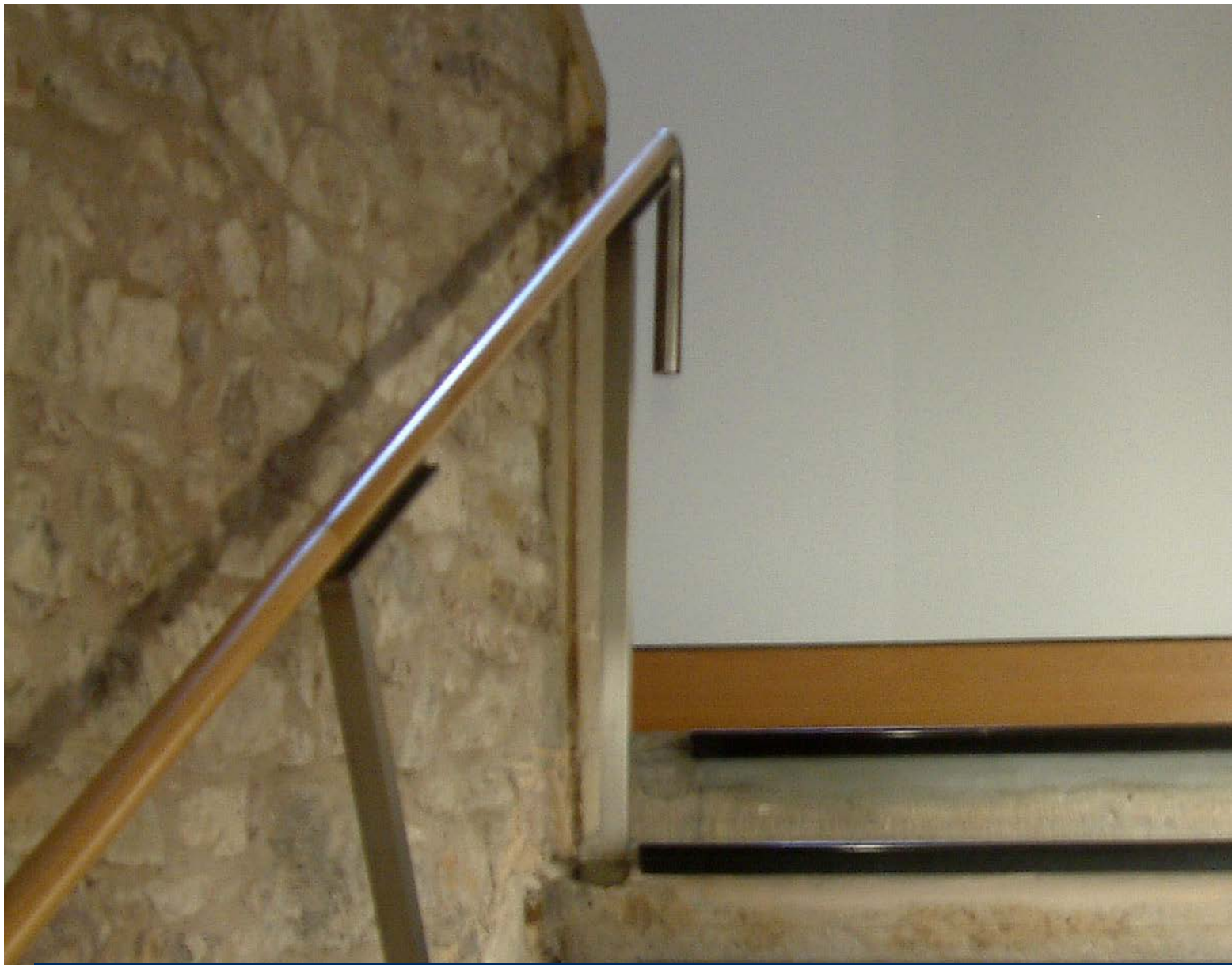
pp. 68-83



Urban Design Studies Unit (UDSU)

pp. 84-99





Architectural Design & Conservation Research

“ Architects, engineers, planners and other built environment professionals, conservators and building patrons have a duty to understand the values and nature of existing buildings and to critically act accordingly while conserving and reusing them. ”

ADCRU deals with the challenges of properly conserving built heritage while allowing changes to adapt it to contemporary uses in an appropriate way. We also deal with the design of new buildings which contribute to the conservation of our environment, learning from traditional strategies and the latest technological innovations.

Our research aims to provide the necessary knowledge, methodologies and approaches to conceive and deliver conservation design projects and new buildings which will have a positive impact on people’s sense of identity, well-being and the environment.

To do research at ADCRU contact:

Dr C. González-Longo: c.gonzalez-longo@strath.ac.uk

RESEARCH AT ADCRU

About us

ADCRU promotes research-informed practice and practice-informed research. It was established in 2013 by Dr Cristina Gonzalez-Longo together with the MSc in Architectural Design for the Conservation of Built Heritage (MSc ADCoBH). She is a Chartered Architect in UK and Spain and RIBA Specialist Conservation Architect, with over twenty years' experience. After graduating at the Technical University of Madrid (ETSAM), she spent three years in Rome with a scholarship from the Italian government to study architectural conservation at the Specialisation School of the University of 'La Sapienza'. She was the project architect and resident architect of Queensberry House (part of the new Scottish Parliament Building, RIBA Stirling Prize) and designed Bowbridge Primary School in Newark (RICS Sustainability Award).

Our research interests

Our research focuses on a variety of subjects such as theory of conservation, architectural design, architectural history, survey & investigations, construction & construction history, structural and environmental design in conservation.

We encourage PhD applications on a variety of topics

ADCRU has an international and diverse cohort of PhD students and has attracted researchers funded by the Commonwealth Scholarship Commission in the UK, the European Commission and former students of the MSc ADCoBH. Topics we promote include:

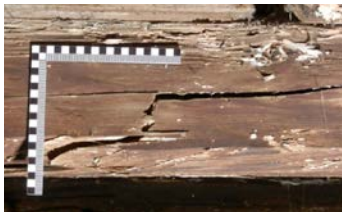
- Complex architectural conservation projects
- Transformation of buildings & architectural conservation theory
- The architecture & conservation of 17th & 18th centuries Scottish architecture
- Environmental design, energy and historic buildings
- Application of Image Processing and new technologies needs for architectural conservation

KEY RESEARCH AREAS



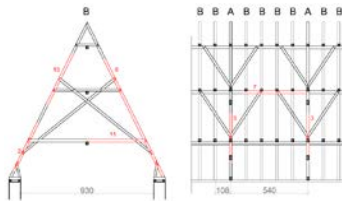
Architectural Stratification & Complex Architectural Conservation Projects

The research unravels the complexities of buildings and relating conservation projects to improve current design and conservation methodologies.



Environmental Design of New buildings

We promote an integrated research about old and new buildings, as we see the present as a continuum of the past and consider conservation in a wider environmental sense.



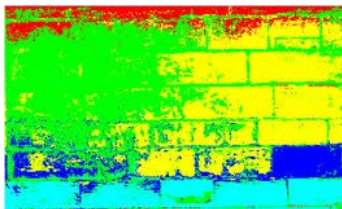
Architectural conservation theory

ADCRU researches the development of the discipline over the centuries, both internationally and locally and proposes new developments.



Architecture, assessment & conservation of 17th and 18th century architecture in Scotland

We investigate the design, methodologies, materials and techniques employed in order to disseminate good conservation practice.



Digital applications needs & new methodologies for architectural conservation

ADCRU considers all the stages of the architectural conservation project, from the early investigation and assessment of historic buildings to the creation and dissemination of architectural knowledge.

PHD TOPICS WE SUPERVISE



Current PhD topics

New Conservation and Consolidation Methods for Sandstone to Avoid Replacement

Noemi Giovelli (co-supervised by the Department of Pure and Applied Chemistry)



Innovative Technologies for Architectural Conservation

Diana Avramica

Achieving Indoor Comfort, Air Quality and Energy Efficiency in High-Rise Residential Buildings

Mohd Firrdhaus Bin Mohd Sahabuddin



Historic Buildings in UK (Modernist, Victorian, Georgian): a Study Qualifying the Health Benefits Inherent in their Architecture

Sarah-Jane Stewart (co-supervised by the Department of Mechanical and Aerospace Engineering)



The Application of Image Processing to the Survey, Assessment and Monitoring of Historic Buildings

Bowen Qiu (co-supervised by Department of Electronic and Electrical Engineering)

Conserving 17th and 18th century Stone Built Heritage in Scotland: Materials and Techniques

Clara Gonzalez Manich



Building Skills for Conserving Seventeenth- and Eighteenth-Century Scottish Built Heritage: the Initial Assessment of Timber Roof Structures.

Anna Serafini

New techniques and methodologies for architectural conservation

Our innovative research is based on internationally recognised architectural conservation theory and involves a range of new and existing methodologies as well as collaboration across disciplines, with the scope to involve and influence professionals, policy makers and the wider society.



INTERNATIONAL EVENTS & FORUMS

Dr Cristina Gonzalez-Longo is a member of the International Council on Monuments and Sites (ICOMOS) International Training Committee (CIF) and actively participates in the improvement of architectural conservation standards and practice. ADCRU has conceived and is invited to participate in a range of events such as:

- Workshop with the University of Edinburgh and University of Leuven, Edinburgh, 2018
- “Rising from the Ashes: the Conservation of Mackintosh’s Glasgow School of Art”. Public conference and open table organised and chaired by ADCRU at The British School at Rome, 2016.
- “Incontri Internazionali di Restauro e Riqualificazione”, Officina L’Aquila, Italy, 2016.



Rising from the Ashes: the Conservation of Mackintosh's Glasgow School of Art

ADCRU organised this public conference and open table at The British School at Rome. It included presentations by the Mackintosh Restoration Project team and leading architects from the Italian Government, and an open table discussion with Professor Giovanni Carbonara and the *Scuola di Specializzazione in Beni Architettonici e del Paesaggio at Sapienza Università di Roma*. The event also included a series of site visits organised by ADCRU in Rome with the architects responsible of the projects, from the Italian Government.



KNOWLEDGE EXCHANGE

Teaching

ADCRU teaches theory and practice of conservation of built heritage at postgraduate level. It runs the MSc in Architectural Design for the Conservation of Built Heritage, a course fully accredited by the Institute of Historic Building Conservation (IHBC) and conforming to the internationally recognised Guidelines for Education and Training in the Conservation of Monuments, Ensembles and Sites adopted by ICOMOS.

Knowledge Exchange Events

ADCRU organises and delivers courses and lectures open to professionals and academics. It has created, organised, chaired, collaborated and participated in many local and international events, such as:

- Masterclass “Preservation in Historic Areas of Spain: Panorama of a Shifting Paradigm” delivered by Santiago Rodriguez-Gimeno and workshop with the University of Edinburgh and University of Leuven, Edinburgh (2018)
- Presentation of research on the Monteath Mausoleum for the Friends of Glasgow Necropolis, Glasgow (2018).
- “Design Well on the Old: Architectural Conservation as a Solution for the Environmental, Social and Economic Challenges of the 21st Century”, VIP guest speaker, Scotland Build 2017, Glasgow (2017).
- “Rising from the Ashes: the Conservation of Mackintosh’s Glasgow School of Art”. Public conference and open table at The British School at Rome (2016).
- “Kelvingrove Unlocked: Exploring Kelvingrove’s Architectural Design and Conservation”, part of Explorathon, European Researchers Night (2016).

A photograph of a stone staircase with a modern metal handrail, set against a textured stone wall. The staircase is made of dark stone steps and a light-colored metal handrail. The wall is made of large, rough-hewn stone blocks. The lighting is warm and natural, suggesting an indoor or sheltered outdoor setting.

New Opportunities for the Management of Scotland's Historic Environment

ADCRU and The Heritage Place led by Dr Deborah Mays (also Honorary Lecturer at ADCRU) combined their expertise and knowledge to organise this day conference. It was a pilot and fact-finding exercise designed to equip attendees with an appreciation of the wide range of benefits available from the Historic Environment Strategy for Scotland ('Our Place in Time'). It highlighted the holistic value of architectural conservation and place-making. The target audience was 'front line' practitioners, particularly within local authorities, including councillors. The comprehensive range of speakers set out how the Strategy can be realized and how its application can bring wider returns. Delegates were given the opportunity to discuss specific case studies and share skills and thinking and the feedback was excellent.

RESEARCH GRANTS & PROJECTS



HISTORIC
ENVIRONMENT
SCOTLAND

ÀRAINNEACHD
EACHDRAIDHEIL
ALBA

The Application of Image Processing to the Survey, Assessment and Monitoring of Historic Buildings.

Bridging The Gap (BTG), University of Strathclyde

Historic Environmental Scotland: Building skills for conserving 17th-18th centuries Scottish built heritage: timber roofs and masonry.

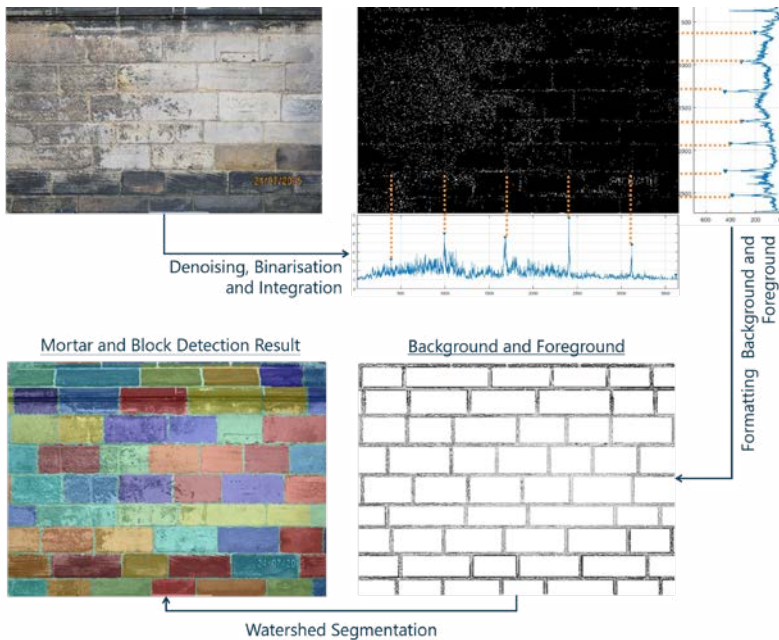
Historic Environment Scotland



COMMONWEALTH
SCHOLARSHIPS

Architectural Conservation Theory, Architectural Stratification and Complex Architectural Conservation projects; Low Energy Design and Healthy Buildings.

Commonwealth Scholarship Commission in the UK





Materials & Techniques for conserving 17th and 18th Century Scottish Built Heritage.

This research project is focused on the stone masonry used to build residential architecture in 17th and 18th century Scotland. The objective of the research is to identify and classify masonry types, defining their characteristics and relating them to their specific historical context, which are essential to understand and assess the conservation of this unique heritage.

ADCRU leader, Cristina Gonzalez-Longo was the project and resident architect of Queensberry House (featured).

PUBLICATIONS BY RESEARCH AREA

Architectural Stratification & Complex Architectural Conservation Projects

Gonzalez-Longo, C. (2020) The Temple of Venus and Rome and Santa Francesca Romana at the Roman Forum: Preservation and Transformation. Academic Monographs Routledge Research in Architecture, Routledge, Taylor & Francis Group. (In preparation, contract signed).

González-Longo, C (2017). "Design Well on the Old: Architectural Conservation as a Solution for the Environmental, Social and Economic Challenges of the 21st Century". The Times Scotland.

González-Longo, C (2013). "Da S. Maria Nova a S. Francesca Romana: Architettura e committenza Olivetana nella trasformazione della chiesa dal Trecento al Seicento", in A. Bartolomei Romagnoli (ed.) "La canonizzazione di S. Francesca Romana. Santità, Cultura e Istituzioni a Roma tra Medioevo ed Età Moderna. SISMELE- Edizioni Del Galluzzo.

González-Longo, C. and Theodossopoulos, D (2013). "The stratification of S. Maria Nova at the Roman Forum: construction, materials and conservation", in Construction & Building Materials, ELSEVIER.

González-Longo, C. and Theodossopoulos, D (2009). "The Platform of the Temple of Venus and Rome", in Kurrer et al. (eds) Proceedings of the 3rd International Conference on Construction History, Cottbus. Berlin.

Environmental Design of New buildings

Mohd Sahabuddin, M. F. B., Gonzalez-Longo, C. & Howieson, S. (2019). "Achieving health and comfort in high-rise residential buildings by using dynamic-hybrid air permeable ceiling (DHAPC)", in American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE).

Mohd Sahabuddin, M. F. B. & Gonzalez-Longo, C. (2019). "Balancing comfort and indoor air quality in high-riser buildings for social housing in Kuala Lumpur: from regulations to construction", in Proceedings of the 51th AiCARR International Conference, Venice.

Mohd Sahabuddin, M. F. & Gonzalez-Longo, C. (2018). "Assessing the indoor comfort and carbon dioxide concentration in high-rise residential buildings in Kuala Lumpur: the people's housing programme." Invited paper for the CIBSE Technical Symposium: Stretching the Envelope.

Mohd Sahabuddin, M. F. B. & Gonzalez-Longo, C. (2017). "Natural ventilation potential in Kuala Lumpur: assumptions, realities and future". PLEA 2017: 33rd International Conference on Passive and Low Energy Architecture.

Mohd Sahabuddin, M. F. B., González-Longo, C. (2015). Traditional Values and Their Adaptation in Social Housing Design–Towards a New Typology and Establishment of 'Airhouse' Standard in Malaysia'. International Journal of Architectural Research: ArchNet-IJAR 9 (2).

Mohd Sahabuddin, M. F. B., Gonzalez-Longo, C. (2014). 'Traditional Values and Their Adaptation in Social Housing Design. World Academy of Science, Engineering and Technology, International Science Index, Architectural and Environmental Engineering, 1(4), 226.

Architectural conservation theory

González-Longo, C. (2015). "Can Architectural Conservation be Mainstream?" ICOMOS Scientific Symposium, Florence.

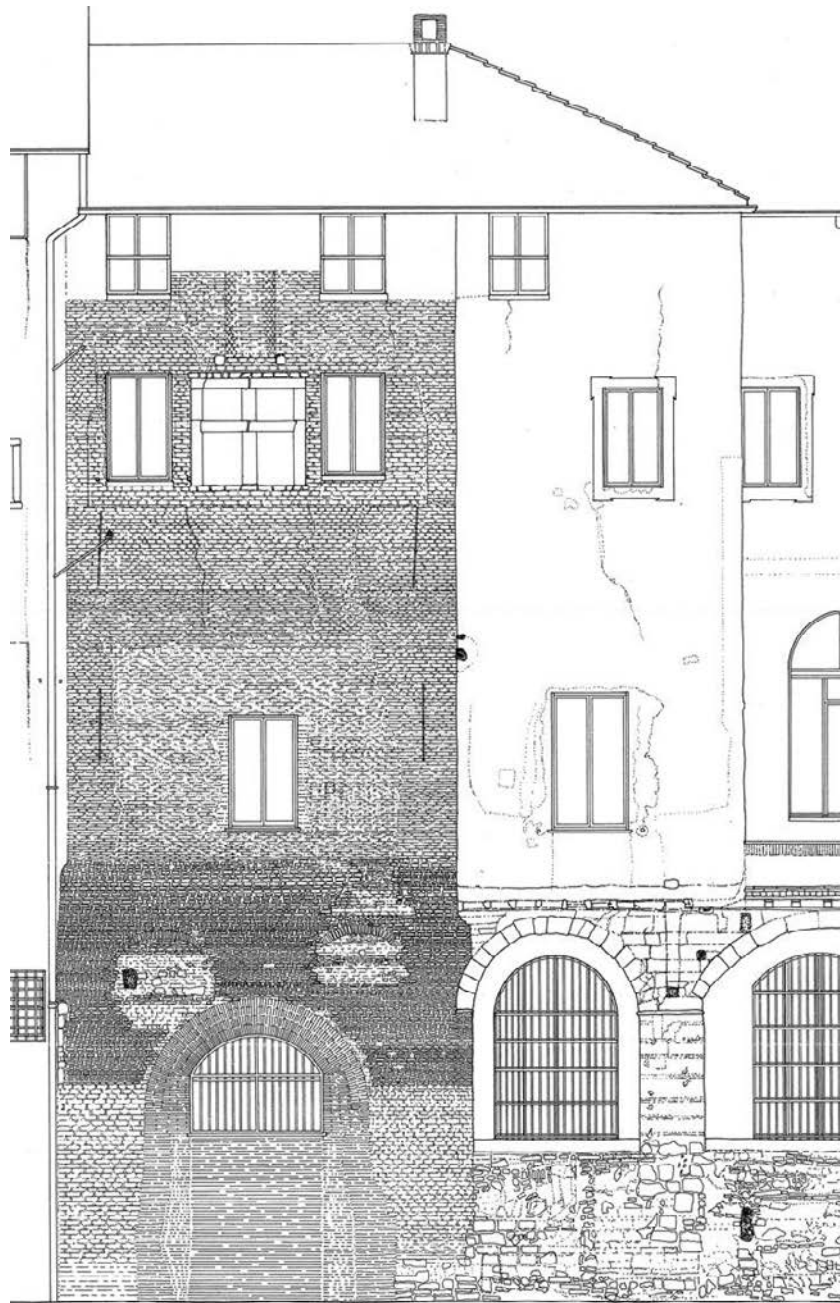
González-Longo, C. (2012). "Using old stuff and thinking in a new way: material culture, conservation and fashion in architecture", in P. Emmons, J. Lomholt, J. Hendrix (eds) The Cultural Role of Architecture: Contemporary and Historical Perspectives. Routledge.

González-Longo, C. (2010). "Urban Renaissance, Urban Baroque- Urban Design in Scotland since the new Scottish Parliament in Edinburgh". Urban Design journal, Urban Design Group, Issue 214.

Architecture, assessment & conservation of 17th and 18th century architecture in Scotland

Gonzalez-Longo, C. (2019). "Robert Mylne and the first baroque mural monument in Greyfriars Kirkyard, 1675", in Jupp, P. & Grainger, H. (eds.) "Death in Scotland: Chapters from the Twelfth to the Twenty-First Century", Peter Lang International Academic Publishers, Oxford.

Gonzalez-Longo, C. (2019). "The architectural innovations of Mr James Smith of Whitehill (c.1645-1731) within the European context", in Lowrey, J., Humm, L. & Mackechnie, A. (eds.). "The Architecture of Scotland 1660-1750". Edinburgh University Press.



© copyright Cristina Gonzalez-Longo

Gonzalez Manich, C., Gonzalez-Longo, C. and Monari, F. (2017). "La fábrica de piedra durante los siglos XVII y XVIII en Escocia: estudio preliminar", in X Congreso Nacional y II Congreso Internacional Hispanoamericano de Historia de la Construcción.

Serafini, A., Riggio, M. and Gonzalez-Longo, C. (2016). "A Database for the Assessment and Analysis of Historic Timber Roof Structures". International Wood Products Journal.

Serafini A. and González-Longo, C. (2016). "17C and 18C timber roof structures in Scotland: design, pathologies and conservation", SAHC 2016, Leuven.

Serafini, A. and González-Longo, C. (2015). "The Design and Construction Techniques of eighteenth-century Timber Roofs in Scotland: Glasgow Trades Hall and Tweeddale House in Edinburgh", 5th International Congress on Construction History, Chicago.

González-Longo, C. (2014). "The Transformation of Drumlanrig Castle at the End of seventeenth-century", in J. Campbell et al. (eds) Proceeding of the First Conference of the Construction History Society, Queen's College, Cambridge. Exeter, Short Run Press.

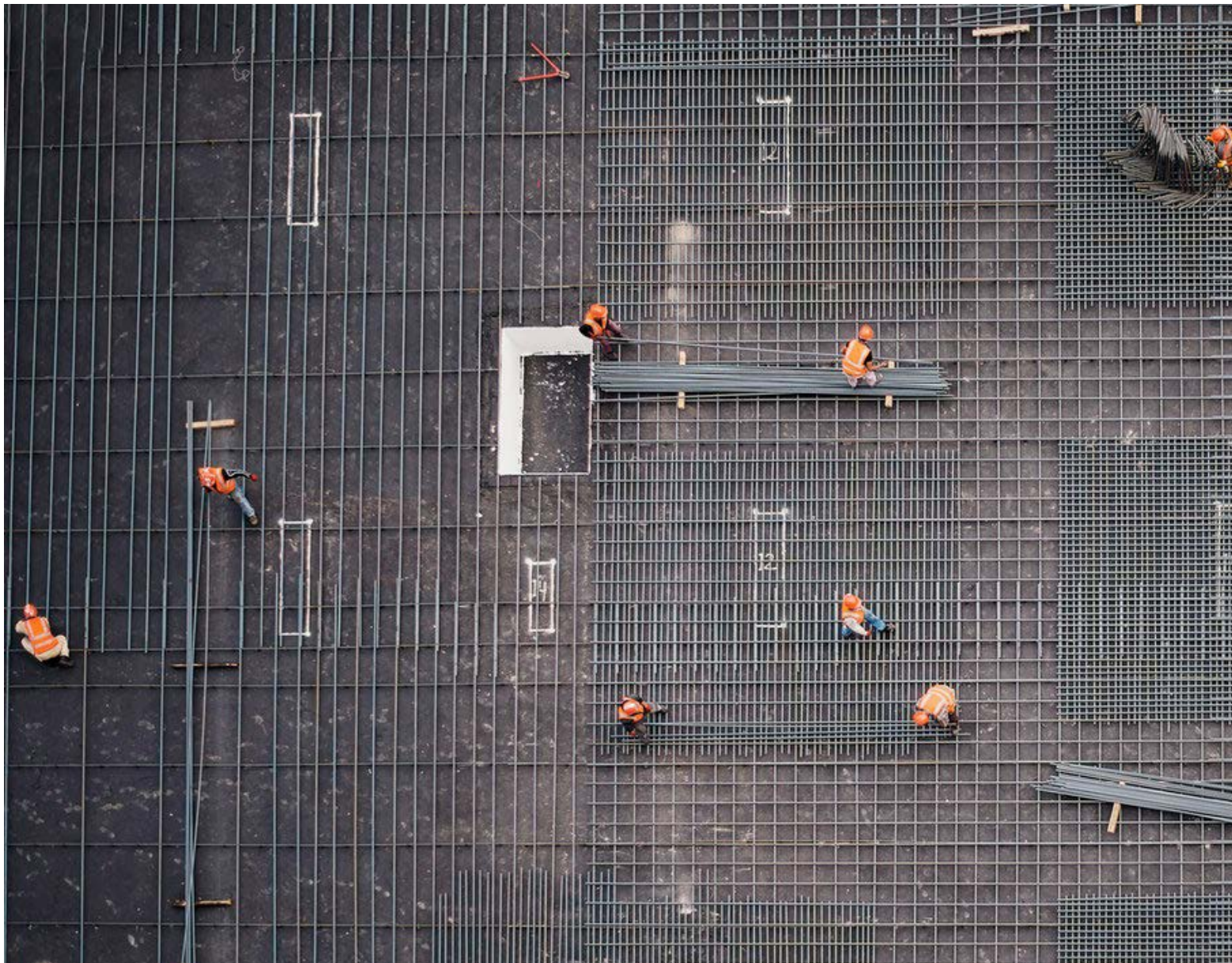
González-Longo, C. (2012). "James Smith & Rome", in Architectural Heritage journal. Edinburgh University Press.

González-Longo, C. and Theodossopoulos, D. (2012). "From Master Mason to Architect: James Smith's Construction Techniques at the End of 17th Century in Scotland", in R. Carvais, A. Guillerme, V. Negre and J. Sakarovitch (eds.) "Nuts & Bolts of Construction History. Culture, Technology and Society", Proceeding of the 4th International Conference on Construction History. Picard, Paris.

Digital applications needs & new methodologies for architectural conservation

González Manich, C., Kelman, T., Coutts, F, Qiu, B, Murray, P., González-Longo, C. and Marshall, S. (2016). "Exploring the use of image processing to survey and quantitatively assess historic buildings", SAHC 2016, Leuven

González-Longo, C. (2013). "Beyond Built Heritage Documentation: digital applications needs for research and conservation" in DEDICATE (Design's Digital Curation for Architecture), AHRC project Final Seminar, University of Glasgow.



Construction Law Research Cluster (CLRC)

“ We engage in research related to the legalities of the construction process including dispute resolution, regulatory enforcement, professional ethics and corporate corruption. ”

The Construction Law Research Cluster (CLRC) at the University of Strathclyde researches the legalities of the construction process. We have been actively engaged in research on dispute resolution, regulatory enforcement and corporate corruption. Recently, our research activity has focused in particular on themes of delay & disruption, environmental regulation and corporate corrupt practice.

In our most recent publications, we have examined the determinants of non-compliance with structural building code standards in Nigeria, studied the legal and contractual issues concerning off-site manufacturing components in the UK house-building sector, investigated the role of mediation in planning and environmental disputes in England and Wales, and explored the legalities of major and megaproject management.

To do research at CLRC contact:

Dr A. Agapiou: andrew.agapiou@strath.ac.uk

RESEARCH AT CLRC

About us

The Construction Law Research Cluster (CLRC) was established in 2010 by Dr Andrew Agapiou, Senior Lecturer at the Department of Architecture, University of Strathclyde. Staff in the research cluster are members of International Council for Research and Innovation in Building and Construction's (CIB) Working Commission on Law and Dispute Resolution. We also offer training and consultancy on the legal aspects of construction.

Our research interests

Over the years, CLRC has been actively engaged in research related to the legalities of the construction process including dispute resolution, regulatory enforcement and corporate corruption. As such research at CLRC frequently involves working together in close partnership with the University of Strathclyde Law School. Recently, our research has focused on the determinants of non-compliance with structural building code standards in Nigeria, the legal and contractual issues concerning off-site manufacturing components in the UK house-building sector, the role of mediation in planning and environmental disputes in England and Wales, and the legalities of major and megaproject management.

We encourage PhD applications on a variety of topics

CLRC has an international and diverse cohort of PhD students. Topics of interest include:

- Mediation;
- Adjudication & Arbitration;
- Corporate and Construction Professional Ethics;
- Construction Law & Technology-enhanced learning;
- Regulatory Compliance;
- Law, Regulation and Offsite Construction.

KEY RESEARCH AREAS



Mediation

Our research has focused on the interaction of construction lawyers, clients and mediators within the mediation process and on the viability of mediation to resolve planning and environmental disputes.



Arbitration & Adjudication

Work within this context has addressed the impacts of legislative changes to the adjudication process within the UK context.

Corporate & Construction Professional Ethics

Our work within this area has addressed compliance to ethical code standards within the procurement process. Studies have also been undertaken on the professional ethical standards of arbitration practitioners within the oil and gas industry sector.



Construction Law & Technology-enhanced learning

Research has been undertaken on the utilisation of simulation tools to deliver professional practice skills to Architecture students and professionals.



Regulatory Compliance

Our work has addressed regulatory compliance to building code standards for house-building in Nigeria.



Law, Regulation and Offsite Construction

Research has focused on identifying the legal and contractual aspects of offsite construction methods within housing developments within the UK

PHD TOPICS WE SUPERVISE



Past PhD theses

Adoption of pre-assembled building services components in Saudi Arabia: Consultants' and Contractors' Views.

Mohammed Alghaseb.

Nudging Saudi Arabian contracting firms within municipal road projects to bid competitively

Nawaf Alahmadi

Global Claims in Engineering and Construction Projects.

John Hughes

An examination of key factors which impede implementation, enforcement and compliance with structural provisions of the building code standards and regulations within mid-rise residential building projects in Nigeria

Sunday Yakubu



Concurrent Delay Analysis in Public Works Construction Disputes

Sherif Abdalalall

Adopting the UK Market Trend Guidelines to Accredite and Regulate Adjudicators for the Malaysian Construction Industry

Azlina Binti Ibrahim Wan



Current PhD topics

- Risk management framework for offsite construction in China
- A framework for Chinese construction project EOT claims analysis: a comparative study between Chinese and English legal systems
- Professional regulatory control mechanism for arbitrator professionals in oil and gas investor-state arbitration.





Modelling the effect of occupants' behaviour on household carbon emissions

Occupants' behaviour has proven its significant impact on buildings performance. The research on carbon emissions has therefore recommended the integration of the technical and behavioural disciplines in order to accurately predict buildings carbon emissions. For this research, a dynamic model is developed to simulate the interaction of occupants' behaviour with various energy efficient scenarios to reduce carbon emissions. The model results show that the behavioural change can contribute enormously to carbon emissions reduction.

INTERNATIONAL EVENTS & FORUMS

2014

Mediate Scotland 2014, Glasgow, UK

“A reflection on Construction Mediation in Scotland: A comparison of the views and experiences of Lawyers and End-users”

Andrew Agapiou, Invited speaker

2010

Using Simulation in teaching and Learning Workshop, Newcastle upon Tyne, UK

“Simshare, SIMPLE and the OER approach”

Andrew Agapiou, Invited speaker

OER in the disciplines: a joint Subject Strand conference, London, UK

Andrew Agapiou, Invited speaker

2009

Enhancement Themes Conference 2009: Developing Graduates for the 21st Century, Edinburgh, UK

“Simulated Professional Learning Environment (SIMPLE)”

Andrew Agapiou, Invited speaker

3rd Annual Built Environment Education Conference, London, UK.

“The role of computer-based simulations in Built Environment Education”

Andrew Agapiou, Invited speaker

KNOWLEDGE EXCHANGE

Consultancy

The cluster has experience of offering consultancy and advice of the resolution of construction and property-related disputes. Dr Andrew Agapiou is a certified mediator in Scotland, involved in the RIBA professional conduct panel and also an adjudicator for the CEDR consumer disputes panel.

Teaching

The cluster is involved in teaching the Architectural Professional Practice curriculum to postgraduate and undergraduate students at Strathclyde. In addition, cluster staff have also been involved in delivering the LLM Construction Law programme within the Strathclyde Law School.

Knowledge Exchange Events

The delivery of in-house CPD programmes covering Health & Safety Legislation, Dispute Resolution and the NEC3 form of Engineering and Construction Contract for Housing Development Corporations, Architecture Practice and Client Organisations. Recent development & training activities have covered;

- An introduction to the NEC3 form of contract
- The role of the Project Manager in the NEC3 Contract
- NEC3 Professional Services form of Contract
- The use of Z-clauses within NEC3 form of Contract



The value of mediation: researching attitudes and experience

The value of mediation has also been widely acknowledged worldwide. In most contexts, however, voluntary uptake of the process is low and research into prospective client perceptions is particularly valuable. We are interested in exploring people's awareness, attitudes and experiences relative to mediation, drawing upon quantitative and qualitative analyses of small and medium-sized contracting firms all around Scotland.

RESEARCH GRANTS & PROJECTS



RICS[®]

Procurement and contract strategies for offsite manufacturing within UK housebuilding.

Royal Institution of Chartered Surveyors Research Trust Award Scheme, with the University of Wolverhampton and the New Engineering Contract Users' Group.

AFRC

ADVANCED FORMING RESEARCH CENTRE
UNIVERSITY OF STRATHCLYDE

Real-Time Simulation of Construction Projects through Hybrid Application of Building Information Modelling and Image Processing.

Advanced Forming Research Centre - Route to Impact Funding, University of Strathclyde, with the Department of Electrical and Electronic Engineering at University of Strathclyde

EPSRC

Scottish Construction Mediation: a survey of the client base.

Strathclyde University Faculty of Humanities and Social Sciences Strategic Fund, with the Law School at University of Strathclyde

Construction clients and mediation: a follow up study of attitudes and experiences.

Royal Institution of Chartered Surveyors Education Trust Award Scheme, with the Law School at University of Strathclyde

Lean Construction Design: Optimising the extent of standardisation and off-site assembly to maximise client value.

EPSRC Bridging the Gap Postgraduate Joint Projects Scheme with the Department of Management Science at University of Strathclyde



The development and evaluation of a contract management simulation game for Architecture students and professionals.

Association of Scottish Schools of Architecture and the Centre for Education in the Built Environment (CEBE)

A photograph of a construction site under a clear blue sky. A large black crane with 'KASSEL PLANT' written on its boom extends from the left side of the frame towards the top. In the background, several multi-story buildings are under construction, surrounded by extensive scaffolding. Some buildings have blue protective sheeting on their upper floors. In the foreground, there are stacks of construction materials, including wooden frames and bags of cement. The overall scene depicts an active residential or commercial building project.

Procurement and contract strategies for OSM within UK housebuilding

Perceived benefit of off-site manufacture (OSM) include increased productivity and building quality, reduction of labour demands, and environmental impacts associated with traditional construction. In turn, knowledge on the associated procurement and contractual options and on the potential risks they pose for those managing housing developments and/or administering construction contracts is lagging behind. Here at CLRCT we are developing procurement and contract strategies and models for OSM based upon qualitative research involving selected case studies of UK house building projects.

PUBLICATIONS BY RESEARCH AREA

Mediation

Agapiou, A (2018) Mediation and planning disputes in England & Wales: Opportunities and challenges. Procs 34th Annual ARCOM Conference, 3-5 September 2018, Belfast, UK, Association of Researchers in Construction Management.

Agapiou, A (2018) Mediating planning disputes: opportunities, experiences and challenges. The Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, Vol. 10, issue 3, pg. 1-12.

Agapiou, A and Clark, B (2018) The practical significance of confidentiality in mediation, Civil Justice Quarterly, January

Agapiou, A and Cheung, S.O (2017) Apologies, apology legislation and civil disputes: the practical implications of apology legislation for dispute resolution practitioners and their clients', International Journal of Arbitration, Mediation and Dispute Management, vol.83, no.2.

Trushell, I, Clark, B and Agapiou, A (2016) Construction mediation in Scotland: an investigation into attitudes and experiences of mediation practitioners, International Journal of Law in the Built Environment, vol. 8, issue 2.

Agapiou, A (2016) Court-Connected Mediation Practice in Perspective in 'Court Connected Construction Mediation Practice: A Comparative International Review', Agapiou, A & Ilter, D (eds), Taylor & Francis, London.

Agapiou, A & Ilter, D (eds) (2016) Court Connected Construction Mediation Practice: A Comparative International Review, Taylor & Francis, London.

Agapiou, A (2016) The co-optation of the techniques and language of alternative dispute resolution: a critical assessment of developments in the UK, International Journal of Arbitration, Mediation and Dispute Management, vol.82, issue 2, p129-134.

Agapiou, A (2016) The impact of mediation practice on the resolution of grievances, the preservation of employment relationships and termination, *US-China Law Review*, vol. 13, issue 3, p 267-275.

Agapiou, A (2015) The factors influencing mediation referral practices and barriers to its adoption: A survey of construction lawyers in England and Wales, *International Journal of Law in the Built Environment*, vol. 7, issue 3, p. 231-247.

Trushell, I, Clark, B and Agapiou, A (2014) Construction mediation in Scotland: An investigation into attitudes and experiences of mediation practitioners. In: Raiden, A B and Aboagye-Nimo, E (Eds) *Procs 30th Annual ARCOM Conference, 1-3 September 2014, Portsmouth, UK, Association of Researchers in Construction Management*, 593-602.

Adjudication & Arbitration

Agapiou, A (2013) UK Construction Practitioners' Experience of Adjudication, *Proceedings of the Institution of Civil Engineers – Procurement, Management and Law*, 166 (3), 137-144.

Agapiou, A (2013) The impact of legislative change on adjudication provisions and the requirements for written contracts under the Construction Act, *US-China Law Review*, 6, (13).

Corporate and Construction Professional Ethics

Abdalsalam R. Almasood (2018) Historical perspectives on ethical obligations in international construction arbitration. *Proceedings of the International Conference on Professionalism and Ethics in Construction*, Keyworth Centre, London South Bank University, UK 21-22 November 2018

Alahmadi, N and Agapiou, A (2016) Indicators and incidents of potential collusion among main contracting firms in municipal road network projects: the Saudi Arabian context, *Royal Institute of Chartered Surveyors COBRA 2016 Conference*, Toronto.

Construction Law & Technology-enhanced learning

Agapiou, A, Maharg, P and Nicol, E (2010) Construction and constructivism: learning contract management and administration via simulated transactions, *CEBE Transactions*, Vol. 7, Issue 2, pp 37-54.

Agapiou, A, Maharg, P and Nicol, E. (2009) Learning contract management and administration using a simulated game environment, *Information Visualisation Conference 09*, 14, - 17 July 2009; Barcelona.

COURT-CONNECTED CONSTRUCTION MEDIATION PRACTICE

A COMPARATIVE
INTERNATIONAL REVIEW

EDITED BY
ANDREW AGAPIOU AND
DENIZ ARTAN ILTER



© 2015 Andrew Agapiou and Deniz Artan Ilter

RICS Research

Construction clients and mediation:
a follow up study of attitudes
and experience



rics.org/research



COBRA 2016
Toronto, Canada
20 - 22 September 2016



rics.org/cobra

ISSN 1548-8663 (Print) ISSN 1530-2981 (Online)
DOI: 10.1726/1548-8663

US-CHINA LAW REVIEW

VOLUME 12, NUMBER 7, JULY 2015

David Publishing Company
www.davidpublisher.com



Association of Researchers in Construction Management

THIRTIETH ANNUAL
CONFERENCE
2014
September 1-3

Portsmouth

Volume 2

ice | proceedings



Management, Procurement
and Law

www.icevirtuallibrary.com/ice/proceed
ISSN 1751-4304

Edited by
JACK GOULDING AND FARZAD POUR RAHIMIAN

Offsite Production and Manufacturing for Innovative Construction

People, Process and Technology



Proceedings of the CIB World Building Congress 2016
Volume 1

Creating built environments
of new opportunities

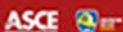
Edited by
Kalle Kähkönen
Marko Keskinen



TAMPERE UNIVERSITY OF TECHNOLOGY



Legal Affairs and Dispute Resolution in Engineering and Construction



International Journal of Law in the Built Environment

International construction:
disputes and resolution
Guest Editor: Professor Steve Donohoe

Access this journal online:
www.emeraldgroupublishing.com/journals



Association of Schools of Construction of Southern Africa

The Eleventh Built Environment Conference

6 - 8 August 2017, Durban, South Africa

Conference Proceedings



International Council
for Research and Innovation
in Building and Construction



So BE it

School of the Built Environment Newsletter

November 2017, Issue 05

SoBE International Research Week

During the week 11-15 September, SoBE hosted its International Research Week in partnership with the International Council for Research and Innovation in Building and Construction (CIB), and the GM Chamber of Commerce. The event was opened by Vice-Chancellor, Professor Helen Marshall, and attended by over 400 presenters and delegates, and over 20 exhibitors. These international industry experts gathered to showcase and discuss the latest developments in the construction sector in a bid to help shape tomorrow's built environment. The event also included the 13th International PGR Conference (IPGRC). Feedback from delegates has shown it to be a well-received event, with the expectation to continue similar events in future. Full conference proceedings from the IRC and 13th IPGRC are available on USIR: <http://usir.salford.ac.uk/442058/> and <http://usir.salford.ac.uk/439131/>, respectively.



Regulatory Compliance

Agapiou, A and Yakubu, S (2019) Determinants of Non-Compliance with Structural Building Code Standards in Nigeria. Proceedings of the Institution of Civil Engineers, Procurement, Management and Law, 172 (2) April.

Agapiou, A and Chen, Z (2017) Collaborative Business Relationships: A Means to an End of Construction Disputes or Fuel for the Fire? International Research Week 11-15 September 2017; University of Salford.

Agapiou, A (2017) The legal formation, governance and regulation of international construction product sales contracts: a case study vignette. International Research Week 11-15 September 2017; University of Salford.

Yakubu, S and Agapiou, A (2017) Building Construction Skills Training for Standards Compliance: The Case of Nigeria. Proc 12th Association of Schools of Construction of Southern Africa (ASOCSA) Built Environment Conference, 6-7 August, Durban, South Africa.

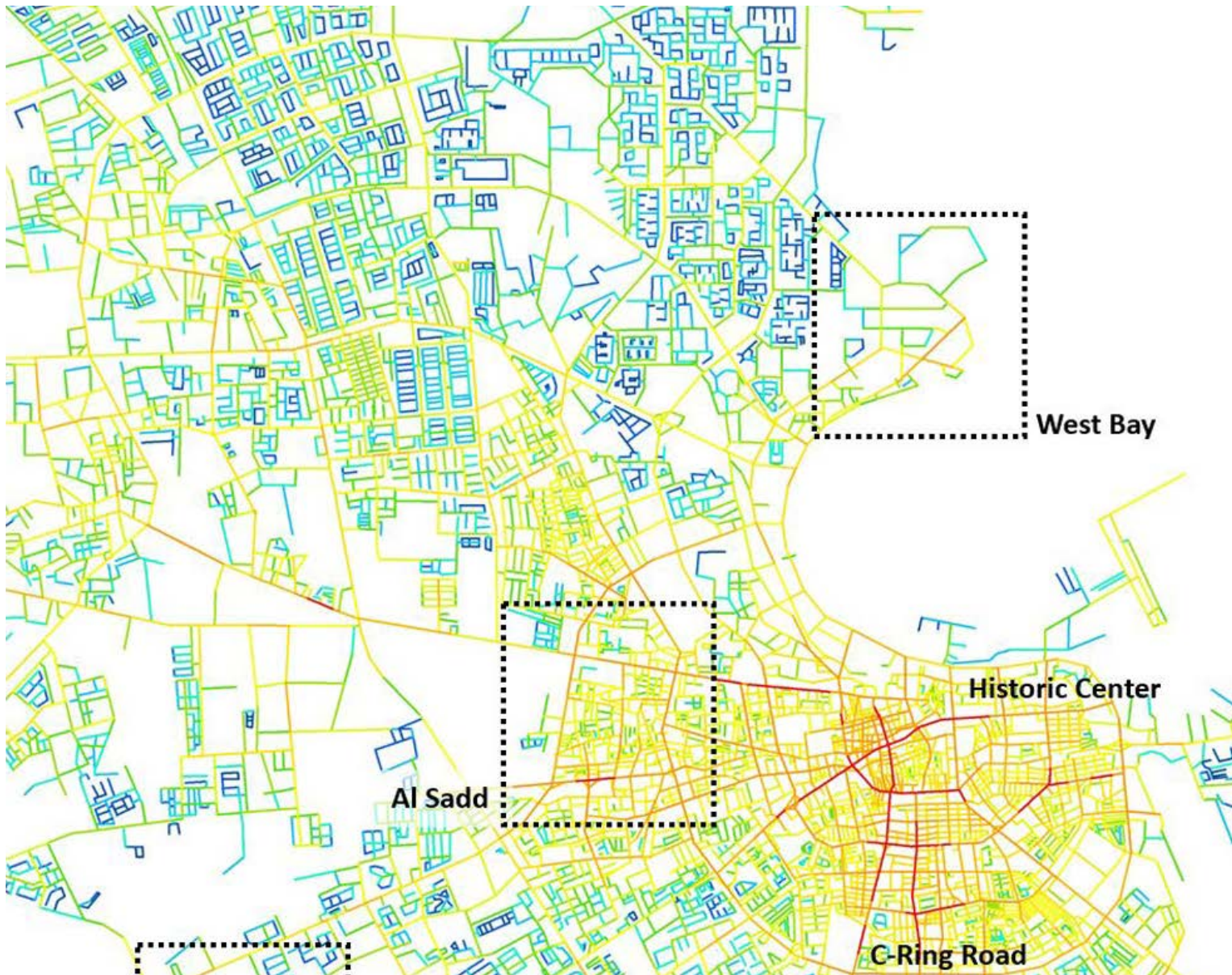
Hughes, J, Agapiou, A & Blackie, J (2016) Legal Developments in relation to Concurrent Delay: the position of the English and Scottish Courts, CIB 2016 World Building Congress, Arto Saari & Pekka Huovinen (eds.), Tampere University of Technology, (vol. III), 592-603

Yakubu, S and Agapiou, A (2016) Factors Affecting the Development and Implementation of the Structural Aspects of the Nigeria Building Code amongst the Stakeholders within the House Building Construction Sector in the Lokoja Municipality, CIB 2016 World Building Congress, Arto Saari & Pekka Huovinen (eds.), Tampere University of Technology, (vol. I), 250-611

Law, Regulation and Offsite Construction

Agapiou, A (2019) Optimising the use of off-site manufactured components in the UK house-building sector: Understanding the legal and contractual issues in 'Offsite Production and Manufacturing for Innovative Construction: People, Process and Technology', Jack Steven Goulding and Farzad Pour Rahimian (eds), Taylor and Francis, London.

Zhang, L, Pour Rahimian Leilabadi, F., Agapiou, A, Goulding, J (2017) Offsite construction: an opportunity for improving risk management, International Research Week 11-15 September 2017; University of Salford.



West Bay

Historic Center

Al Sadd

C-Ring Road

**Cluster for Research in Architecture & Urban
in the Global South (CRAUCGS)**

“ Our mission is to research architectural and urban transformations, investigate societal and environmental challenges and opportunities, and interrogate the multitude of influences that characterise the global south. ”

The Cluster for Research in Architecture and Urbanism of Cities in the Global South (CRAUCGS) at the University of Strathclyde includes research expertise in areas that encompass knowledge economy and sustainable urban qualities, socio-spatial practice of migrant and minority communities, lifestyle trends and housing transformations, cultural identity and image making, urban traditions and user-centred assessment, and architectural design pedagogy. Our goal is to develop quality research and to maximise impact through dissemination, research-led teaching, while influencing policy and decision-making.

We strive to respond to critical questions, central to the global south, on urban growth, continuity and fragmentation; sustainable urban qualities; regenerating historic cities; the quality of urban life, health and liveability; architectural identity and multiple modernities; and multiculturalism.

To do research at CRAUCGS contact:

Prof A. M. Salama: ashraf.salama@strath.ac.uk

RESEARCH AT CRAUCGS

About us

The Cluster was established in 2014 by Prof Ashraf Salama to address architecture and urban transformations in the global south including Africa, Central and Latin America, most of Asia and the Middle East, and North Africa (MENA). In a short time, CRAUCGS has attracted researchers from various countries around the globe. Our research demonstrates the critical role of architects in urbanisation, city development, and shaping future environments. We have a trans-disciplinary ethos and engages in global partnerships.

Our research interests

CRAUCGS places emphasis on generating research that is captured and disseminated in high quality outputs and KE activities. Our expertise is expanding, involving partnerships in Europe and the MENA region. We examine the sharp dichotomies within the global south where architectural and urban spectacles are developed in tandem with environmental degradation, ethnic and regional conflicts and displacements, political and economic instability, among other undecorated realities. Our research addresses the severe dualities of urban transformations and place production towards enhancing decision making and improving peoples' lives.

We encourage PhD applications on a variety of topics

Addressing various scales of the built environment in the global south, CRAUCGS is interested in the following topics:

- Knowledge economies and sustainable urban qualities.
- Socio-spatial practice of migrant and minority communities.
- Lifestyle trends and housing transformations.
- Cultural identity, spectacles, and global city image.
- Urban traditions and user-centred assessment of designed environments.
- Architectural education and design pedagogy.

KEY RESEARCH AREAS



Knowledge Economies & Sustainable Urbanism

CRAUCGS develops and validates frameworks for investigating sustainable urban qualities in emerging knowledge economies focusing on major cities in the Gulf region.



Socio-Spatial Practices of Migrants & Minorities

CRAUCGS investigates urban dynamics and socio-spatial experiences in relation to migrant and minority communities.

Lifestyle Trends & Housing Transformations

CRAUCGS explores the relationship between lifestyles and housing choices, cultures and typologies, and the role of mega projects and affordability in rapidly urbanising contexts



Cultural Identity, Spectacles & Global City Image

CRAUCGS studies architectural identities in the MENA region, attempting to understand the impact of flows and geo-cultural politics place typologies.

Urban Traditions & Designed Environments

CRAUCGS examines urban traditions in the context of nationalist particularism and the modern state. Learning from traditions we assess urban open spaces from users' perspective.



Architectural Education & Design Pedagogy

CRAUCGS develops dynamics for knowledge integration in design architecture pedagogy while testing transformative approaches into various learning settings.

PHD TOPICS WE SUPERVISE



Past PhD theses

Housing formation and transformation in North African cities: The case of Tripoli, Libya

Huyam Abudib

Urban space in port cities of the eastern Mediterranean: The case of Alexandria, Egypt

Amira Elsemellawy (to complete in 2019).



Socio-spatial practices of youth population in urban spaces in Accra, Ghana

Kristijn van Riel (to complete in 2019).



Current PhD topics

- Quality of urban life in the Africa city: the cases of Lilongwe, Malawi and Lusaka, Zambia
- Place attachment in postcolonial neighbourhoods in Greater Cairo
- Social sustainability in residential environments in Al-Basra.
- Urban fragmentation and continuity of Saudi cities: the case Riyadh, KSA
- Collaborative urban governance for sustainable development in Dhaka
- Compact development for informal settlements in Cairo
- Spatial design parameters for Buddhist meditation in Thailand
- Rapid urban development in post-conflict contexts in Benghazi



CRAUCGS Researchers

Our researchers study societal and environmental challenges and explore urban opportunities those challenges create in various contexts, including Accra, Ghana; Alexandria, Egypt; Dhaka, Bangladesh; Lilongwe, Malawi; Lusaka, Zambia; and Tripoli, Libya.



INTERNATIONAL EVENTS & FORUMS

2018

**Communities for a Changing Population,
Planning Aid Scotland, Glasgow, UK.**

*Embracing Social Innovation for Future Built
Environment Professionals*

Ashraf M. Salama, Invited Speaker

**The City (Re) Shaped: Exploring the nexus
between politics, memory, and urbanism in the
built environment, Leeds, UK.**

*A Comprehensive Framework for Understanding
Cities Shaping and (Re)Shaping Processes*

Ashraf M. Salama, Keynote Speaker

**2nd International Conference for Sustainable
Design of the Built Environment, London, UK.**

*The Quest for Socio-Cultural Sustainability:
Implications for Research and Education*

Ashraf M. Salama, Keynote Speaker

Kuala Lumpur Architectural Festival, Malaysia

*The Future of Architectural Education and Design
Pedagogy in a Global Society*

Ashraf M. Salama, Keynote Speaker

2017

**Invited Lecture for KLABS at the University of
Belgrade, Serbia**

*Sustainable Urbanism & Globalisation: Architectural
& Urban Transformations in Emerging Cities*

Ashraf M. Salama, Invited Lecture

**Invited Lecture at Bilkent University, Ankara,
Turkey**

*Contemporary Housing Transformations and Urban
Dynamics on the Arabian Peninsula*

Ashraf M. Salama, Invited Lecture

**PLEA 2017 International Conference, Edinburgh,
UK**

*Built Environment Education and Practice in a
Changing World*

Ashraf M. Salama, Forum Chair 2016

2016

**Invited Lecture at the American University in
Cairo, Egypt**

*Emerging Issues on Socio-Spatial Practice and the
Everyday Environment*

Ashraf M. Salama, Invited Lecture

**Invited Lecture at the North-western
Polytechnic University, Xi'an, China**

*Modernity – Identity in a World of Global Flows: The
Case of the Arabian Peninsula*

Ashraf M. Salama, Invited Lecture

**International Conference on Contemporary
Mosque Architecture, Dammam, Saudi Arabia**

*Persisting Inquiries: Interrogating Mosques
Architecture in Western Cultures*

Ashraf M. Salama, Keynote Speaker

International Events

CRAUCGS engages effectively in the international discourse about designing and planning in the global south through workshops, seminars, and public lectures. An example of a recent activity includes a series of invited seminars on architectural and urban transformations in the Global South, at the University Putra Malaysia, one of our strategic partners in South East Asia.



KNOWLEDGE EXCHANGE

Consultancy

CRAUCGS has experience to offer consultancy work and planning guidance to government agencies. Our research work is developed in collaboration with the Master planning teams, local authorities, and key real estate development enterprises in the cities of Abu-Dhabi, Cairo, Doha, Dubai, and is presented and debated with diverse types of stakeholders in the wider MENA region. We aspire to expand our reach in offering design guidance to various beneficiaries in other parts of the global south.

Teaching

We firmly believe in research-led teaching and in incorporating knowledge generated from research findings in course materials. CARUCGS teaches cultural and behavioural factors in architecture and urbanism as they relate to the global south at the postgraduate level, contributes to urban design and cultural studies modules, and promotes and supervises UG dissertations, Master and PhD theses topics that address architectural and urban realities of the global south. Our researchers have collaborated in the development of a CPD on sustainable global cities for planning and architectural firms that seek consulting opportunities in the Gulf region.

Knowledge Dissemination and Exchange Events

We are regularly invited to deliver lectures around the world as part of honorary visiting professorial appointments in Egypt, Qatar, and Malaysia. Since 2014, CRAUCGS has collaborated with colleagues of other units in the series of annual seminars, organised by the Department, on social innovation and resilience. The cluster has developed a network of international scholars through a series of special issues of refereed journals addressing the unique particularities of education and practice in the global south.

Sustainable urbanism in emerging cities

CRAUCGS has developed and validated the triadic framework for examining urban qualities in emerging cities which identified a wide spectrum of factors related to three pillars: efficiency, diversity, and identity and the way in which they are interwoven to establish insights into the development of sustainable cities.



RESEARCH GRANTS & PROJECTS



Re-Enterprising the 'Forgotten Villages of Greater Cairo'

GCRF pump priming, Hunter Centre For Entrepreneurship, Innovation and Entrepreneurship, Strathclyde Business School



European Commission

Sustainable and Resilient Built Environment Knowledge Labs (KLABS)

Erasmus+, European Commission, with 10 EU and Western Balkans HEI Partners



Investigating Housing Typologies in Multicultural Societies of the Gulf Region

Qatar National Research Fund, Qatar Foundation, with Qatar University

Architecture and Urban Planning

Erasmus+ KA107, with University of Belgrade



BC-SDBE: Building Capacity for Sustainable Development of the Built Environment

Newton Fund, British Council Institutional Links Project, with University of East London



Characterisation of Architecture and Urbanism of Cities in the Global South and The Quality of Urban Life in Sub-Saharan African Cities

Leadership Fund, University of Strathclyde



Fundamentalists and Other Modernisms: the Catalogue of the Pavilion of the Kingdom of Bahrain

Venice Architecture Biennale-2014 and the Ministry of Culture, Manama, Bahrain

Fundamentalists and Other Modernisms

The pavilion of the Kingdom of Bahrain at the 2014 Architecture Biennale offered a selection of a hundred Arab modernist buildings to articulate the impact of modernity on the Arab world. Our contribution included an elucidation of plurality of architectural trends, identities, and meanings.



PUBLICATIONS BY RESEARCH AREA

Knowledge Economies & Sustainable Urbanism

Salama, A. M., Wiedmann, F., Thierstein, A., & Al Ghatam, W. (2016). Knowledge economy as an initiator of sustainable urbanism in emerging metropolises. *ArchNet-IJAR: International Journal of Architectural Research*, 10(1), 274-324.

Salama, A. M., & Wiedmann, F. (2016). Fragmentation and continuity in Qatar's urbanism: towards a hub vision. In M. Evren Tok, et al. (eds.), *Policy-Making in a Transformative State: The Case of Qatar (155-177)*. Palgrave Macmillan, London, UK.

Wiedmann, F., Salama, A. M., & Mirincheva, V. (2014). Sustainable urban qualities in the emerging city of Doha. *Journal of Urbanism*, 7(1), 62-84.

Salama, A. M. & Wiedmann, F. (2013). *Demystifying Doha: On Architecture and Urbanism in an Emerging City*. Routledge, London, UK.

Socio-Spatial Practice of Migrant & Minority Communities

Wiedmann, F., & Salama, A. M. (2019). *Building Migrant Cities in the Gulf: Urban Transformation in the Middle East*. Bloomsbury (I.B. Tauris Imprint), London, UK.

van Riel, K., & Salama, A. M. (2019). Using auto-photography to explore young people's belonging and exclusion in urban spaces in Accra, Ghana. *Open House International*, 44(1), 62-70.

Salama, A. M., Wiedmann, F., & Ibrahim, H. (2018). Migrant knowledge workers' perceptions of housing conditions in Gulf cities. *Journal of International Migration and Integration*, 19(1), 15-33.

Salama, A. M., Azzali, S., & Wiedmann, F. (2017). The everyday urban environment of migrant labourers in Gulf Cities: the case of the old centre of Doha, Qatar. *City, Territory and Architecture*, 4, [5].

Salama, A. M., & Wiedmann, F. (2016). Perceiving urban liveability in an emerging migrant city. *ICE - Urban Design and Planning*, 169(6), 268-278.

Lifestyle Trends & Housing Transformations

Salama, A. M., Wiedmann, F., & Ibrahim, H. G. (2017). Lifestyle trends and housing typologies in emerging multicultural cities. *Journal of Architecture and Urbanism*, 41(4), 316-327.

Remali, A. M., Salama, A. M., Wiedmann, F., & Ibrahim, H. G. (2016). A chronological exploration of the evolution of housing typologies in Gulf cities. *City, Territory and Architecture*, 3(Article 14), 1-15. [14].

Abudib, H. H. (2016). Exploring contextual characteristics of traditional medinas in North Africa. *ArchNet-IJAR: International Journal of Architectural Research*, 10(1), 325-343.

Salama, A. M. (2015). A socio-anthropological approach for exploring housing culture in contemporary Cairo. In A. Picone (ed.), *Mediterranean housing cultures* (128-137). University Federico II, Napoli, Italy.

Cultural Identity, Spectacles & Global City Image

Salama, A. M. (2016). Evolutionary interventions in search of national architectural identity. In L. Molinari, & I. Jaidah (eds.), *AEB 1966-2016: Fifty Years of Architectural Design in Qatar* (8-19). Skira, Milan, Italy.

Salama, A. M. (2014). A century of architecture in the Arabian Peninsula: evolving Isms and multiple architectural identities in a growing region. In G. Arbid (ed.), *Architecture from the Arab world (1914-2014): A Selection* (137-143). Venice Biennale, Italy.

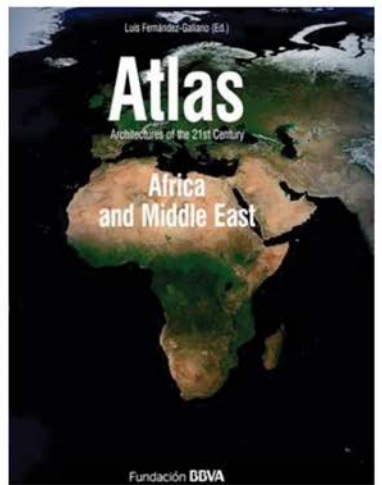
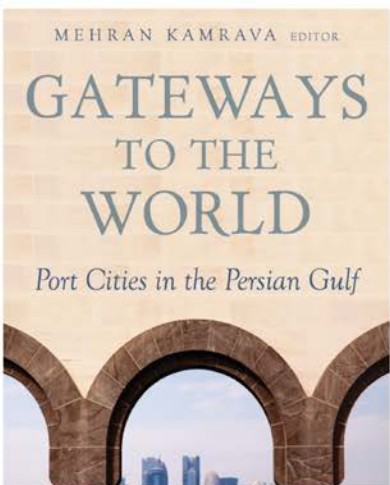
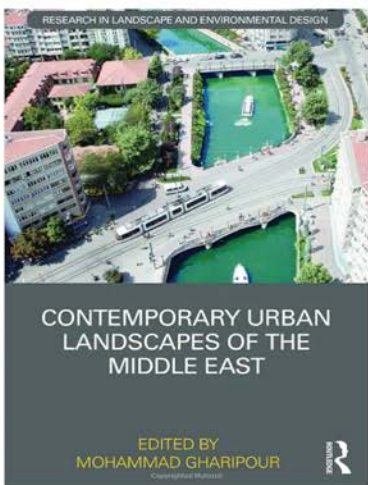
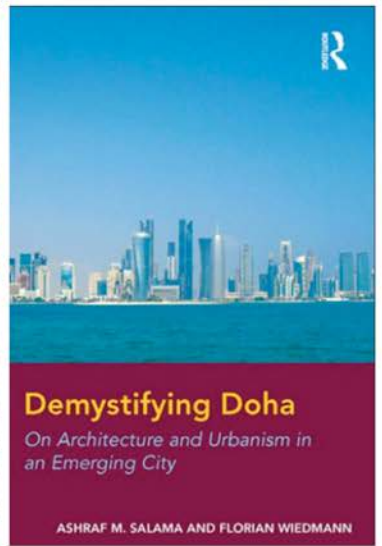
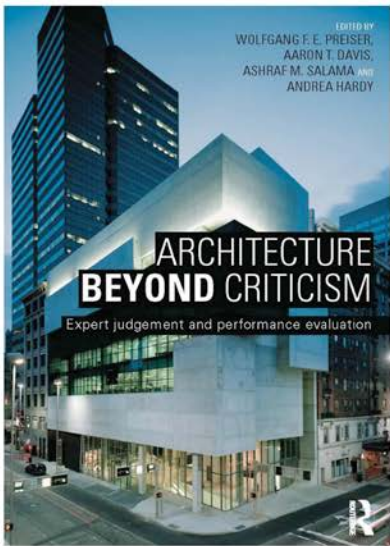
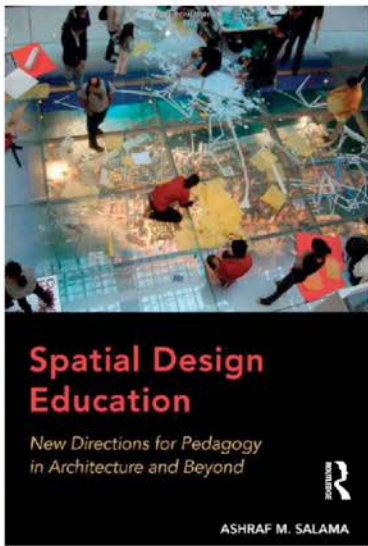
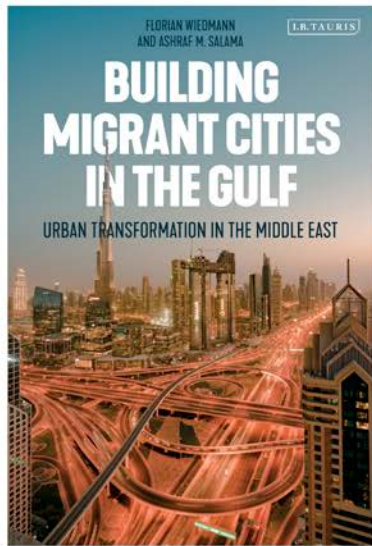
Salama, A. (2013). Narrating Doha's contemporary architecture: the then, the now, the drama, the theater, and the performance. In J. L. Mateo, & K. Ivanisin (eds.), *Middle East: Landscape, City, Architecture* (94-101). Park Books, London, UK.

Salama, A. M. (2012). Architectural identity demystified: visual voices from the Arab world. In P. Emmons, J. Lomholt, & J. S. Hendrix (eds.), *The Cultural Role of Architecture: Contemporary and Historical Perspectives* (175-185). Routledge, London, UK.

Urban Traditions & Designed Environments

MacLean, L., & Salama, A. M. (2019). Towards a context specific and multidimensional quality of urban life model. *Open House International*, 44(1), 25-33.

Salama, A. M., & Remali, A. M. (2018). Urban traditions in the midst of the Chinatown of Liverpool and the quasi-enclave of Glasgow. *Traditional Dwellings and Settlements, WP Series, UC-Berkeley*, 292, 1-22.



Shehab, N., & Salama, A. M. (2018). The spatiality of segregation: narratives from the everyday urban environment of Gothenburg and Glasgow. *ArchNet-IJAR: International Journal of Architectural Research*, 12(1), 71-90.

Salama, A. M. (2016). Nationalist particularism and levels of legitimizing architectural and urban traditions in four Gulf cities. *Traditional Dwellings and Settlements – WP Series, UC-Berkeley*, 272, 1-28.

Salama, A. M., & Azzali, S. (2015). Examining attributes of urban open spaces in Doha. *ICE - Urban Design and Planning*, 168(2), 75–87.

Salama, A. M. (2015). Urban traditions in the contemporary lived space of cities on the Arabian Peninsula. *Traditional Dwellings and Settlements Review*, 27(1), 21-39.

Preiser, W., Davis, A., Salama, A., & Hardy, A. (eds.) (2014). *Architecture Beyond Criticism: Expert Judgment and Performance Evaluation*. Routledge, London, UK.

Architectural Education and Design Pedagogy

Salama, A. M. (2019). Reflections on architectural education of the Muslim world within a global world. *International Journal of Islamic Architecture*, 8(1), 33-41.

Salama, A. M. (2018). From the global south: pedagogical encounters in architecture. *Charrette: Journal of UK Association of Architectural Educators*, 5(1), 1-7.

Salama, A. M. (2018). Post-professional architecture and academia: foreword. In H. Sadri (Ed.), *Neoliberalism and the Architecture of the Post Professional Era* (pp. 271-277). Springer: Switzerland.

Salama, A. M., & MacLean, L. (2017). Integrating Appreciative Inquiry (AI) into architectural pedagogy. *Frontiers of Architectural Research*, 6(2), 169-182.

Salama, A. M. (2015). *Spatial Design Education: New Directions for Pedagogy in Architecture and Beyond*. Routledge, London, UK.

Salama, A. M. (2014). 'Liveness' beyond design studio pedagogy: layers of 'live' within and across the boundaries of classroom settings. *Proceedings of the 2nd Annual Conference of UK Association of Architectural Educators* (88-93), Sheffield, UK.



Cluster for Research in Design & Sustainable

“ **Our mission is to research and implement design responses to social, environmental, and economic challenges within the built environment in both developed and developing countries.** ”

The Cluster for Research and Design & Sustainability (CriDS) at the University of Strathclyde draws together research expertise in sustainable architecture and urbanism, studies on the identification of social ecologies and environmental systems for supporting resilient communities, innovations in solar design technology, improvements in health, and advances in education for sustainable development, to help address challenges faced by communities across the world.

Our goal is to make a difference, by producing quality research work, and research-led educational provision, that will help to improve peoples’ lives today and in the future.

To do research at CRiDS contact:

Dr D. Grierson: d.grierson@strath.ac.uk

Prof B. Dimitrijevic: branka.dimitrijevic@strath.ac.uk

Dr S. Howieson: s.howieson@strath.ac.uk

RESEARCH AT CRIDS

About us

CRiDS was established in 2010 to address improved relationships between the built and natural environment. Since then, the unit, led by Dr David Grierson and Prof Branka Dimitrijevic, has attracted over 30 postgraduate researchers from around the world. Recent work on the development of a Space/Nature Syntax Method has been presented at MIT in USA, and our research in social innovation and resilience has led to a series of annual symposiums since 2015. The cluster has a holistic approach, and a collaborative, cross-disciplinary ethos.

Our research interests

The Cluster is focussed on producing quality research outputs, engaging in useful knowledge exchange activity, and achieving meaningful impact on peoples' lives. Our international expertise is being directly applied at the world-renowned Arcosanti urban laboratory in Arizona, USA, and in developing social innovation networks and frameworks across the world, that aim to make a difference. In collaboration with Strathclyde Engineering for Development we are currently designing and building an earthquake-resilient school in Nepal, and developing energy and resource efficient technologies for communities in developing countries.

We encourage PhD applications on a variety of topics

CRiDS encourages applications related to the following topics:

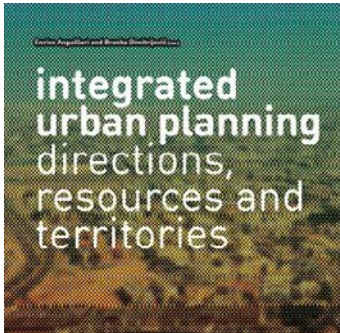
- Sustainability and the Built Environment
- Sustainable Design
- Social Innovation and Resilience
- Energy Efficiency and Indoor Air Quality
- Education for Sustainable Development.

KEY RESEARCH AREAS



Architecture and Ecology

Research in this area examines environmental and sociological aspects shaping the relationship between Nature, people and place. Our work considers the detrimental effects of the built environment on the natural environment, as well as impacts on human development, with the aim to support a positive transformation of this relationship through design.



Social Innovation and Resilience

Social innovation emerges when the existing governance systems are not capable of providing agile responses to evolving problems or sudden disruptive events. Our research explores social innovation networks, frameworks and solutions which support the resilience of communities within the context of the sustainable development of the built environment.



Energy & Resource Efficiency and Occupant Health

Research in this area supports design interventions that aim towards reductions in energy and resource use, and improved health. Our work has involved assessing the impact of house dust mites on asthma and providing solutions for improved thermal comfort and air quality.

Education for Sustainable Development

Our research explores transformative methods for cross-disciplinary education in sustainable development (ESD). The cluster has contributed to the development of curricula, teaching methods and material within Higher Education Institutions across Europe, and more recently in North Africa.



PHD TOPICS WE SUPERVISE



Past PhD theses

Education for Sustainable Development.

Claire Hyland

Architecture and Ecology.

Karen Munro



Sustainable Architecture: the Development of a Sustainable Management System for Iran.

Neda Poorang

Sustainable Development Policies: the Problem of Housing Collapse in the City of Basra, Iraq.

Qaaid Zgher Khlef Al-Saraify



Sustainable Architecture: Environmental Analysis using Artificial Intelligence.

Nada Khider Jassim Al-Naemy



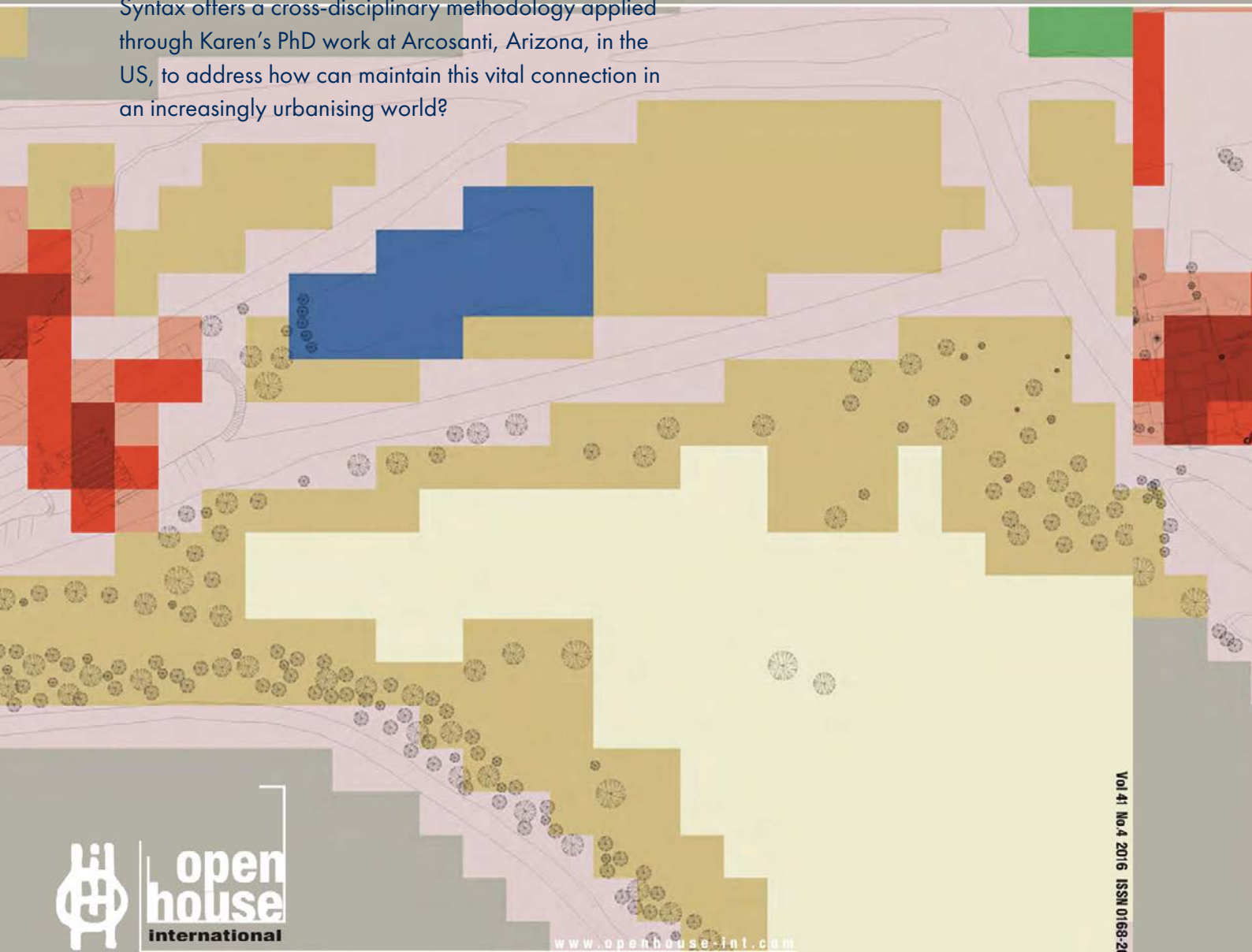
Current PhD topics

- The conflict between energy efficiency and indoor air quality.
- Children's experience of nature in primary school architecture.
- Displacing air conditioning in kingdom of Saudi Arabia.
- Housing design, economic and socio-environmental dimensions for a sustainable future in Iran.
- Indoor air quality, dust mite allergens and asthma.
- Passive and active solar design to displace space heating in Greece.
- Regenerative design and sustainable development.
- Social innovation systems for building resilient communities.
- Sustainable housing in developing countries.



Architecture and Ecology: Towards a Space/Nature Syntax

The Biophilia Hypothesis describes the innate connection between humans and Nature that offers us psychological, physical, and emotional benefits. The Space/Nature Syntax offers a cross-disciplinary methodology applied through Karen's PhD work at Arcosanti, Arizona, in the US, to address how can maintain this vital connection in an increasingly urbanising world?



INTERNATIONAL EVENTS & FORUMS

2019

**Lecture Presentation at Taylor's University,
Kuala Lumpur, Malaysia**

"Ecology, Biophilia, and Cities of Tomorrow"

David Grierson, plenary Lecture

**Presentation at Victoria Shanghai Academy,
Hong Kong Island, Hong Kong**

"Ecology, Biophilia, and Sustainable Architecture"

David Grierson, plenary Lecture

2018

**Influence of Climate Change in Serbia in Future,
Belgrade, Serbia**

*"Mitigation of and Adaptation to Climate Change in
Glasgow"*

Branka Dimitrijevic, Invited speaker

**Built Heritage Management and Presentation,
Nis, Serbia**

*"Challenges of Application of Innovative Technologies
in Built Heritage Management and Presentation"*

Branka Dimitrijevic, Keynote speaker

Proximate Orientalism, Vienna, Austria

*"Influences of Islamic architectural styles on the
architecture of Karel Parik"*

Branka Dimitrijevic, Invited speaker

Inclusive Tourism, Manila, Philippines

*"Inclusive Tourism in the City: Community and
Urban Space Perspectives"*

Branka Dimitrijevic, Invited speaker

Cultural Heritage and Tourism, Matera, Italy

"SMART Cultural Heritage and Tourism"

Branka Dimitrijevic, Visiting professor

2017

**Sustainable and Resilient Built Environment,
Banja Luka, Bosnia and Herzegovina**

"Sustainable Urban Development of Glasgow"

Branka Dimitrijevic, Invited speaker

2016

**Invited Presentation at the 3rd World
Symposium for Sustainable Development,
Massachusetts Institute of Technology (MIT),
Cambridge, MA, USA**

"Linking Space and Nature Syntaxes"

David Grierson and Karen Munro, Invited
speakers

**Invited Presentation for KLABS at the Venice
Biennale, Venice, Italy**

*"Didactical Activities Using Contemporary Learning
Methodologies and Materials"*

David Grierson, Invited speaker



KLABS project partners from 11 universities at TU Delft, Netherlands

Partners in the Erasmus+ funded KLABS project collaborated with members of CRiDS on the development of curricula for MSc courses at six universities in Western Balkan countries. Branka Dimitrijevic co-edited the book "Integrated Urban Planning: Territories, Resources and Directions" and co-authored a chapter in the book "Sustainable and Resilient Buildings: Approaches, Methods and Tools", used in teaching at the MSc courses.

KNOWLEDGE EXCHANGE

Consultancy

The Cluster offers a range of consultancy work and advice to government agencies and industry partners. For example, David and Branka collaborated with 'Zero Waste Scotland' and 'Ricardo Energy and Environment' on the development of "Designing Out Construction Waste: a guide for project design teams". David is working with Strathclyde Engineering for Development on the design and construction of earthquake-resilient schools in Nepal.

Teaching

CRiDS teaches ecology and sustainability to architecture and engineering students at undergraduate and postgraduate levels. David has led the Faculty-wide postgraduate programme in Sustainable Engineering since 2004, involving more than 900 students working on industry-based projects. The Cluster has also been invited to deliver presentations around the world on architecture and ecology, social innovation and resilience, energy and resource efficiency, and education for sustainable development.

Knowledge Exchange Events

Since 2010, the Cluster has organised annual conferences and symposia in collaboration with academics from across the University including:

- Annual student-led industry conference on Sustainable Engineering;
- Symposium on Frameworks for Social Innovation in Planning for Built Environments;
- Symposium on Social Innovation Systems in Building Resilient Communities;
- Symposium on Sustainability and Resilience of Buildings, Settlements and the Natural Environment.

Sustainability and resilience of buildings, settlements & the natural environment

A series of whole-day knowledge exchange events supported by 2020 Climate Group Scotland, Scottish Natural Heritage and Royal Society of Arts Scotland that brought together researchers from across the University, speakers from public and private sector, and other academic institutions nationally and internationally to discuss how research can support social and entrepreneurial innovation in communities to increase resilience of buildings, settlements & the natural environment.



RESEARCH GRANTS & PROJECTS



The Nepal Project: Designing and Constructing Earthquake-Resilient Schools in Nepal

Strathclyde Engineering for Development

Inclusive Tourism in the City: How Urban Tourism Can Benefit Marginalised and Vulnerable Communities

Global Challenges Research Fund, with the University of Philippines Diliman



BC-SDBE: Building Capacity for Sustainable Development of the Built Environment

British Council Institutional Links Project

Designing Out Construction Waste

Zero Waste Scotland



Sustainable and Resilient Built Environment Knowledge Labs

Erasmus+, with 10 EU and Western Balkans HEI Partners



Architecture and Planning

Erasmus+ KA107



The Development of a Micro-Solar CHP and Desalination Unit

Scottish Enterprise



Analysing and Testing the Architectural and Ecological Model Developed at Arcosanti, Arizona, USA.

The Cosanti Foundation



Sustainable Design and the Impact of Small Scale Renewable Energy Intervention in Rural West Africa

EPSRC

The Nepal Project

Following the devastating earthquake in 2015 the aim of the project, led by Dr Grierson, is to design and construct new classrooms and support facilities for Shree Bhairabi Secondary School in the Nuwakot district of Nepal, using low energy, earthquake-resilient, methods and techniques.



PUBLICATIONS BY RESEARCH AREA

Architecture and Ecology

Grierson, D. & Al-Saraify, Q. Z. K. (2019), *Walking to Occupational Activities within Three Neighbourhoods in Basra City*, Open House International.

Grierson, D. & Munro, K. (2018) *Nature, People, and Place: informing the design of urban environments in harmony with Nature through the Space/Nature Syntax*, in Azeiteiro, UM., Akerman, M., Leal Filho, W., Setti, AFF. & Brandli, LL. (eds.). *Lifelong Learning and Education in Healthy and Sustainable Cities*. Springer International Publishing (World Sustainability Series)

Grierson, D. (2016) *Unfinished Business at the Urban Laboratory: Paolo Soleri, Arcology, and Arcosanti*, Open House International.

Munro, K. & Grierson, D. (2016) *Linking Space and Nature Syntaxes: the Influence of a Natural View through Observed Behaviour at Arcosanti, Arizona, USA*, in Leal Filho, W., Brandli, L., Castro, P. & Newman, J. (eds.). *Handbook of Theory and Practice of Sustainable Development in Higher Education*. Cham, Cham: Springer International Publishing (World Sustainability Series)

Grierson, D. & Salama, A. M. (Editors) (2016) *Forging Advances in Sustainable Architecture and Urbanism*, Open House International (Special Issue).

Salama, A. M. & Grierson, D. (Editors) (2016) *Transformations in Architecture and Urbanism of Cities of the Global South*, Open House International (Special Issue).

Grierson, D. (2011) *Towards Sustainable Building Design*, in Graham, L. (ed.) *Sustainable Research by Designers*. University of Illinois, Common Ground Publishers.

Grierson, D. & Moultrie, C. M. (2011) *Architectural Design Principles and Processes for Sustainability: towards a typology of sustainable building design*, *Design Principles and Practices*.

Social Innovation and Resilience

Grierson, D. & Salama, A. M. (Editors) (2019) *Urban Performance Between the Imagined, the Measured, and the Experienced*, Open House International (Special Issue).

Harrington, S., Dimitrijevic, B. & Salama, A. M. (2018) Cracks and light: observing the resilience of the history museum of Bosnia and Herzegovina, Martor.

Horgan, D. & Dimitrijevic, B. (2018) Social innovation systems for building resilient communities, Urban Science.

Dimitrijevic, B. (2018) Challenges of Application of Innovative Technologies for Cultural Heritage Management and Presentation, Proceedings of the International Conference Built Heritage Management and Presentation, Niš, Serbia.

Harrington, S, Dimitrijevic, B. & Salama, A. (2017) Modernist Architecture, Conflict, Heritage and Resilience: The Case of Historical Museum of Bosnia and Herzegovina, Archnet- IJAR: International Journal of Architectural Research.

Dimitrijevic, B. (2017) Application of ICT for urban regeneration, environmental protection and social equality in Scotland, Places and Technologies 2017, Book of Conference Proceedings, Sarajevo, Bosnia and Herzegovina.

Malek, S. & Grierson, D. (2016) A Contextual Framework for the Development of a Building Sustainability Assessment Method for Iran, Open House International.

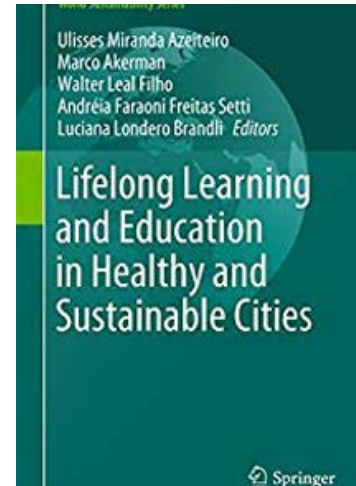
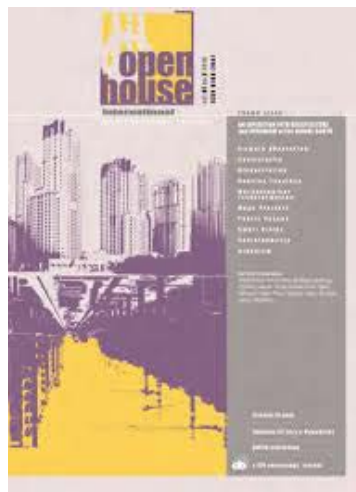
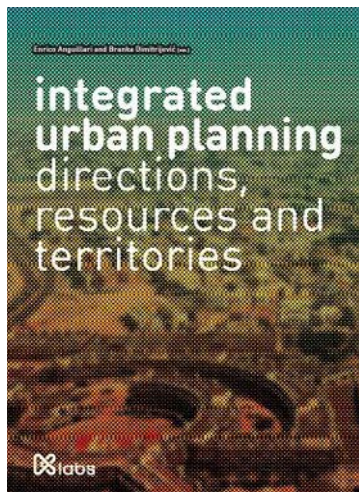
Grierson, D. (2014) Technology and Ecology, Humphreys, D. & Stober, S. (eds.) Transitions to Sustainability: Theoretical Debates for a Changing Planet. Champaign, Illinois, USA: Common Ground Publishing.

Energy & Resource Efficiency and Occupant Health

Nigra, M. & Dimitrijevic, B. (2018) Is radical innovation in architecture crucial to sustainability? Lessons from three Scottish contemporary buildings, Architectural Engineering and Design Management.

Konstantinou, T. & Dimitrijević, B. (2018) Sustainable Refurbishment for an Adaptable Built Environment, Kosanović, S., Klein, T., Konstantinou, T., Radivojević, A. & Hildebrand, L. (Eds.) Sustainable and Resilient Buildings: Approaches, Methods and Tools. Delft: TU Delft Open.

Hijazi J. & Howieson S. (2018) Displacing Air Conditioning in the Kingdom of Saudi Arabia: an evaluation of 'fabric first' design integrated with hybrid night radiant and ground pipe cooling systems, Building Services Engineering Research and Technology.



Howieson S. (2017), The Great Scottish Housing Disaster: the impacts of feudalism, modernism, energy efficiency and vapour barriers on indoor air quality, asthma and public health, Sustainability.

Guida, A., Pagliuca, A. & Dimitrijevic, B. (2015) Sustainable reuse of Modern Movement heritage building: problems and solutions in Scotland and Italy, Structural Studies, Repairs and Maintenance of Heritage XIX: Proceedings of the 14th Conference, Southampton, UK.

Sharp T. Farren P. & Howieson S (2015), Occupant Interactions and Effectiveness of Natural Ventilation Strategies in Contemporary Housing in Scotland, UK, International Journal of Environmental Research and Public Health.

Dimitrijevic, B. (2014) Strengthening the Sustainability of Built Heritage in Scotland, Architecture & Science.

Howieson S. (2014) Are Our Homes Making Us Ill? The Impact of Energy Efficiency on Indoor Air Quality, Public Health Perspectives.

Education for Sustainable Development

Anguillari, E. & Dimitrijevic, B. (Eds.) (2018) Integrated Urban Planning: Territories, Resources and Directions. Delft: TU Delft Open.

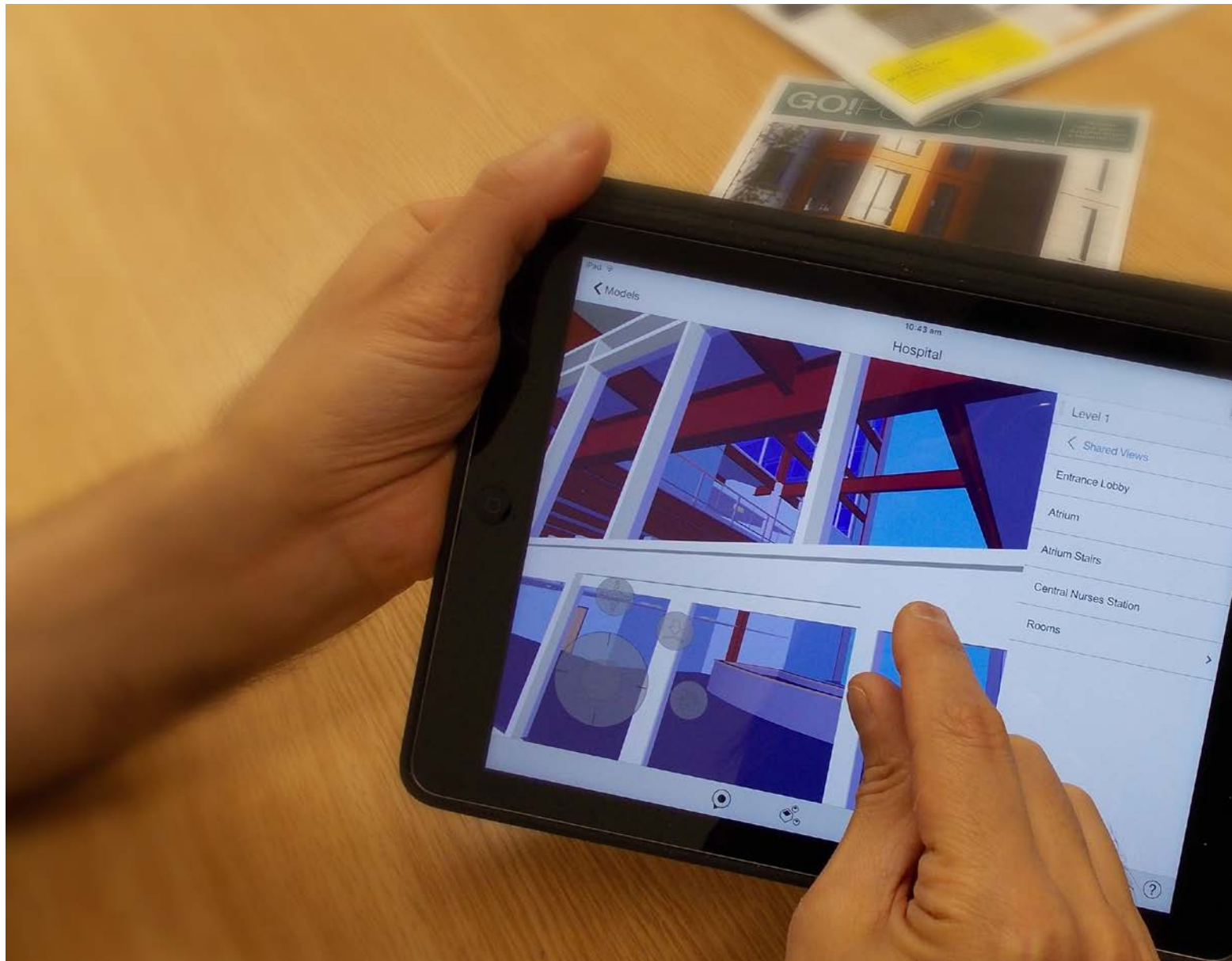
Grierson, D. & Munro, K. (2017) Towards Transformative Learning Methods for Interdisciplinary Postgraduate Education for Sustainable Development (ESD): a case study, ArchNet-IJAR: International Journal of Architectural Research.

Grierson, D. (2016) Didactical Activities using Contemporary Learning Methods and Materials: MSc Sustainable Engineering, Faculty of Engineering, University of Strathclyde, Knowledge Labs for Sustainable and Resilient Environments, Venice, Italy.

Hyland, C., Grierson, D., Sadler, S. & Asgari, Z. (2013) 10 out of 10 for Scottish School Design? Providing an Accessible Sustainable Environment for 21st Century Education, Atiner Series, Athens.

Grierson, D. (2012) How Do We Begin Again?, Association of Architecture Students, Guatemala City, Guatemala.

Grierson, D. & Hyland, C. (2011) Learning for Change: cross-disciplinary postgraduate programmes in sustainability, International Journal of Environmental, Cultural, Economic and Social Sustainability.



Digital Construction Research Unit (DiCR)

“ Our vision for Digital Construction is that Technologies cannot work spontaneously, there are enormous complex interdependent processes; and people with conflicting interests who will make these technologies effective and efficient. ”

The Digital Construction Research Unit at the University of Strathclyde evaluates and develops advanced technologies, methodologies and approaches for cutting-edge Information and Communication Technologies (ICT) to improve the performance of construction industry. The Unit also aims to understand the relationships between technologies, processes, and people. The team is committed to research and knowledge exchange in addition to research-led teaching.

Our goal is to develop quality research and to maximise impact through dissemination, research-led teaching, while influencing policy and decision-making. We seek to extend knowledge of Digital Integrated practices and innovative trans-disciplinary solutions.

To do research at DiCRU contact:

Dr. I. Motawa: Ibrahim.motawa@strath.ac.uk

Dr. Z. Chen: zhen.chen@strath.ac.uk

RESEARCH AT DICRU

About us

The DiCRU is a newly established research unit with two members of staff and currently nine PhD students. Dr Ibrahim Motawa is a Senior Lecturer in Building Information Modelling and director of the MSc course 'Advanced Construction Technologies & BIM'. Dr Motawa has been the principle investigator of research projects related to BIM development and energy efficiency in buildings. Dr Zhen Chen is a Lecturer in Construction Management. He has an academic and professional career for dependable built environment through working for companies, professional bodies, and universities worldwide.

Our research

The research group addresses a strategic priority of the Department of Architecture to explore and develop advanced ICT methodologies and systems in response to the UK (and the global) interests of digital transformation of the construction industry. Implementation of BIM level 2, prospective BIM Level 3/4, Industry 4.0, and Digital Twin are key concepts in our research. In collaboration with industry partners, we act as a knowledge hub and a conduit for facilitating a paradigm shift within the industry.

We encourage PhD applications on a variety of topics

In addition to the topics of the current research projects, topics of interest include:

- Building Information Modelling/Management
- Big Data in construction and for Smart Buildings and Cities
- Applied informatics and artificial intelligence
- Energy Efficiency Simulation and Building performance
- Optioneering and process reengineering
- Megaproject management

KEY RESEARCH AREAS



BIM, Big Data, and IoT for Intelligent Buildings

The Built Environment is rapidly changing with the move towards a resource efficient circular economy and the drive for more efficient, agile and customisable manufacturing through Industry 4.0. Our work in this area aims to integrate intelligent smart systems in conjunction with big-data concepts to improve construction performance.



Intelligent Decision Support Systems for Construction and in Megaprojects

Our work involves development and validation of decision support systems for construction problems and for managing megaprojects. We examine the impact of qualitative/quantitative and static/dynamic measures on design/construction/operation stages. We study the interdependency among technologies; processes; and people to develop integrated interfaces.



Sustainable and Energy Efficient buildings

Industrial informatics for smart and energy efficient buildings have huge potential to make significant contributions to sustainable systems. Our work within this area covers applications for communication and control infrastructures; systems dynamic, predictive analytics; energy control, optimization, and demand response.



These research topics are also covered to some extent in our MSc in Advanced Construction Technologies & BIM. Students in this course develop industrial solutions while researching on the principles and techniques related to the above areas.

PHD TOPICS WE SUPERVISE



Current PhD topics

A Framework for Improving Business and Technical Operations within Timber Frame Self-Build Housing Sector by Applying Integrated VR/AR and BIM Technologies

Lilia Potseluyko Amobi



The Application of Heritage Building Information Modelling (HBIM) Processes for Building Conservation Works

Saiful Fazli Bin Ramli



BIM integrated building code checking system for Chiang Mai, Thailand

Social sustainability and BIM

Silpa Singharajwarapan
Soukaina Elaouad



An Integrated Risk Management Decision Support System for Oil and Gas Construction Projects

Mohammed Almhawi

Using immersive technologies for architectural applications

Andrew Graham

Hybrid Optical Fibre Based Daylighting & LED High Power Source for Buildings

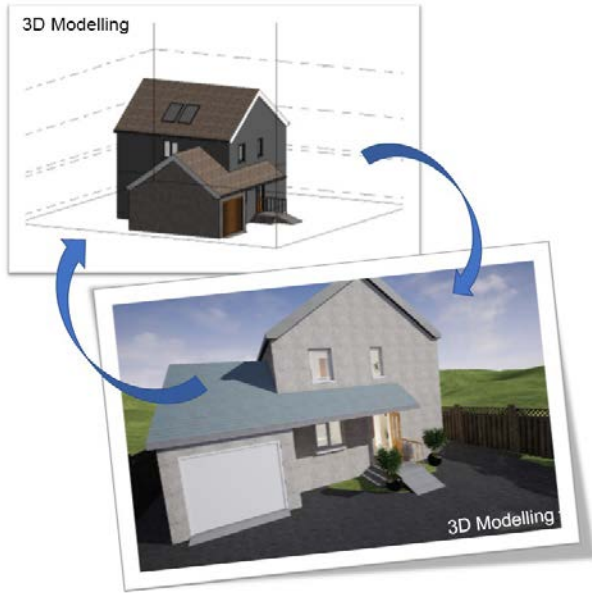
Seyedmohammadsale Seyedzadeh Kharazi

An analytic approach to adopting BIM overlay in Libya

Ambark Bareka

A framework of BIM education in Libya

Ozaer Zaed



Improving Operations within Timber Frame Self-Build Housing Sector through VR/AR and BIM

Thanks to the advent of Virtual and Augmented Reality (VR and AR) technologies, companies can improve their competitiveness by enhancing their clients' spatial understanding, simplifying communications, provide customisation options and consolidate quantification and support interoperability. This research seeks to provide technical recommendations for the development of a prototype framework to support the adoption of BIM and VR/AR technologies within the UK housing industry.



INTERNATIONAL EVENTS & FORUMS

2018

16th International Operations and Maintenance Conference in the Arab Countries - OMAINTEC 2018, Cairo, Egypt

“Managing Maintenance within Industry 4.0”,
Ibrahim Motawa, Keynote Speaker

Future of FM & Building Operations, Glasgow, UK

Zhen Chen, seminar organiser with BAM FM Ltd and BAM Energy Ltd

Engineering for the Sustainable Built Environment, Glasgow, UK

Zhen Chen, seminar organiser with AECOM

2017

The British Council ‘Science Collaboration Symposium: Smart Cities’, Abu Dhabi, United Arab of Emirates

Ibrahim Motawa, Invited Lecturer

The EU COST action ‘Mining the European Anthroposphere (MINEA)’, Vienna, Austria

“WG 1: Modelling the stocks and flows of the built environment for construction and demolition waste management”

Ibrahim Motawa, Invited Lecturer

15th International Operations and Maintenance Conference in the Arab Countries - OMAINTEC 2017, Beirut, Lebanon

“Smart maintenance” - Workshop on Digital Transformation in the Operation and Maintenance of the Construction and Building Industry

Ibrahim Motawa, Workshop organiser and Keynote Lecture

Laser Scanning Solutions for Building Projects, Faro

Zhen Chen, seminar organiser with BIM/CIM North UK

International Multi-Disciplinary Mega-Projects, Glasgow, UK

Zhen Chen, seminar organiser with AECOM

The British Council 'Science Collaboration Symposium - Smart Cities'

The event, hosted at the Masdar Institute, Abu Dhabi, United Arab of Emirates, 26-27 March 2017 is part of the UK/UAE 2017 Year of Creative Collaboration. Its aim is to encourage scientific researchers to present their stimulating work and ideas for knowledge transfer related to Smart cities. The event was attended by scientists and innovators from research institutions and start-up companies from the Gulf countries, as well as the UK.



KNOWLEDGE EXCHANGE

Consultancy

The DiCRU offers consultancy to industry partners and government agencies in the UK - and particularly in Scotland - on a number of key areas, including BIM implementation. One of our most recent works with industry was for the Royal Liverpool University Hospital, where we conducted a sustainability-oriented assessment of redevelopment plans using ANP approach.

Teaching

The Unit is delivering the MSc course in Advanced Construction Technologies & BIM. As a research-led teaching approach, the course covers many related areas to digital construction and benefits from strong links with many professional and governmental bodies such as: Scottish Future Trust and Construction Scotland Innovation Centre. We also contribute to undergraduate teaching in the area of Architecture Informatics and organise and deliver CPD and training programmes for professionals and prospective technology learners.

Knowledge Dissemination and Exchange Events

The Unit engages in national and international events for knowledge exchange related to digital construction and BIM. Examples of recent activities include research engagement sessions with students and staff of the Department of Architecture at the University of Seville (Spain), an Erasmus+ funded agreement. We have had several KE activities with industry partners, including:

- Development of BIM models for existing buildings – case of Lochbrae Court, with Cairn Housing Association, Edinburgh.
- BIM and QR coding for Passivhoos with John Gilbert Architects Ltd, Glasgow.
- Design of Add-Ons for Flex Series with Neat (UK) Ltd, Construction Scotland Innovation centre, Blantyre.

Advanced Construction Technologies & BIM

The construction industry stakeholders are in need of high-calibre and highly-competitive candidates with knowledge and skills in construction disciplines, Advanced Construction Technologies and Building Information Modelling. Our multidisciplinary course aims to develop the knowledge, practical, and personal skills of graduates to work in the Architecture/Engineering/Construction (AEC) industry and to develop further research skills related to AEC fields.



RESEARCH GRANTS & PROJECTS



Development of a BIM-Integrated Virtual Showroom for Offsite Manufactured Production

Knowledge Transfer Partnerships (KTP) with Norscot Joinery LTD



The effective design and delivery of megaprojects in the European Union

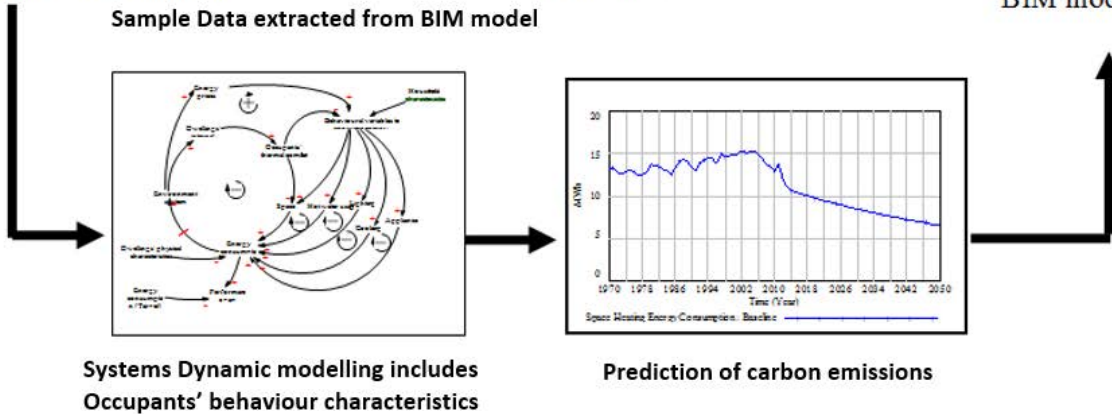
COST Action TU1003, funded by the European Cooperation in Science and Technology (COST), Horizon 2020, European Union.

For concrete elements:	
Embodied energy to construct the building elements	2500 MJ/m ³
Energy required for material transportation to the site	1000 Kwh
Energy required to heat and cool the building in operation	4500 Kwh
Variation in space	50 m ³
Thermal mass and insulation	100 kJ/m ² K



BIM module

Sample Data extracted from BIM model



Systems Dynamic modelling includes Occupants' behaviour characteristics

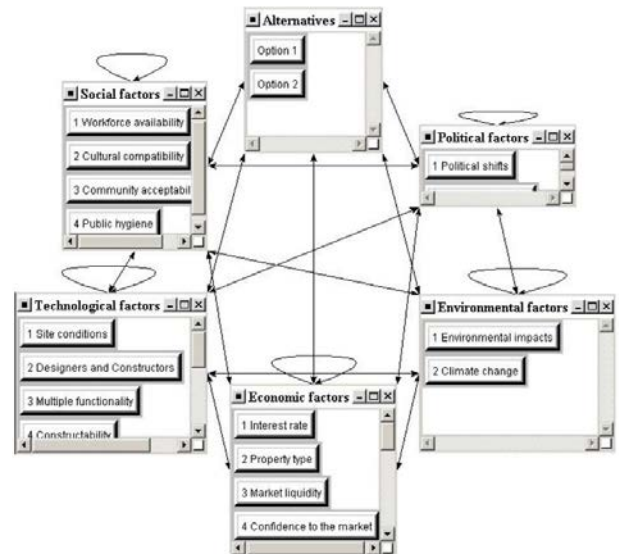
Prediction of carbon emissions

Source: Modelling the effect of occupants' behaviour on household carbon emissions. Motawa and Oladokun (2019), Page 14 – add 'ASCE Journal of Performance of Constructed Facilities, 33(2).



A sustainability-oriented assessment of redevelopment plans for the Royal Liverpool University Hospital using ANP

A consultation report was submitted to the Royal Liverpool and Broadgreen University Hospitals NHS Trust with regard to the redevelopment of the Royal Liverpool University Hospital. The analytic network process (ANP) method was adopted to evaluate two proposed redevelopment plans under a whole range of requirements on hospital sustainability in relation to social, technical, economic, ecological, and political (STEEP) issues. The recommended plan from this report matches the final decision made by the NHS Trust.



PUBLICATIONS BY RESEARCH AREA

BIM, Big Data, and IoT for Intelligent Buildings

Motawa I. (2017). Spoken dialogue BIM systems – an application of Big Data in construction. *Journal of Facilities*, Vol. 35 Issue: 13/14, pp.787-800.

Motawa I. and Almarshad A. (2015). Case-Based Reasoning and BIM systems for asset management, *Journal of Built Environment Project and Asset Management (Special Issue: BIM for Built Asset Management)*, Vol. 5(3), pp. 233-247

Motawa I. and Almarshad A. (2013). A knowledge-based BIM system for building maintenance, *Journal of Automation in Construction*, Volume 29, Pages 173-182

Hong J., Chen Z., Li H. and Xu Q. (2006). A case study of intelligent buildings: The City of Manchester Stadium (in Chinese). *Intelligent Buildings*, 16(5): 62-65.

Li H., Chen Z., Yong L. and Kong S. C. W. (2005). Application of integrated GPS and GIS technology for reducing construction waste and improving construction efficiency. *Automation in Construction*, 14(3): 323-331.

Intelligent Decision Support Systems for Construction and in Megaprojects

Chen Z. (2019) Grand challenges in construction management. *Frontiers in Built Environment*. 5:31.

Boateng P., Chen Z. and Ogunlana S. (2017). *Megaproject Risk Analysis and Simulation: A Dynamic Systems Approach*. Emerald Group Publishing Ltd. 360 pages.

Alasad R. and Motawa I. (2016). Dynamic Demand Risk Assessment for Toll Road Projects. *Journal of Construction Management and Economics*, Vol. 33 (10), pp 799-817

P. Boateng, Chen Z. and Ogunlana S. (2015) An analytical network process model for risks prioritization in megaprojects. *International Journal of Project Management*, 33(8): 1795-1811.

Alasad R., Motawa I. and Ogunlana S. (2013). A System Dynamics-Based Model for Demand Forecasting in PPP Infrastructure Projects – A Case of Toll Roads. *Organization, Technology and Management in Construction: an international journal (OTMC Journal)*, Volume 5 (2)

Jia G., Ni X., Chen Z., Hong B., Chen Y., Yang F. and Lin C. (2013) Measuring the maturity of risk management in large-scale construction projects. *Automation in Construction*, 34: 56-66.

S. Ogunlana, O. Awodele and Motawa I. (2011). Markets in developing countries: Is Public Private Partnership (PPP) the answer? In "Future Prospects in the Field of Construction, Real-Estate Infrastructure Management", Bauhaus-Universitat Weimar, pp 183-196 (Book Chapter)

Motawa I. and Kaka A. (2009). Modelling payment mechanisms for supply chain in construction, *Journal of Engineering, Construction, and Architecture Management*, Vol. 16, No. 4, Pages 325-336

Motawa I., Kaka A. and Wong H. C. (2008). Development of transparent payment systems. *Journal of Financial Management of Property and Construction*, Vol 13(2), Pages 143 – 156.

Motawa I. and Kaka A. (2008). Payment mechanisms for integrated teams in construction, *The Australian Journal of construction economics and building*, Vol. 8, No. 2, 2008, Pages 1-10

Motawa I., Anumba C., Lee S. and Peña-Mora F. (2007). An integrated system for change management in construction. *Journal of Automation in Construction*. Vol 16(3), May 2007, Pages 368-377

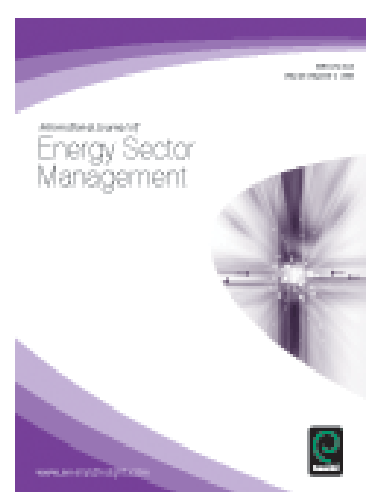
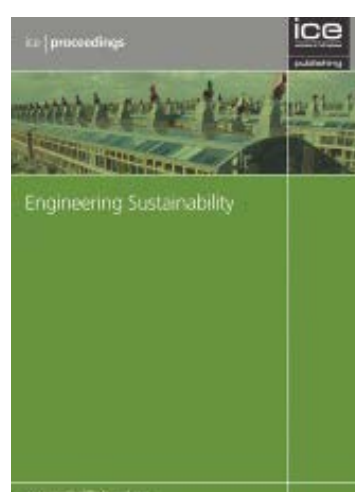
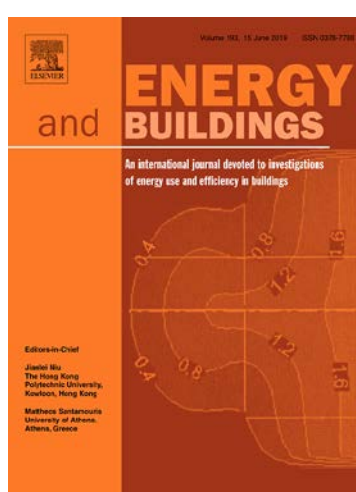
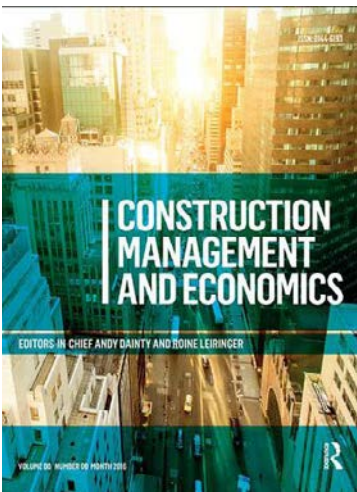
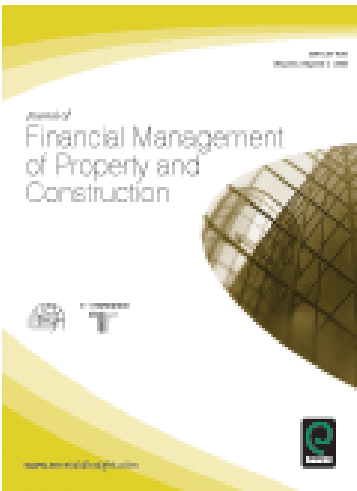
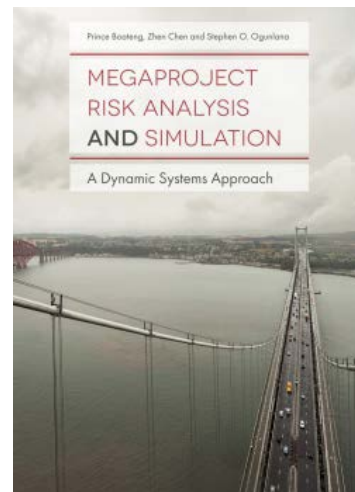
Motawa I., Anumba C and El-Hamalawi A. (2006). A fuzzy system for evaluating the risk of change in construction projects. *Journal of Advances in Engineering Software*, Vol 37(9), Pages 583-591

Chen Z., Li H., Kong S. C. W., Hong J. and Xu Q. (2006) E-commerce system simulation for construction and demolition waste exchange. *Automation in Construction*, 15(6): 706-718.

Sustainable and Energy Efficient buildings

Motawa I. and Oladokun M. (2019). Modelling the effect of occupants' behaviour on household carbon emissions, *ASCE Journal of Performance of Constructed Facilities*, 33(2).

Motawa I. and Oladokun M. (2015). A model for the complexity of household energy consumption, *Journal of Energy & Buildings*, Volume 87, pages 313–323.



- Chen Z. (2015) Principles of facilities management. *Journal of Facilities Management*. 13(1).
- Motawa I. and Oladokun M. (2015). Dynamic modelling for sustainable dwellings, the *ICE Journal of Engineering Sustainability*, Institution of Civil Engineers (UK), ICE publishing, Vol. 168 (4), pp. 182-190
- Motawa I. and Oladokun M. (2015). Structural Equation Modelling of energy consumption in buildings, *International Journal of Energy Sector Management*, Vol. 9 (4), pp. 435-450
- Chen Z., Abdullah A.B., Anumba C. J. and Li H. (2014) An ANP experiment for demolition plan evaluation. *J. Constr. Eng. Manage.*, 140(2): 06013005.
- Chen Z., Clements-Croome D. J., Hong J., Li H. and Xu Q. (2006) A multicriteria lifespan energy efficiency approach to intelligent building assessment. *Energy and Buildings*, 38(5): 393-409.



Urban Design Studies Unit (UDSU)

“ **Our mission is to study which spatial structures support the complex process of development and self-organisation of cities, typical of how they have evolved and flourished.** ”

The Urban Design Studies Unit (UDSU) at the University of Strathclyde studies cities, their form, functions and impact, with the ultimate goal of designing them better, and for the long run.

In particular, we aim to understand the major interrelated dynamics posed by recent urbanization processes, in both informal settlements and established cities, which we treat as self-organizing systems. Our goal is to understand and learn how to design the resilient city.

We are committed to research, teaching, and knowledge exchange beyond academia, including consultancy and training. All our research is applied in our teaching and contributes shaping our approach to the urban design and placemaking.

To do research at UDSU contact:

Prof S. Porta: sergio.porta@strath.ac.uk

Dr O. Romice: ombretta.r.romice@strath.ac.uk

RESEARCH AT UDSU

About us

The Unit was set up in 1988 by Hildebrand Frey, to address problems of urban rehabilitation, renewal and restructuring. Its research originally focused on the city and its origin, its development, form and structure and then expanded to study its impact on people and community engagement. Currently the Unit, led by Prof Sergio Porta and Dr Ombretta Romice, is growing in interests and expertise, to include the complex relationships between urban form and the broad dynamics of change and evolution. We have a collaborative ethos and we strongly believe in the value of research-based teaching.

Our research interests

The Unit has developed international expertise on urban analysis from both a morphological and an experiential angle. We have a portfolio in urban planning and design, community engagement, identity and sociability of public spaces, network analysis and environmental psychology. Our research is interdisciplinary, with inputs from urban morphology, urban geography, environmental psychology, evolutionary biology, system ecology, physics of complex networks and architecture.

We encourage PhD applications on a variety of topics

UDSU has an international and diverse cohort of PhD students and has attracted Fulbright researchers. Our PhD students are involved in teaching, so they develop key skills for their future. Topics of interest include:

- analysis of urban form and relation to socio-economic dynamics;
- resilience in urban systems;
- informal settlements;
- urban design quality assessment;
- environmental-behavioural studies and user engagement;

KEY RESEARCH AREAS



Science of Urban Form & Evolution

Our work on urban science is an evidence-based investigation of urban form and how it changes in time. We seek to understand the contribution of urban form to the larger evolution of cities in their social, economic, institutional and environmental aspects.



Urban Design & Masterplanning for Change

Work in this area focuses on how we as urban designers can help generate a sustainable and resilient urban form. We study how to link building density, street centrality, transport, service and retail nodes and ecological networks in an innovative process of masterplanning.



Environmental Psychology & Quality of Life

Whilst strongly encouraged by the UK government and now a compulsory feature of planning, user engagement in design is still not fully understood or effectively performed. Our expertise in the area of public engagement ranges from design to environmental psychology.



Radical Architecture Construction

This line of research is about processes of community-based housing production centred around human experience. Community participation is brought to the next level combining end-users construction and person-centred interaction into community building.

All these research topics are introduced and applied in our MSc in Urban Design and urban design studio in Year 5: students have contributed, over the years, to the development of these areas, and in particular ‘Masterplanning for Change’, our approach to the design of the resilient city.

PHD TOPICS WE SUPERVISE



Past PhD theses

Prosperity & slums: a dynamic trajectory for positive development.

Aisha Abubakar



Resilience & Urban Design: a systems approach to the study of resilience in urban form. Learning from the case of Gorbals, Glasgow.

Alessandra Feliciotti



Understanding the Urban Form of Informal Settlements.

Maddalena Iovene

Finding the Plot: A plot-based housing development model applied to physical regeneration in Glasgow.

Gordon Barbour

Designing for “Life between buildings”: modelling the relationship between streetscape qualities and pedestrian activity in Glasgow, Scotland.

John Alexander Maxwell



Urban Morphometrics: Towards a Science of Urbanism.

Jacob Leonard Dibble



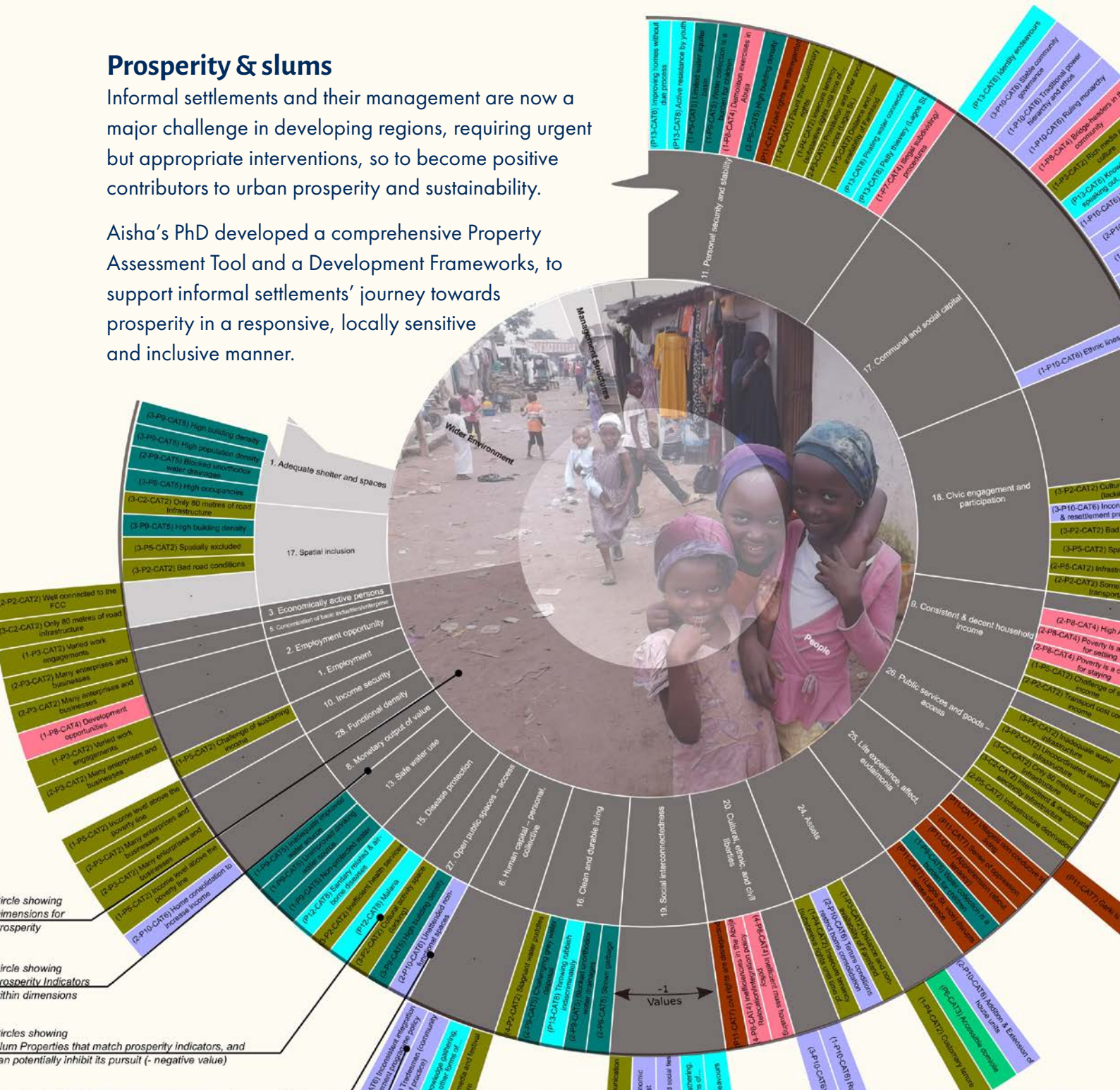
Current PhD topics

- Measuring urban form and urban life in Baghdad;
- Tools and frameworks for a quantitative analysis of urban form;
- Traditional morphology of settlements in Botswana;
- Users' perception and understanding of resilience in housing;
- Generative and bottom-up urban regeneration in South Africa.

Prosperity & slums

Informal settlements and their management are now a major challenge in developing regions, requiring urgent but appropriate interventions, so to become positive contributors to urban prosperity and sustainability.

Aisha's PhD developed a comprehensive Property Assessment Tool and a Development Frameworks, to support informal settlements' journey towards prosperity in a responsive, locally sensitive and inclusive manner.



INTERNATIONAL EVENTS & FORUMS

2018

Launch of STRELKA Educational Institute. Moscow, Russia.

Sergio Porta and Ombretta Romice, invited speakers

IAPS 25th International Congress. Rome, Italy.

“Transitions to sustainability, lifestyles and human wellbeing: cultural, environmental and political challenges”.

Ombretta Romice, Keynote speaker

2017

Innovation districts and the example of Tel Aviv. Tel Aviv, Israel.

“The Case of Tel Aviv”.

Sergio Porta, Invited speaker

2016

Workshop on Vital Public Spaces. Geneva, Switzerland.

“Designing and managing public spaces for inclusive, safe, resilient and sustainable cities”.

Sergio Porta, Invited speaker

Urban Design Institute of South Africa Conference. Tshwane, South Africa.

“Urban+trans+formation: Considering a Vision for the Gauteng Inner-city”.

Ombretta Romice, Keynote speaker

2015

7th Annual Symposium of Architectural Research in Finland. Espoo, Finland.

“Archi+Tectonics: Architecture, Communities and Cities under Change”.

Ombretta Romice, Keynote speaker

2012

EBRA 10th International Symposium. Changsha, China.

“History and reality: environment-behavior studies in the perspective of multidimensional transformation”.

Dr. Ombretta Romice, Keynote speaker

Engage with Strathclyde. Glasgow, UK.

“Sustainable Homes & Communities: holistic design, total place”.

Sergio Porta, Invited speaker

2011

4th Dortmunder Lectures on Civic Art. Dortmund, Germany.

“New Civic Art”.

Sergio Porta, Plenary Lecture

IAPS-joint Network Symposium. Daegu, South Korea.

“Continuity and Change of Built Environments”.

Ombretta Romice, Keynote speaker.



Launch of STRELKA Educational Institute

Following UDSU's support to Strelka in the Masterplanning of the town of Svobodny, in Russia, the Strelka Institute for Media, Architecture and Design, with the support of DOM.REF (Russia Housing and Urban Development Corporation) invited us to present our work on Masterplanning for Change, and help disseminate our ideas on housing and urban planning to practicing architects, young bureaus and city representatives responsible for urban development.

KNOWLEDGE EXCHANGE

Consultancy

The Unit has experience in offering consultancy and design advice. With our Year 5 and PGR students we routinely work with local authorities across UK to develop long term strategies and detailed design proposals. We have recently delivered consultancy on the strategic development of the city of Svobodny (Russia) for KB Strelka.

Teaching

UDSU teaches urban design at undergraduate and postgraduate level. It runs the MSc in Urban Design and is part of the Building Beauty PG Diploma in Architecture. We also deliver courses and training for professionals and local authorities. These include Masterplanning training programmes, the latest one delivered to Strelka Education in Moscow, the Urban Design Representation CPD and the GIS & Spatial Analysis course.

UDSU regularly takes part to International assessment panels for research and teaching. Our last experience was on behalf of the Portuguese Science and Technology Foundation (FCT), the Portuguese national Research Funding Organization (RFO) for all areas of knowledge, where we reviewed the area of Architecture and Urbanism for all National Research and Development (R&D) units.

Knowledge Exchange Events

UDSU has organised and hosted international congresses, workshops and symposia, including:

- EEPUM Workshop and Round Table;
- International Summit on Plot Based Urbanism;
- 22nd IAPS International Conference in Glasgow;
- EPUK Environmental Psychology Conference in the UK;
- Multimodal Representation of Space Conference;
- Designing with Communities International Conference.



EPUUM Workshop

PhD students at UDSU recently organised and hosted an international multi-disciplinary cooperation workshop aiming to explore the ecological and evolutionary perspectives in urban morphology, trying to link the smallest scale of the individual unit to macro-regional aggregations and built a new shared language to apply ecological methods and models to the study of the urban environment.



RESEARCH GRANTS & PROJECTS



Ax:son Johnson
Foundation

EPSRC



ROYAL
ACADEMY OF
ENGINEERING



CONSORZIO COOPERATIVE COSTRUZIONI
CCC
Società cooperativa



Architecture+DesignScotland
Ailtearachd is Dealbhadh na h-Alba



RTPI

Chartered Town Planner

Urban Form Resilience Project

with Ax:son Johnson Foundation and Arup Engineering.

GALE, Global Accessibility to Local Experience

EPSRC grant in collaboration with University of Cambridge Computer Lab and the Queen Mary University Institute for Complex Systems.

Distinguished Visiting Fellowship

Royal Academy of Engineering.

L'Abitare Futuro / The Future Inhabiting

commissioned by National Consortium of Construction Cooperatives of Italy.

Multiple Centrality Assessment (MCA): a strategic modelling tool for use in urban regeneration

KTA grant in collaboration with Robert Adam Urbanism.

Plot-Based Urbanism: A Field Guide to Masterplanning

"Bridging the Gap" by the Faculty of Engineering, University of Strathclyde.

Under the Microscope: Small Scottish Towns

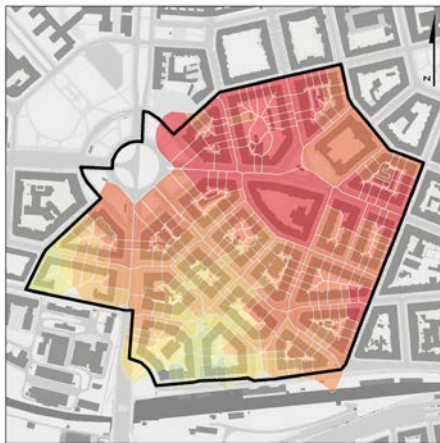
Research & Development and Architecture & Design Scotland grant.

Gateways to Professions: Urban Design

granted by the Department for Education and Skills, with RTPI.

The Urban Form Resilience Project and MoRE

In partnership with the Ax:son Johnson Foundation, UDSU is developing a Morphological Resilience Evaluation (MoRE) web-app to measure changes in characters of urban form that affect its resilience. MoRE uses five morphological attributes of urban resilience - diversity, connectivity, redundancy, modularity and efficiency.



Dejvice, Prague

PLACE-TYPE: Compact fabric



Typical score in this place-type category:



Typical score in Prague:



In terms of Plot Diversity...

- 3rd out of 24 in Prague
- 1st out of 4 in Compact fabric place-type
- 22% of plots have a diversity value over 0.75
- 0% of plots have a diversity value below 0.25



Zahradní Město, Prague

PLACE-TYPE: Terraced houses



Typical score in this place-type category:



Typical score in Prague:



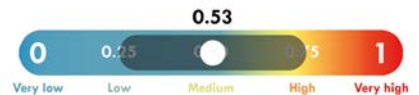
In terms of Plot Diversity...

- 16th out of 24 in Prague
- 4th out of 4 in Terraced houses place-type
- 3% of plots have a diversity value over 0.75
- 0% of plots have a diversity value below 0.25



Sídlíště Ďáblice, Prague

PLACE-TYPE: Modernist estate



Typical score in this place-type category:



Typical score in Prague:



In terms of Plot Diversity...

- 21st out of 24 in Prague
- 2nd out of 4 in Modernist estate place-type
- 0% of plots have a diversity value over 0.75
- 0% of plots have a diversity value below 0.25

PUBLICATIONS BY RESEARCH AREA

Science of Urban Form & Evolution

Feliciotti A, Romice O, and Porta S, (2018). From system ecology to urban morphology: towards a theory of urban form resilience, in: "International Forum on Urbanism: Reframing Urban Resilience Implementation", UIC School of Architecture, Barcelona.

Dibble J, Prelorendjos A, Romice O, et al. (2017). On the origin of spaces: Morphometric foundations of urban form evolution. *Environment and Planning B: Urban Analytics and City Science*: 1-24.

Venerandi, A, Zanella, M, Romice, O, Dibble, J & Porta, S (2017), Form and urban change: an urban morphometric study of five gentrified neighbourhoods in London, in: *Environment and Planning B: Planning and Design*, vol 44, no. 6, pp. 1056-1076.

Remali, AM & Porta, S (2017), Correlating street network and urban blocks in the city centre of Tripoli, in: *Journal of Urban Morphology* 21(2) pp. 161-179.

Iovene M, Fernández de Córdova G, Romice O, & Porta S (2017). Towards informal planning : mapping the evolution of spontaneous settlements in time. In: 24th ISUF International Conference - City and Territory in the Globalization Age. Universitat Politècnica de València, Valencia, pp. 545-557.

Porta, S., Romice, O., Maxwell, J. A., Russell, P., & Baird, D. (2014). Alterations in scale: Patterns of change in main street networks across time and space, in *Urban Studies*, 51(16).

Strano, E., Nicosia, V., Latora, V., Porta, S., & Barthélemy, M. (2012). Elementary processes governing the evolution of road networks, in *Scientific Reports*, 2, 1-8.

Urban Design & Masterplanning for Change

Romice O, Porta S and Feliciotti A, (2018). Urban form Resilience Urban Design Practice: Masterplanning for Change, in: "International Forum on Urbanism: Reframing Urban Resilience Implementation", UIC School of Architecture, Barcelona.

Danenberg R, Mehaffy M, Porta S, & Elmlund P (2018). Main street plot scale in urban design for inclusive economies: Stockholm case studies. *Proceedings of the Institution of Civil Engineers-Urban*

Design and Planning, 171(6), 258-267.

Porta, S., Romice, O., Feliciotti, A., & Rudlin, D. (2018). Big box, short life: little box, long life: the democracy of resilience: plot-based urbanism, evolution and informal participation. In: Create Streets, London.

Abubakar A, Romice O, & Salama A. M. (2017). Defining slums using multidimensional and relational properties: A dynamic framework for intervention. ArchNet-IJAR: International Journal of Architectural Research, 11(2), 34-54.

Feliciotti, A. Romice, O. Porta, S. (2017). Urban regeneration, masterplans and resilience: the case of Gorbals, Glasgow, Journal of Urban Morphology, 21(1).

Romice, O. Feliciotti, A. Porta, S. (2017). The road to masterplanning for change and the design of resilient places, in: "Archi+Tectonics: architecture, communities and cities under change, in: Proceedings of the 7th Annual Symposium of Architectural Research in Finland", Aalto University, Helsinki

Feliciotti, A., Romice, O., & Porta, S. (2016). Design for change: five proxies for resilience in the urban form. Open House International, 41(4), 23-3

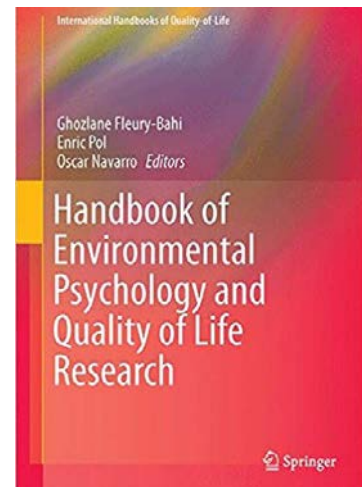
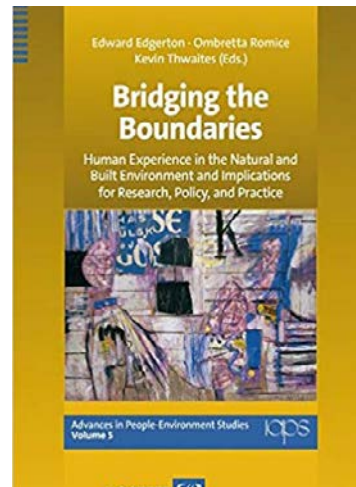
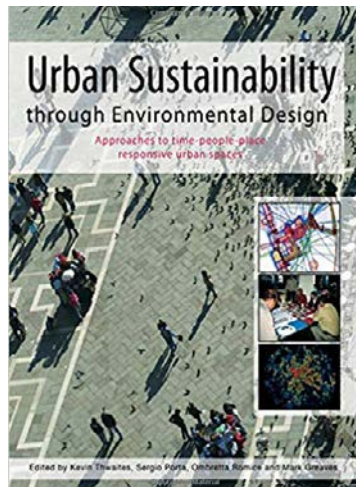
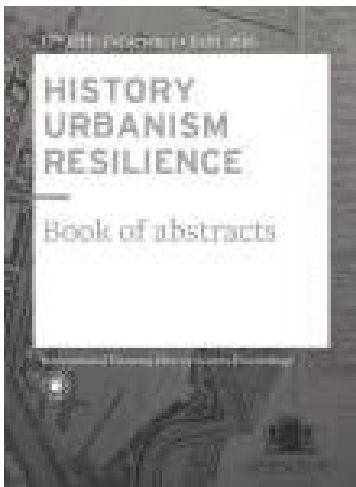
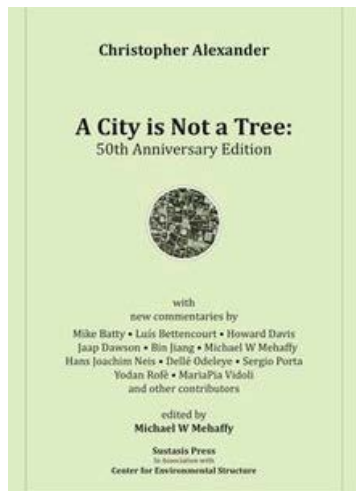
Barbour G C, Romice O., & Porta S (2016). Sustainable plot-based urban regeneration and traditional masterplanning practice in Glasgow. Open House International, 41(4), 15-22.

Romice, O. Porta S. Feliciotti, A. Barbour, G. (2017). Masterplanning for Change: Design as a way to create the conditions for time sensitive place-making, in: AlWaer, H. Illsley, B. eds., Placemaking: rethinking the masterplanning process, ICE Publisher, formerly Thomas Telford

Greaves M, & Romice O (2015). Exploring whether the UK Localism Act (2011) and effective community engagement can empower communities and deliver place sensitive development. In J., & W-S. E (Eds.), Tradition and Heritage in the Contemporary Image of the City: Practise and Process (Vol. 3). Krakow

Romice O, & Porta S (2015). Plot based urbanism: a roadmap to masterplanning for change. Academy of Urbanism Journal.

Mehaffy, M. Porta, S. Romice, O. (2014). The 'neighbourhood unit' on trial: A case study in the impacts of urban morphology, Journal of Urbanism, International Research on Placemaking and Urban Design



Porta, S. Romice, O. (2014). Plot-based urbanism: towards time-consciousness in place-making, In; Mäckler, C., & Sonne, W. (Eds.), "Dortmund Lectures on Civic Art/Dortmunder Vorträge zur Stadtbaukunst", Sulgen, DE: Niggli, 82-111

Environmental Psychology & Quality of Life

Romice, O. Thwaites, K, Porta, S. Greaves, M. Barbour, G. Pasino, P. (2016). Urban design and quality of life, in: Fleury-Bahi, G. Pol, E. Navarro, O. (eds.) "The Handbook of Environmental Psychology and Quality of Life Research", Springer, 242-273

Romice O., Paul, A. (2015). Multi-storey - changing patterns of regeneration: what can be applied from people- environment studies? In R. Lawrence, & G. Barbey (Eds.), *Repenser l'Habitat - Rethinking Habitats: Donner un sens au logement - Making Sense of Housing* (pp. 279-315). Paris.

Edgerton, E. Romice, O. Thwaites, K. (2014). *Bridging the Boundaries: Human Experience in the Natural and Built Environment and Implications for Research, Policy and Practice*. Hogrefe Publishing, Cambridge, MA.

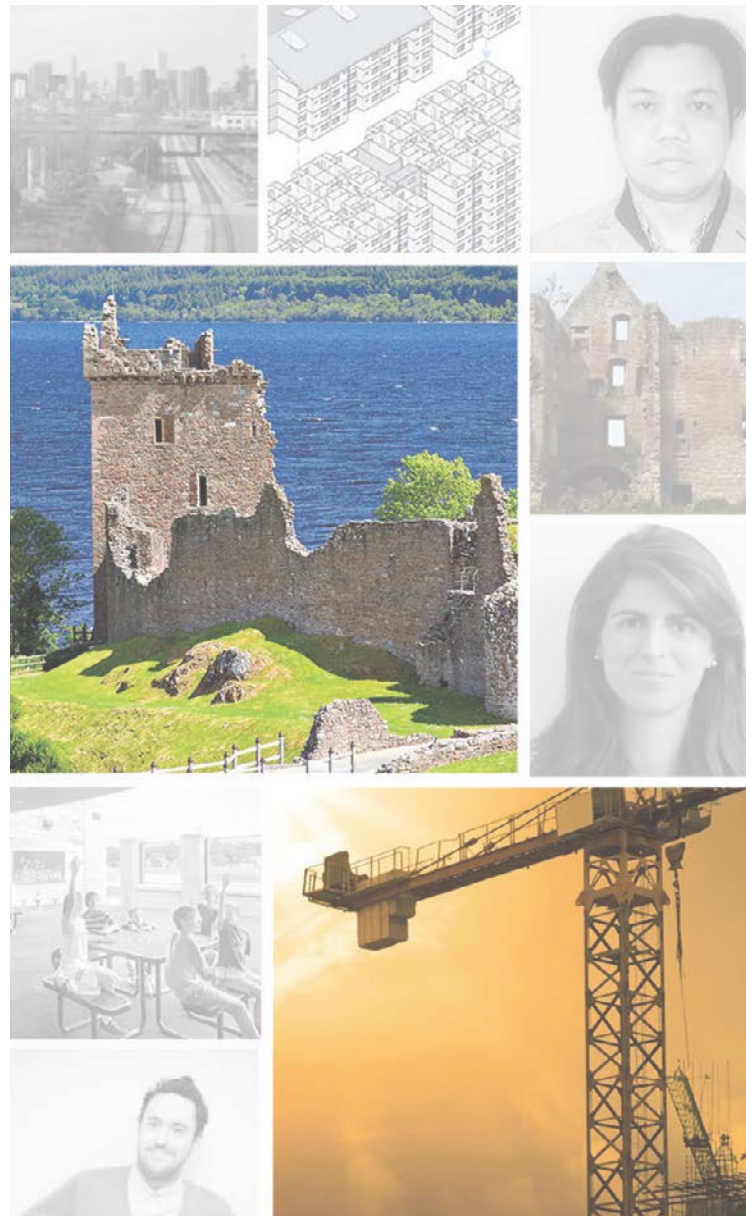
Radical Architecture Construction

Moore Alexander, M. Zecchi, E. Russell, P. Vidoli, M Caperna, A. Romice, O. Porta, S. (2017). The Timeless Way of Educating Architects: A New Master in 'Building Beauty' in Naples, Italy, in: 'Proceedings of the PUARL 2016 Conference', San Francisco.

Porta, S. Rofè, Y. Vidoli, M. (2016). The production of cities: Christopher Alexander and the problem of 'System A' at large scale, in: 'Proceedings of the Pursuit of Pattern Language for Societal Change – PURPLSOC', Krems.

Porta, S., Rofè, Y. Vidoli, M. (2016). The city and the grid: building beauty at large scale, in: Mehaffy M. (ed.), 'A city is not a tree, 50th anniversary edition', Sustasis Press.

Porta, S., Russell, P., Romice, O., Vidoli, M. (2014). Construction and Therapy: an Integrated Approach to Design Build, in: Cavanagh, T. Hartig, U. Palleroni, S. (eds.), 'Working Out: Thinking While Building', 98-108, Halifax, NS: ACSA Press



University of
Strathclyde

The University of Strathclyde is a charitable body, registered in Scotland, with registration number SC015263