

MAKING THE FUTURE

FACULTY OF TECHNOLOGY, DESIGN AND ENVIRONMENT
RESEARCH UPDATE 2018/19



The Faculty of Technology, Design and Environment comprises the School of Arts, School of the Built Environment, School of Architecture and School of Engineering, Computing and Mathematics. The Faculty has an international reputation for excellence, innovation and ambitious desire to be recognised as one of the leading places to study in the world.

90%

of our research was classed as internationally recognised or better in the 2014 Research Excellence Framework



Our researchers have worked with the **United Nations, Ford, Steel Construction Institute, TATA Steel, Red Cross and Red Crescent, Handicap International, Siemens, HelpAge International, 3M, Williams F1, Ministry of Defence, Oxford University Press, EDF Energy, English Heritage, Save the Children**, and many other companies and organisations



HELLO & WELCOME



enhance research excellence and facilitate meaningful knowledge exchange; to enhance the impact of research in its broadest terms, and widen dissemination for the benefit of local, regional and global communities, including our staff, students and alumni.

We continually encourage our staff to engage in a diverse range of research interactions as only appropriate in the context of the Faculty's wide range of disciplines. We also support these staff with a range of development initiatives, tailored to the stage in their career that they have reached. Likewise, candidates are being given increased status in our research planning

We are tactically looking to recruit doctoral postgraduate researchers and post docs to work with our staff on joint publication with international citation. We have therefore recently set up a Doctoral Training Programme (DTP) to improve research methods training, enhance an understanding of interdisciplinary methodologies and generally encourage higher quality interactions within a wide and larger research community.

The Faculty is fully committed to the internationalisation of our research. We are developing strategies for consolidating productive relationships with a select number of international partners. At the same time we also continue to support discrete smaller scale associations where there is proper mutual benefit.

The Faculty's Research Office is the vital support mechanism for improving the quality of these collaborations, and the staff there work tirelessly to ensure that we are always up-to-date with funding opportunities, that research grant bids are afforded the best chance of success, and that we are offering opportunities for our staff and candidates to develop the necessary skills and expertise to thrive in their careers.

Lastly, all that is needed to be said is that research in a university should never sit alone and isolated. The practice and outputs of research need to inform teaching. That is why our leading professors can still be found in the lecture theatre, seminar room, studio and workshop. Our extensive research strengths underpin both Undergraduate and Masters-level programmes as well as our portfolio of research degrees.

I am writing this introduction whilst sitting on a high-speed train travelling between Chandigarh and Delhi in northern India. I am returning from the successful launches of two new RCUK-funded research projects in the field of Low Carbon Building led by our own world expert, Professor Rajat Gupta. It is a sign of the times.

Research in the Faculty of Technology, Design and Environment is based around powerful well-led research groupings with an international outlook. Staff of all levels, including postgraduate researchers, are collaborating to address specific research agendas. Increasingly, this research activity is attempting to address the world's grand challenges - the 'wicked problems' that threaten our ability to provide a sustainable society for future generations.

These research groupings operate at the highest levels of academic excellence, are networked with other international and UK academic institutions, are partnered successfully with practice and industry, and are committed to high quality high impact research and knowledge exchange outputs.

We have adopted an approach to research that encompasses three overarching strategic objectives: to pursue and support research of the highest quality that has potential to become recognised as internationally excellent or world leading; to promote and support collaborations and partnerships which

PAUL INMAN
Pro Vice-Chancellor and Dean,
Faculty of Technology, Design and Environment

Socially sustainable futures?

New international research on urban regeneration in Vancouver and London

DR JULIET CARPENTER, SCHOOL OF THE BUILT ENVIRONMENT

Dr Juliet Carpenter, Senior Research Fellow in the School of the Built Environment, was recently awarded a Marie Skłodowska Curie Global Fellowship for her project “Social Sustainability and Urban Regeneration Governance: An International Perspective”. She is currently spending two years at the University of British Columbia, Vancouver, to conduct her research and case studies, and will be returning to Oxford Brookes in the final year of the project.

Cities in the 21st century are faced with increasingly complex challenges, reconciling the drive for economic growth with concerns related to social cohesion and inequalities. These tensions are particularly manifest in the arena of urban regeneration, where the - at times - conflicting interplay of public, private and civil society interests impacts on the governance mechanisms in these crucial sites of urban transformation. There is a distinct lack of cross-national comparative research

exploring how specific processes of regeneration governance contribute to more socially inclusive projects, to reconcile the inherent tension between economic drivers and social inequalities that cities across the globe are facing.

The key aim of this project therefore is to address this important gap in our understanding, with an international comparative study of urban regeneration governance in the UK and Canada. Using an innovative comparative research framework which involves original approaches to methodology that engage with new technologies, the project critically examines stakeholder involvement in governance processes related to regeneration in two different global contexts.

It explores whether, and how, participatory processes contribute to more socially just regeneration projects, and ultimately, whether and how they influence a city's ability to build a more socially sustainable future.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 749154.



Optimising facilities delivery for schools through BIM

DR ESRA KURUL, SCHOOL OF THE BUILT ENVIRONMENT



Dr Esra Kurul, Reader in the School of the Built Environment, is an expert in the management of knowledge and innovation as a source of competitive advantage. The Innovate UK-funded project titled “BIM-enabled collaborative platform for innovative low impact school procurement” aimed to develop a BIM-enabled continuous process and product improvement approach to support integrated collaborative procurement, design, and delivery of low impact standardised designs to meet a variety of public client needs in key sectors such as education.

The project was led by Willmott Dixon (WD) a construction and property services company, with Oxford Brookes as the academic lead. The team explored ways of using BIM to close the upstream knowledge-feedback-loop between construction, use and design phases. It supported integrated collaborative procurement, design and delivery of low impact standardised designs for school projects.

To harness best practice lessons, BIM has been used as a learning platform to enable continuous process and product development through collaboration between key members of the supply chain.

Under Esra's leadership, the Oxford Brookes team developed a plug-in to WD's existing building information models to help them make sense of the performance of their projects in use.

The WD Project Director considers this novel approach to using BIM as an important factor that helped them deliver school projects six weeks faster. According to him, the Oxford Brookes input provided the theoretical underpinnings that the company was looking for, e.g. process analysis in devising appropriate approaches for innovation.

This project has received funding from Innovate UK.

“BIM has been used as a learning platform to enable continuous process and product development through collaboration between key members of the supply chain.”

The golden years of Italian cinema

DR DANIELA TREVERI GENNARI, SCHOOL OF ARTS

Dr Daniela Treveri Gennari is Reader in Film Studies. She works on post-war Italian cinema and her particular interests are audiences, film exhibition and programming, as well as digital humanities.

We know a lot about the directors and stars of Italian cinema's heyday, from Roberto Rossellini to Sophia Loren. But what do we know about the Italian audiences who went to see their films? In its golden years, the 1940s and '50s, Italian cinema produced the internationally influential Neorealist movement, with figures like Rossellini and De Sica achieving world fame. At that time cinema-going was the most popular national pastime, representing at its peak 70% of leisure expenditure by Italians. However, we know little about how Italian audiences chose films, what genres and stars they preferred, and how region, location, gender, and class influenced their choices. With this project, for the first time, oral and written accounts of film-going during this period are being contextualised by press reception, box-office figures, and film industry data in order to uncover the hidden side of Italian film history: its spectators.

This project under the leadership of Dr Daniela Treveri Gennari is the first study of cinema audiences in Italy during this period, when Italians went to the cinema more than almost any other nation in Europe.

It has been crucial to conduct this large-scale empirical research into Italian film audiences of that time before those audiences disappear. It builds on earlier findings from research supported by a British Academy Mid-Career Fellowship exploring the importance of films in everyday life in Italy, and the social experience of cinema-going, through interviews with surviving

audience members, analysis of their responses using a data analysis software, and the contextualisation of these responses through further archival research. The innovative nature of the collaboration between Oxford Brookes University, the University of Bristol (Catherine O'Rawe) and the University of Exeter (Danielle Hipkins) along with six Italian non-profit organizations, has been vital for the success of this large-scale project.

The project has been a unique opportunity to uncover a hidden history fundamental to Italian and European identity. In a period when Italy went through one of its most dramatic changes, from a predominantly agricultural nation to a leading industrial power, cinema was a constant for its people. Crucially, at the centre of this project are those people whose stories about cinema need to be told, understood and disseminated. Their stories, and the project, are important for all those interested in the culture, history and sociology of Europe. The project is currently being further disseminated by the AHRC funded ICAMAP, a digital archive that has integrated the data collected from the Italian Cinema Audiences (questionnaires and video-interviews) with new and unexplored archival resources as well as digitised artifacts crowd-sourced from individuals private archives (comprising photos, programmes, leaflets, private letters, signed posters, etc.).

This project has received funding from the AHRC under Grant Agreement no. AH/K003453/1.

“a unique opportunity to uncover a hidden history that is fundamental to Italian and European identity. In a period when Italy went through one of its most dramatic changes.”





Researchers receive major grant to help improve the energy efficiency of millions of homes in India

PROFESSOR RAJAT GUPTA, SCHOOL OF ARCHITECTURE

A research team led by Professor Rajat Gupta, Director of the Oxford Institute for Sustainable Development and Low Carbon Building Group, was recently awarded a £1.5million research grant funded by the Engineering and Physical Sciences Research Council, the Economic and Social Science Research Council and the Government of India's Department of Science and Technology to help improve the living conditions for millions of citizens in India.

The RESIDE (Residential building energy demand reduction in India) project brings together an interdisciplinary team of architects, engineers, digital scientists, urban planners and behavioural researchers to assess all aspects of the residential energy use problem, including performance of the building fabric; in-home appliances including heating, ventilation and air conditioning; indoor environment and occupant behaviour. The RESIDE India team is led by Principal Investigator Dr Vishal Garg from IIT Hyderabad and Co-investigator Prof Jyotirmay Mathur from MNIT Jaipur – both premier research institutions in India - and the University of the West of England, Bristol.

RESIDE will undertake surveys and monitoring of energy consumption in 2000 homes spread across the five different climatic zones in India in order to build up a new, open access database for policy and practitioner communities in India and other countries in the Asia-Pacific region. In 10% of these homes, the team will also trial and evaluate a Smart Home Energy Management System, to be designed within the project, to enable householders greater control over their comfort and energy consumption.

These activities will be used to develop low-cost monitoring and post-occupancy evaluation protocols suitable for the Indian situation. This will not only improve Best Practice, but allow a framework by which consistent data can be collected and added to the RESIDE database. Using novel techniques

developed by the project team for assessing the potential up-scaling of individual household measures and actions to a neighbourhood level, RESIDE will explore and establish protocols for assessing the potential for, and likely benefits of, widespread uptake of energy efficiency and rooftop solar technologies at a community scale.

By engaging with a wide range of stakeholders involved in planning and construction throughout the project, and by undertaking an extensive review of policy experiences in similar countries, the RESIDE project will establish the key factors essential for consideration in the development of a new residential building code for India. Then, building on the extensive data collected through the project, and a set of co-design workshops, the project will develop a proposed framework for a new residential building code.

RESIDE builds on ongoing India research by the Low Carbon Building Group, including the United Nations funded project 'Mainstreaming sustainable social housing in India (MaS-SHIP)' which seeks to promote sustainability as an integral part of social housing, and the Newton Fund supported Learn-BPE project on evaluating the actual performance of green buildings in India.

RESIDE is funded by the EPSRC, ESRC and Department of DST under Grant Agreement No. EP/R008434/1.

Augmented reality training for Aeronautical Engineers, Doctors, and Astronauts

DR FRIDOLIN WILD, SCHOOL OF ENGINEERING, COMPUTING AND MATHEMATICS

The EU funded project WEKIT (Wearable Experience for Knowledge Intensive Training), is an ambitious three-year research and innovation project supported under Horizon 2020 to develop and test a novel way of industrial training that is enabled by augmented reality and smart wearable technology (WT). With EUR 2.7 million of EU funding, twelve WEKIT partners representing academia, including the Performance Augmentation Lab (PAL) led by Dr Fridolin Wild at Oxford Brookes University and industry from six countries in Europe, are building a ground-breaking industrial-strength learning technology platform. The project develops a unique methodology to capture expert experience and share it with trainees in the process of enabling immersive, in-situ, and intuitive learning. In this way, WEKIT will bring learning content and technical documentation to life via task-sensitive Augmented Reality (AR), making industrial training more efficient, affordable and engaging.

WEKIT is evaluating this new technology across a range of case studies, including training astronauts. Everything is more difficult in space. Up is sometimes down and anything not properly secured is likely to float away. At ALTEC (a service provider for the Italian Space Agency) researchers from PAL ran a procedure for setting up stowage racks for use by astronauts on the International Space Station. They tracked the trainees as they installed the equipment, monitoring their efficiency on every step as well as their heart-rate variability.

With the help of radiologists in Genoa and EBIT, a medical software company, researchers from the PAL trained a number of students to assess the blood flow in the carotid artery on an unfamiliar ultrasound machine. This tricky procedure involves following instructions (laid out in 3D) whilst maintaining control of both an ultrasound probe and a long-suffering patient (in this case: an actor). A holographic tutor delivers the recorded think-aloud explanation of the expert, while instructional holograms, floating videos and to-be snapshots guide trainees step by step through the procedure. Tested by medical and engineering students, this trial gave us some very in-depth feedback on the subtleties of using AR for complicated, interactive procedures.

Collaborating with the ambulance plane service operator Luftransport, researchers from PAL tested recording body movement and gaze direction of experts paired with a think-aloud protocol to express otherwise implicit knowledge, as well as training maintenance engineers and engineering students with the help of ghost trails on a pre-flight check procedure.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 687669.



“WEKIT will bring learning content and technical documentation to life via task-sensitive AR, making industrial training more efficient, affordable and engaging.”





Professionalising humanitarian action

PROFESSOR CATHRINE BRUN AND DR BRIGITTE PIQUARD, SCHOOL OF ARCHITECTURE

Dr Brigitte Piquard and Professor Cathrine Brun from the Centre for Development and Emergency Practice (CENDEP) are involved in the European Humanitarian Action Partnership (EUHAP), which aims to strengthen the professionalisation of humanitarian aid.

CENDEP is hosted by the Oxford Brookes School of Architecture and has built a strong tradition of research including shelter after disaster, disaster recovery, urbanisation and conflict, human rights and refugee studies. It works with local communities and aid agencies across the globe.

Funded by the European Commission Erasmus+ Programme, EUHAP is a collaborative community of humanitarian stakeholders representing academia, training providers, employers and employees. The project was primarily concerned with promoting the exchange of best and innovative practices as well as improving the quality and efficiency of education in order to boost competences, increasing employability, and enhancing opportunities and professionalisation in humanitarian aid. The project has helped to align competency frameworks in the humanitarian sector and among university educators and closer links between universities and humanitarian actors have been created as a result.

This project has received funding from the European Union's Erasmus+ programme under grant agreement No 14PS0003.



Our academics have collaborated with universities and organisations in **India, Australia, South Africa, Brazil, Norway, Germany, Italy, France, Spain, Colombia, USA, Iran, Jordan, Sri Lanka, the Netherlands, China, South Korea, Japan, Nigeria, Zimbabwe, Kenya, Ethiopia, Bangladesh, Pakistan, Canada, Indonesia, Malaysia, Zambia** and many other countries

A £22m project to reduce noxious emissions from cars

DR FABRIZIO BONATESTA, SCHOOL OF ENGINEERING, COMPUTING AND MATHEMATICS

Volkswagen found itself at the centre of an emissions scandal in 2015 leading to serious repercussions for the car making industry. 'Emissionsgate' or 'diesalgate', as the press and social media often referred to the controversy, has had an impact on a truly global scale. The fallout has led to a series of prominent resignations by leading industry figures, dramatic plunges in the values of stock and many billions of pounds being committed to rectifying emissions issues and the ongoing task of recalling and retrofitting millions of cars.

This scandal stemmed from discrepancies between results in test environments and how cars actually perform in real-world settings in terms of their compliance with nitrogen oxide and Particulate Matter (PM) emission regulations. Modern, fuel efficient Gasoline Direct Injection (GDI) engines have been shown to actually emit more particulate than diesel engines. Worryingly, GDI engines emit particulate matter mostly in the ultra-fine size range, where current tail-pipe gas filters show low filtration efficiency. This has serious environmental consequences and health implications for conditions such as heart diseases, cancer and pulmonary inflammation.

The realisation of the extent of the issue of PM emissions from modern GDI engines is relatively new and car manufacturers around the world are still researching suitable solutions. The gradual introduction of stringent Real Driving Emissions tests for regulation compliance from 2017 to 2022 affords very little time for development of new technology.

The Engine Modelling Team at Oxford Brookes University, led by Dr Fabrizio Bonatesta, is part of a large multi-partner engine development project led by Ford Motor Company APC6 DynAMO (Dynamic Analysis Modelling and Optimisation of GDI engines) which seek to develop this new technology. The £22M project will deliver the next generation of Gasoline Direct Injection engines, optimised for reduced fuel consumption and reduced noxious emissions. The

involvement of Oxford Brookes will be in the area of engine modelling and Particulate Matter formation and emissions.

The current powertrain development process focuses on engineering and validating individual engine systems in isolation. It relies on a time intensive sequential process. This approach does not take account of interactions between sub-systems and, as a result, key attributes such as fuel economy do not reach the full potential available within the chosen hardware and controls. This project is developing a new analytical multi-objective, dynamic, optimisation methodology to simultaneously optimise across multiple engine systems, with specific intent to simultaneously reduce CO2 and Particulate Matter emissions. The project also aims to demonstrate a game changing CAE methodology that will substantially improve UK automotive engineering competitiveness, improving capability, and significantly reducing time to market.

Within the larger R&D project, the Engine Modelling Team at Oxford Brookes will support the engine optimisation exercise through development and application of validated full-cycle models of modern downsized GDI engines, to evaluate the effects of a range of engine calibration controls on in-cylinder soot formation mechanisms, as well as on fuel consumption. The research activities, supported primarily by consortium partners CD-Adapco/Siemens Ford and Loughborough University, aim to deliver improved, exploitable, fundamental knowledge of soot mechanisms taking place during partially-premixed spark ignition combustion. The project will identify effective and feasible control strategies to reduce soot formed at source, enabling lower ultra-fine soot yield (especially in terms of particle number) and lesser reliance on Gasoline Particulate Filters.

The project also aims to develop improved modelling software and statistical approaches for model calibration, to enable greater competitiveness and capabilities for the UK automotive sector.

This project is funded by APC6 under Grant Agreement no. 113130





From social sustainability to socio-spatial justice

DR REZA SHIRAZI, SCHOOL OF THE BUILT ENVIRONMENT

Dr Reza Shirazi recently completed a project about the social sustainability of compact neighbourhoods in London and Berlin. This project was funded by the European Commission under the Marie Skłodowska Curie Individual Fellowships scheme.

A main achievement of this research was developing an integrated methodology for measuring social sustainability of urban neighbourhoods. This methodology was applied to Kilburn and Bethnal Green in London, and Klausenerplatz and Samariterkiez in Berlin. It included a household survey and intensive fieldwork and observation for data collection.

The research showed that these compact neighbourhoods enjoy high accessibility of urban facilities, benefit from a satisfactory level of safety and security, and the overall quality of homes meets the expectations of the inhabitants. However, the level of interaction networking and neighbourhood participation is quite low. In fact, the low level of interaction and networking challenges the dominant argument in the literature that higher densities encourage higher social exchange and encourage people to be engaged in neighbourhood-based activities. The proposed evaluation framework can help local authorities and decision makers to identify strengths and weaknesses of social sustainability qualities in different neighbourhoods, and guides them to plan interventions and programmes which can enhance social sustainability standards in the future.

Following on from this project, Dr Shirazi has been awarded a Marie Skłodowska Curie Global Fellowship

entitled "(Un)Just Neighbourhoods: Socio-Spatial Justice in Urban Neighbourhoods". Working on case studies from San Francisco and Oakland, he will analyse the achievements of neighbourhood-oriented urban development schemes in addressing socio-spatial (in)equalities. He will also develop an evaluation framework for measuring key qualities of socio-spatial justice at the neighbourhood scale. During the outgoing phase (2018-2019), the research will be hosted by the Institute of Urban and Regional Development at UC Berkeley, where he will work with Professor Malo Hutson. In the final year (2020), Dr Shirazi will return to Oxford Brookes University and get involved in dissemination and teaching activities supervised by Professor Ramin Keivani.

COMPACTABILITY has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No PIEF-GA-2013-624794. JustHoods has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 748452.



“The proposed evaluation framework can help... decision makers to identify strengths and weaknesses of social sustainability qualities in different neighbourhoods, and guides them to plan interventions... which can enhance social sustainability standards.”

Opera for everyone

DR ALEXANDRA WILSON, SCHOOL OF ARTS

Dr Alexandra Wilson is a musicologist and cultural historian, with research interests focusing primarily upon Italian opera and operatic culture from the nineteenth century to the present. Her monograph *The Puccini Problem: Opera, Nationalism, and Modernity* was awarded the American Musicological Society's Lewis Lockwood Award for a work of outstanding musical scholarship. She has also published articles in leading musicological journals and chapters in edited books on topics including historic singers, opera in period film, and contemporary staging practices.

During her recent British Academy Mid-Career Fellowship, Alexandra Wilson examined the relationship between opera and popular culture in Britain during the 1920s, a key historical moment when cultural hierarchies were codified that still endure today. While the relationship of literature to 1920s debates about 'high' and 'low' culture has been extensively researched, the complex place of opera in such

debates has not. Demonstrating how opera defied easy categorisation as 'highbrow' or 'middlebrow', Dr Wilson has explored the art-form's encounters with popular novels, music and films and investigated how its ambiguous status was further confused by dissemination via recordings and radio broadcasts. The project investigates the socially-constructed nature of cultural hierarchies, their relationship to national identities, and their long-term implications. Through a monograph, conference, radio broadcast, concert and blog, she has demonstrated how studying opera's historical interactions with popular culture can challenge present-day assumptions that opera is and always has been elitist, stereotypes that inhibit potential new audiences from engaging with it.

Funding for further research has been provided through a Leverhulme Major Research Fellowship.



“How studying opera’s historical interactions with popular culture can challenge present-day assumptions that opera is and always has been elitist.”

Investigating publishing histories in Africa

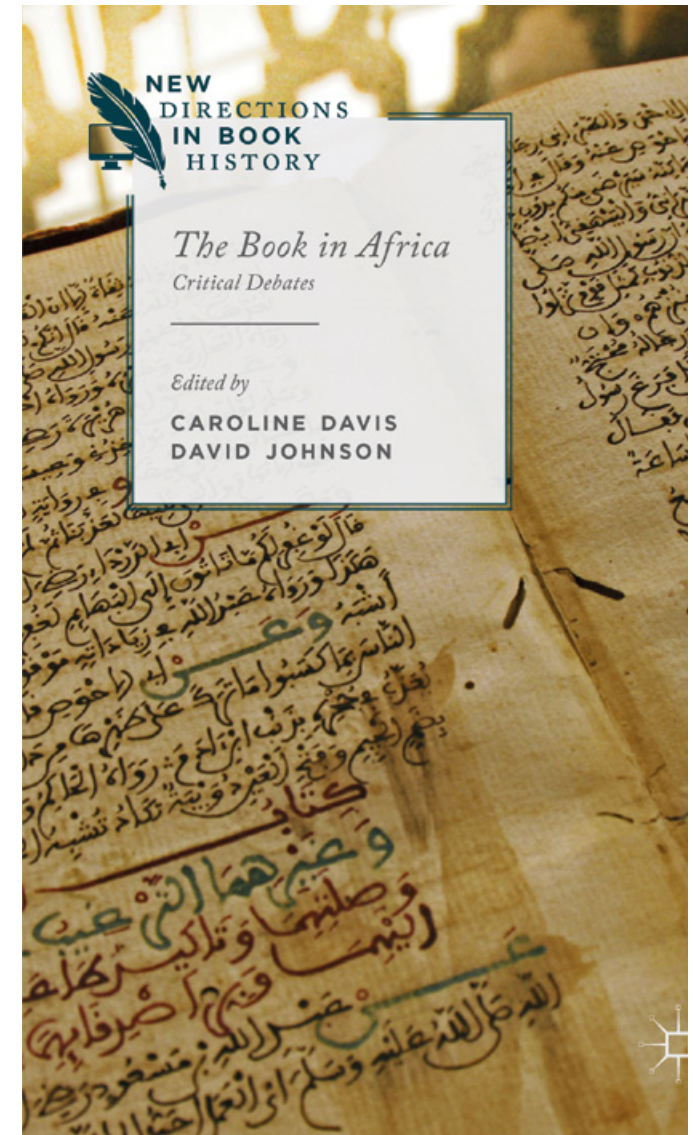
DR CAROLINE DAVIS, SCHOOL OF ARTS

Dr Caroline Davis is a Senior Lecturer in the School of Arts. She teaches publishing studies and book history, and her research focuses on British colonial and postcolonial publishing and literary publishing histories in Africa.

Through her British Academy funded project ‘Print Culture and Publishing in South Africa’, Dr Caroline Davis has investigated the publishing and reception of the book in South Africa before and during the apartheid era. In collaboration with Professor Archie Dick and Dr Beth Le Roux in the University of Pretoria, she studied the institutions informing textual and literary production, circulation and consumption in the country. This involved examining publishing and state archives and carrying out new oral history research relating to authors and publishers in South Africa.

A programme of colloquia and seminars brought together print culture scholars in both regions, and a number of joint publications arose from the partnership, including *The Book in Africa: Critical Debates*, edited by Caroline Davis and David Johnson (Palgrave, 2015) and a special issue of the *Journal of Southern African Studies* entitled ‘Print Culture in Southern Africa’, due for publication next year. She was awarded an Oxford Brookes Research Excellence Award in 2017-18 to enable her to write a new monograph on the history of the British book trade in Africa in the 20th century, based on this recent research.

Print Culture and Publishing in South Africa has received funding from the British Academy.



“A programme of colloquia and seminars brought together print culture scholars in both regions, and a number of joint publications arose from the partnership.”

Documenting the vernacular architecture of the world

DR MARCEL VELLINGA, SCHOOL OF ARCHITECTURE

Dr Marcel Vellinga, Reader in Anthropology of Architecture, is Editor-in-Chief of the fully revised, updated and expanded edition of Paul Oliver's classic 1997 "Encyclopedia of Vernacular Architecture of the World". The Encyclopedia brings together 15 editors and around 1,000 contributors from a variety of disciplinary backgrounds and from all around the world. Featuring approximately 3,000 entries, the encyclopedia will contain over 30% entirely new material and will be available as a six volume printed work and as an interactive online encyclopedia.

An update is particularly important in view of the rapid cultural and environmental changes that have taken place in the past two decades. Population growth, urbanisation, globalisation, climate change, migration, natural disasters, conflicts, and the internationalisation of architectural practice have exerted increasing pressure on vernacular forms of architecture in many parts of the world. In some cases, this has resulted in the abandonment, replacement

or destruction of distinctive and unique vernacular traditions; traditions that a revised edition of this encyclopedia will be able to document, before they are lost forever. In other cases, it has resulted in conscious attempts to conserve, safeguard or revive existing traditions, or invent new ones, and to explore their application and appropriation in contemporary architectural practice. These processes have in turn led to the emergence of hybrid forms of 'new vernacular' architecture that combine vernacular and contemporary elements, both in professional and informal contexts, in many parts of the world.

A major development in the field of vernacular architecture studies, this new edition, will bring the encyclopedia, which has long been unavailable, back to prominence and to a new expanded readership, and will be the definitive and most up-to-date reference resource for the study of the world's vernacular and traditional building cultures.



TABASCO and the building envelope

DR SHAHAB RESALATI AND CHRIS KENDRICK, SCHOOL OF ARCHITECTURE

Dr Shahab Resalati and Chris Kendrick worked on a three year EU funded project "Thermal Bridging Atlas of Steel Construction for Improved Thermal Performance (TABASCO)", led by the Steel Construction Institute.

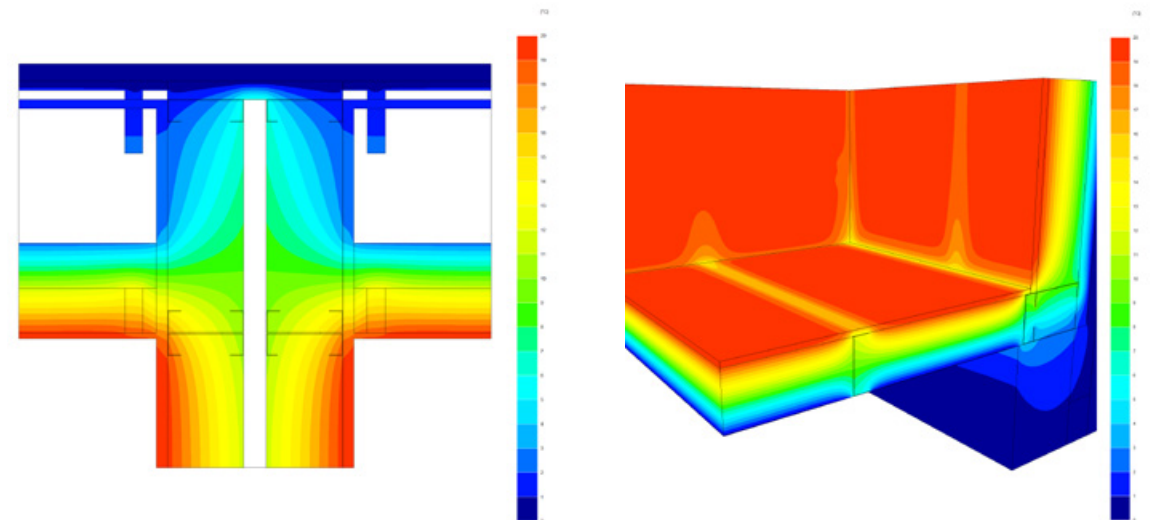
The implementation of stricter Regulations for Energy Performance in Buildings throughout Europe has brought with it new problems of how to provide high levels of thermal insulation and air-tightness and how to eliminate 'thermal bridging' that potentially affects the practical use of all forms of steel construction. This is relevant to all sectors of building construction, and therefore to the steel technologies used in housing and residential buildings, commercial and industrial buildings because of the risk that the steel elements add proportionately to thermal bridging in highly insulated building envelopes.

The steel technologies and details used will differ depending on the building type and materials and on practice and regulations around Europe. Therefore, the potential scope of possible design solutions is very wide. In many countries, it is planned to prepare the equivalent of accredited construction details for common applications that are used to gain Building Regulation approval at the early stages of the building design process. Clearly, the industries that are more

active in preparing and agreeing these details nationally will be more successful in achieving greater market penetration in the new Regulatory framework across Europe. Many constructional systems, such as composite construction, also involve mixed materials and so it is necessary to consider thermal bridging parameters for materials in combination.

The research team at the Architectural Engineering Group, in collaboration with other partners from Finland, Germany, France, and the UK, prepared the best guidance and details that assist architects and suppliers in how to achieve energy efficient steel construction. The guidance and information have been presented in the form of working details for various common cases, supplemented by thermal performance parameters, including linear 'cold bridging' values. It has been supplemented by measured performance data including at a local and building scale.

This project has received funding from the European Union's Research Fund for Coal and Steel under grant agreement No RFSR-CT-2011-00028.



Creating healthy cities of the future

DR TIM JONES, SCHOOL OF THE BUILT ENVIRONMENT

Dr Tim Jones, Reader in Urban Mobility, is leading on a collaborative project between Oxford Brookes and three universities in Brazil - University of Santa Catarina, University of Rio Grande do Sul and University of Brasilia. The Brazil-UK Healthy Urban Mobility project, funded by the Newton Fund, the ESRC and the Brazilian research organisation ConFAP. The focus of the research is on understanding the impact of personal (im)mobility on both individual and also community health and wellbeing.

Since the initiation of the World Health Organization (WHO) Healthy Cities movement over thirty years ago there have been increased efforts to understand how the urban environment affects health outcomes and can produce more equitable health benefits. A key concern is the way in which the physical fabric of cities affects urban mobility and how this relates to health and wellbeing.

Environmental design supportive of walking and cycling ('active mobility') could help to promote moderate physical activity as part of daily travel routines, delay biological ageing and age-related conditions and improve overall health and wellbeing.

In the Global South, however, the rapid growth in private motorisation and the lack of value placed on walking and cycling means the association between environmental attributes and active mobility are more complex. This is having a significant impact on the urban poor and low-income groups who already engage in, and rely on, walking and cycling (and public transport) to meet their daily travel needs.

The trend in the Global North, meanwhile, particularly in countries like the UK, is towards a decrease in physical activity. This is associated with more widespread private car use, obesogenic

environments and greater mechanisation in the home, workplace and public places.

The implementation of healthy urban mobility as part of the broader Healthy Cities concept, therefore, presents serious challenges in both the Global South and Global North and requires different approaches towards its realisation.

Oxford Brookes and partners in Brazil are studying these questions in different neighbourhoods in Brazil (Brasilia, Florianopolis and Porto Alegre) and in Oxford. These cities were chosen because of their different spatial and demographic characteristics and the challenges they are facing in relation to promoting healthy urban mobility.

Empirical research is timed such that it will be conducted in parallel in both Brazil and the UK using exactly the same approach and methods so that the UK-Brazil multidisciplinary team can engage in co-learning and knowledge exchange. More specifically, this also enables them to evaluate the overall approach and methodologies, to compare datasets between cities and between Brazil and the UK, and to evaluate potential policies and delivery models to promote healthy urban mobility in different contexts.

Through the combination of novel research methods to experiment and assess, as well as actively involving communities and stakeholders in dialogue and mutual learning, the team hopes to develop new approaches to mobility planning that seek to address health inequalities within urban areas.

The Brazil-HUM project is funded by the ESRC, ConFAP and Newton Fund under Grant Agreement no. ES/N01314X/1.

“Understanding the impact of personal (im)mobility on both individual and also community health and wellbeing.”



Upscaling environment-friendly cavitation melt treatment

DR IAKOVOS TZANAKIS, SCHOOL OF ENGINEERING, COMPUTING AND MATHEMATICS

The metals industry is seeking new advanced technologies for sustainable manufacturing. A green, economical, and pollution-free alternative to a range of conventional melt processes (fluxing, alloying, gas lancing) is ultrasonic melt treatment (UST). UST involves the introduction of high-intensity ultrasonic waves into liquid metal to induce acoustic cavitation. Laboratory tests showed that UST offers beneficial effects, such as accelerated diffusion, activation of inclusions, improved wetting, dissolution, deagglomeration, and dispersion of particles leading to degassing, refined solidification microstructure, and uniform distribution of constituent phases.

UltraMelt2 is an EPSRC funded project led by Dr Iakovos Tzanakis at Oxford Brookes University that follows on from the success of the UltraMelt (EP/K00588X/1). The project seeks further advances in validated modelling and computer simulations of UST bringing this technology closer to industrial application.

Existing state-of-the-art UST numerical models are currently disjointed, thereby prohibiting the predictive modelling of UST for industrial implementation. Unifying these models, using sophisticated experimental means for their validation, and applying them to the simulation of industrial casting processes will reveal the optimum process parameters required for the widespread industrial application of this technology.

The modelling novelty of the proposed research lies in a fully predictive, three-dimensional, empirically-validated numerical description of the influence of cavitation bubbles and acoustic flows on melt degassing and the fragmentation of particle clusters and intermetallics, as well as on their dispersion in the melt volume.

This project is funded by the EPSRC under Grant Agreement no. EP/K005804/1.



Personalised decision support system for diabetes management

DR CLARE MARTIN, SCHOOL OF ENGINEERING, COMPUTING AND MATHEMATICS

According to the World Health Organisation, there are about 60 million people with diabetes in the European Region. Type 1 diabetes often appears in childhood, but it can also occur in adults. It is a widespread health condition that lasts for life. People with Type 1 diabetes traditionally manage their condition by drawing blood from their fingertips several times a day to test their blood sugar levels in order to calculate a dose of insulin to inject. If the dose is too large it can be fatal.

The advent of wearable technology offers hope both to adults and parents of young children with the condition. A growing number of people now administer their insulin via a wearable pump, and many also wear continuous glucose monitors. The 3.9m Euro EU H2020 funded PEPPER project, for which Oxford Brookes University is the coordinator, is utilising such technology, together with artificial intelligence, to give people freedom from daily decision-making. The project brings together computer scientists, clinicians and industry leaders to create a personalised decision support system for diabetes management.

The PEPPER team, led by Dr Clare Martin, is developing a personalised decision support system

using case-based reasoning combined with predictive computer modelling. The system will make predictions based on real-time data in order to empower individuals to participate in the self-management of their condition. The design involves users at every stage to ensure that the system meets patient needs and raises clinical outcomes by preventing adverse episodes and improving lifestyle, monitoring and boosting quality of life. The project is also examining the extent to which human behavioural factors and usability issues have previously hindered the wider adoption of such personal guidance systems. It is being developed and validated initially for people with diabetes on basal-bolus insulin therapy, but the underlying approach can be adapted to other chronic diseases.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689810.





Award winning artist and composer, creator of monumental kinetic sound works

PROFESSOR RAY LEE, SCHOOL OF ARTS

Professor Ray Lee is the inaugural Professor of Sound Art in the School of Arts at Oxford Brookes University where Publishing and Fine Art are ranked 3rd and 4th in The Guardian University League Tables 2018. He is Postgraduate Research Tutor and supervises practice based arts students in sound and contemporary arts practice.

Sound artist and composer Ray Lee, renowned for creating music for public places, has composed an outdoor musical and visual spectacle which has been more than a year in the making. Through sound generators positioned in aluminium conical 'bells' swinging from giant metal towers, the composition builds an escalating series of tonal pitches in a constantly evolving texture of pulsed tones created by the swinging of the bell-speakers by a team of volunteer bell-ringers. Audience members are able to walk around the space and experience the series of micro-melodies shifting and changing as the piece progresses. Ringing forth with a peel of electronic tones that combine into a transfixing harmony of pulsing drones, 'Ring Out' continues the work of multi-award winning composer and artist Lee, whose distinctive combination of sound and kinetic sculpture has thrilled audiences the world over.

'Ring Out' has been performed in Newbury Market Square, Zebedee's Yard in Hull City of Culture, and London Southbank for the New Music Biennial. The creation of 'Ring Out' was supported through a PRS Foundation New Music Biennial 2017 Commission, funding from the National Lottery and Arts Council England, and co-commissioned and produced with Oxford Contemporary Music.



'Ring Out' continues the work of multi-award winning composer and artist Lee, whose distinctive combination of sound and kinetic sculpture has thrilled audiences the world over.'

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