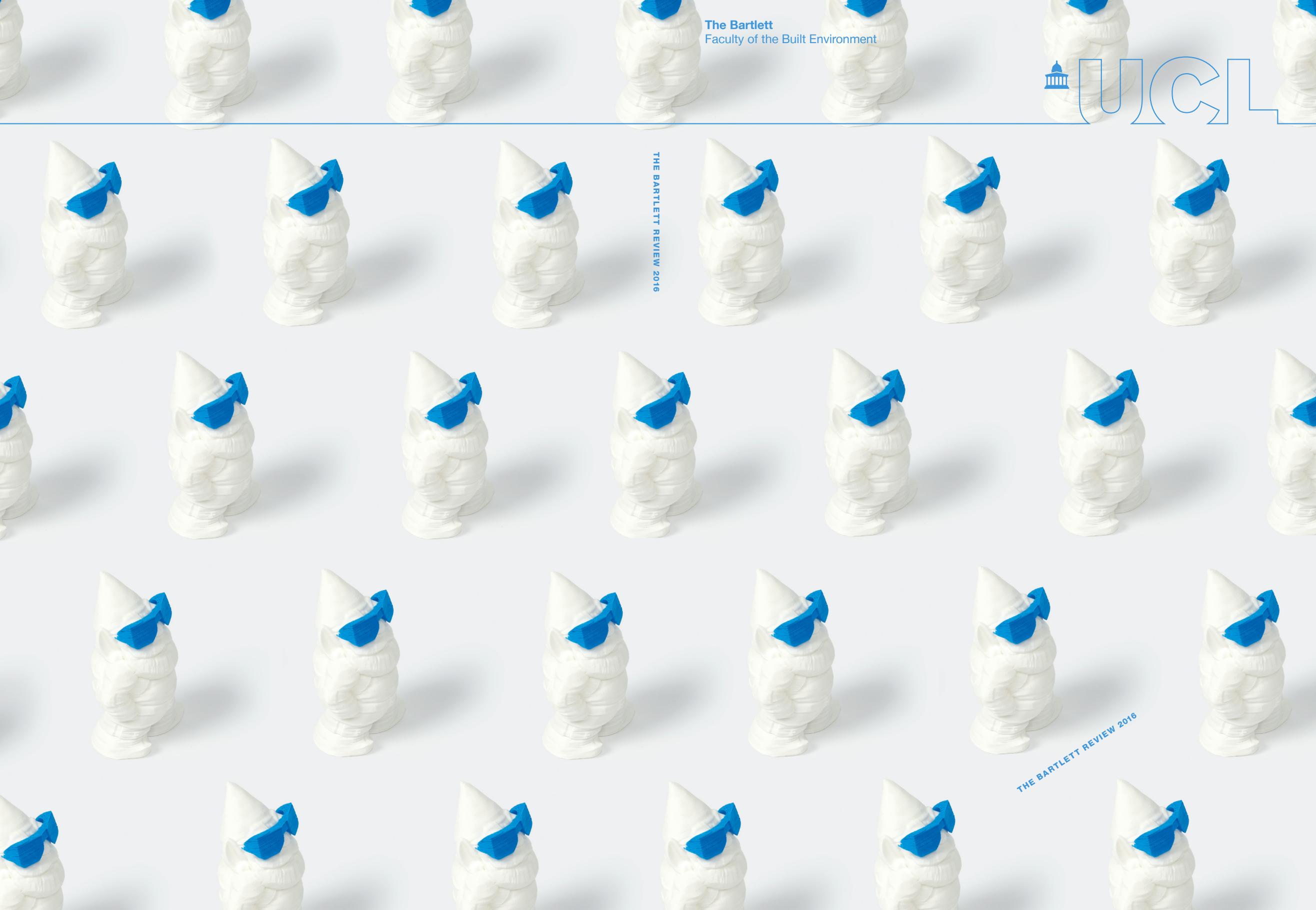




THE BARTLETT REVIEW 2016

THE BARTLETT REVIEW 2016



WELCOME

We are The Bartlett: UCL's global faculty of the built environment. We develop new responses to pressing world issues.

We are a world-leading, multidisciplinary faculty, united by the radical spirit of UCL. Once a year, we distil that spirit here in *The Bartlett Review*.

Over the next 100-plus pages, we explore some of the groundbreaking thinking and research to have emerged from The Bartlett in 2016 – and its impact on the world.

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THE BARTLETT IS EXPANDING - AND THAT EXPANSION IS FOLLOWING A PARTICULAR AGENDA. WE WANT TO BE COMPREHENSIVE, WHILE ENSURING THAT EACH OF OUR CONSTITUENT PARTS HAS THE SCALE TO BE EXCELLENT IN ITS OWN RIGHT. ACHIEVING THIS REQUIRES NEW COLLABORATIONS AND IT REQUIRES SPACE. IN 2016, WE REOPENED 22 GORDON STREET AND STARTED CONSTRUCTION AT HERE EAST IN STRATFORD - BOTH SPACES INTENDED TO HELP US REACH CRITICAL MASS.

THE BARTLETT REVIEW 2016
LETTER FROM THE DEAN

We want to be the world's number one faculty of the built environment. Up until now, there have been two areas that have been missing from a comprehensive portfolio of built environment activity. One of those is civil engineering and what Here East does is bring together parts of The Bartlett School of Architecture, The Bartlett School of Environment, Energy, and Resources (BSEER) and UCL's Department of Civil, Environmental and Geomatic Engineering in the same space. From this partnership comes a new programme starting in 2017/18, a four-year undergraduate MEng in Engineering and Architectural Design.

The second area is real estate. 2017 will see us open the Real Estate Institute. We aren't limiting ourselves to the notion of buildings as tradeable assets or as labels – 'commercial' or 'retail' – but to a wider understanding of the societal value of the built environment. We'll be covering a side

of property that has never been tackled comprehensively before: its intangible value.

These are difficult problems for economics: how do I put a value on heritage? What is the value of design? What is the value of urban place-making? The Real Estate Institute will be developing answers to all of these questions, while looking at their potential to shift development financing to new pathways conducive to a more socially meaningful environment. As the last year in politics has shown, if government fails to make people's lives feel meaningful, they will respond at the ballot box.

The Real Estate Institute will build on the momentum started with the launch of the UCL Institute for Global Prosperity in 2015. Having previously dealt with the mechanics of the city, we are now starting to dig deeper into how the built environment shapes the social and economic fabric of society.

We can't ignore the role that technology in our cities, from big data to artificial intelligence, can play in this. These are hugely exciting areas – but it is critical that we employ design thinking in their development if they are going to create social value, rather than become part of the problem. That's why 2016 also saw the establishment of the Institute of Digital Innovation in the Built Environment (iDIBE), whose task will be to explore these new digital, physical and spatial realms. iDIBE builds on The Bartlett's strength in design for robotics and advanced manufacture in the School of Architecture; data science, visualisation, and the Internet of Things at CASA; energy systems modelling at UCL Energy Institute; and spatial analysis and urban modelling in the Space Syntax Laboratory.

It is early days, but these moves reflect the strategic direction of The Bartlett: to challenge the way people think about economics and growth, and to try to create an understanding of the built environment, including its new technologies, as a central element of how society works. The way we build our buildings and the way we build our cities actively affects the form of society that we construct. We have learned that the traditional conception of the built environment as a passive outcome of social action is only part of the story – it also plays an active role.

What allows The Bartlett to make these forward-thinking moves? One part of the equation is that we're in London and, in world-city terms, this is the place where all the interesting thinking

is going on in these areas – from new financial technologies and business models, to new forms of manufacture and production, to new ways of conceiving of services. Another is because we're part of UCL, a university that encourages people to think boundary-breaking thoughts and enables networks across interdisciplinary boundaries, which means we can look at a single problem from many different perspectives.

We've recognised that you can only create an excellent educational experience if you have a truly diverse cohort of people. Our view is that diversity in all its guises is essential – without it in every area of university life, one cannot hope to be truly excellent. This year, The Bartlett achieved the Athena Swan Bronze Award, demonstrating our commitment to furthering the careers of female staff at every level of the faculty. We are not restricting our efforts to gender equality – our action plans focus on the steps we can take to ensure that the way we work is equal and fair for everybody within the staff and student body.

Society in general is going through a major transition. We're moving from an industrial to a post-industrial age, and the transition will not be easy, as there will be winners and losers. The EU Referendum vote was a wake-up call; raising questions about the value of experts and research and about how people feel they create value for, and identify with, society. This is a design problem, and one that The Bartlett, working at the boundary of the arts, social and physical sciences, can help to solve. This is our challenge. ■

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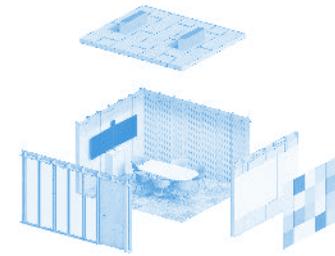
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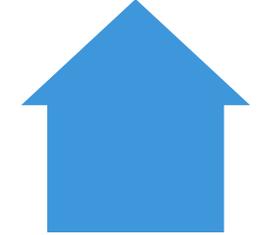
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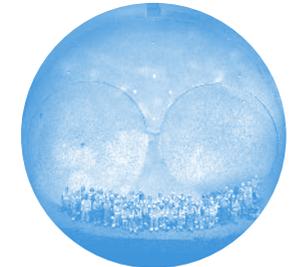
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THE BARTLETT IN NUMBERS 2016

ESSAYS X 10

SPECIAL SUPPLEMENT

Enjoy 24 pages of radical thinking from across The Bartlett, including: Jane Rendell and David Roberts on the future of ethics in the built environment; Constance Smith on the challenge zoonotic diseases pose for global prosperity; Claire McAndrew and Tim Broyd on the post-digital city; and Peter Morris on why project managers should care about climate change.

SHORT STORIES

THE SHEER SIZE OF THE BARTLETT MEANS THAT WE HAVE MORE PEOPLE DOING MORE THINGS THAN WE CAN KEEP UP WITH - THINGS THAT ARE FORGING CONNECTIONS BETWEEN THE BUILT ENVIRONMENT AND AREAS OF PRESSING WORLD CONCERN. THIS SECTION CONTAINS SHORT REPORTS COVERING 24 OF THEM.

PRESERVING THE SMELLS OF HISTORY

Heritage scientist Cecilia Bembibre wants to add an extra dimension to the study of historic locations and objects: smell.

Cecilia Bembibre, a third year PhD student at UCL Institute for Sustainable Heritage, is travelling around England collecting the ‘scent profiles’ of objects in historic collections. Using carbon sponges that absorb the organic compounds let off by objects, she then runs these samples through a gas chromatographer and a mass spectrometer to produce a kind of chemical blueprint for the object’s smell. She likens this to a recipe.

Chemically, scents can be broken down easily into their compounds. ‘Old book smell’? That’s acetic acid, furfural, benzaldehyde, vanillin and hexanol you’re detecting. However, Bembibre is just as interested in the the cultural reception that different smells have received throughout history: “In order to understand and archive a smell, we need to know about the human experience of it.”

Bembibre’s research is currently focused on two sites: Knole House, a National Trust-owned estate built in the 17th Century and the setting of Virginia Woolf’s *Orlando*; and the library at St Paul’s Cathedral. These sites provide both a rich reservoir of scents and an archive of written materials to serve as historical context.

The perception of scent is, by nature, a bodily activity, and Bembibre has responded to this by leading a series of ‘smellwalks’, encouraging participants to more actively engage in the ‘smellscapes’ around them. She believes that research into smells can foster a multi-dimensional interaction with heritage and is keen to collaborate with researchers from disciplines such as anthropology to help us better understand the cultural context of our olfactory environment.

Contact Cecilia Bembibre: tencopies@gmail.com



Cecilia Bembibre isolates the volatile organic compounds (VOCs) of an old book by placing it inside a clean, sealed bag. An absorbent carbon fibre is inserted into the bag’s valve to soak up the ambient VOCs inside.

Photography: @HMaligoub

THE LONDON PROSPERITY BOARD

How do you close the health, wealth and opportunity gap between the capital’s richest and its most deprived?

London is one of the most vibrant and wealthy cities in the world, yet orthodox growth-led economic models have not led to sustainable improvements in living standards for many Londoners. After austerity, and now Brexit, London needs innovative ways to tackle these problems.

This is the starting point for the London Prosperity Board, a new cross-sector partnership launched by The Bartlett’s Institute for Global Prosperity (IGP) in October 2016 and supported by JPMorgan Chase Foundation. Professor Dame Henrietta Moore, Director of the IGP, chairs the Board, which involves, among others, Public Health England, Greater London Authority, London Legacy Development Corporation and London Borough of Hackney.

East London is the pilot site for the Board’s research and innovation projects, which focus on stimulating new thinking about pathways to sustainable economic, social and cultural prosperity. East London is undergoing rapid changes associated with the Olympic legacy and wider processes of urban expansion. London’s Olympic legacy goal is to close the gap in prospects and prosperity between communities in east London and wealthier areas of the capital within 20 years of the Games.

The London Prosperity Board will launch a series of pilot projects in 2017. These will include testing a Prosperity Index, which has been developed with community researchers and people living and working in three east London neighbourhoods. The Index will examine where the benefits of regeneration accrue and where people are struggling to access opportunities.

ucl.ac.uk/bartlett/igp/research

THREE YEARS OF URBAN PAMPHLETEER

A collaboration with Central Saint Martins explores the long tradition of using pamphlets to instigate change in cities.

“If you think about where architectural knowledge resides,” says Dr Ben Campkin, Director of UCL Urban Laboratory, “it is in the built fabric, but also in the published form.”

Campkin and Dr Rebecca Ross, Senior Lecturer at Central Saint Martins and an Honorary Senior Research Associate at Urban Lab, are co-editors of the *Urban Pamphleteer* series, which was founded in 2013 as a joint undertaking between the Lab and the art school. The latest, issue 6, entitled ‘Open-source Housing Crisis’, explores communal, tech-savvy and creative ways to approach London’s escalating housing crisis – currently witnessing a shortfall of 100,000 units a year.

“With *Urban Pamphleteer* we wanted to create a publication that brought together different kinds of discourse around the city,” Campkin explains. “So between citizens, practitioners and scholars we could provide a forum where debates could happen between those separate silos.”

Each issue is aligned to support activities and events at UCL. Issue 6 was compiled on the back of a one-day workshop at Central Saint Martins in 2015. The event brought together 35 built environment professionals, designers, academics, and technologists to develop and scope creative responses to the housing crisis.

All issues of *Urban Pamphleteer* – with themes ranging from smart cities and regeneration in London to heritage in Doha, security design and urban education – are free to read online and are also distributed in print.

urbanpamphleteer.org

THE TRUTH

ABOUT

SHIPPING

Since UCL Energy Institute's shipping map – shipmap.org – went live in April 2016, it has made more than a 100,000 twitter impressions and been covered not only in the specialist press but by the likes of *VOX* and *Fast Co*. So why all the noise about shipping?

According to Dr Tristan Smith, Reader in Energy and Shipping at The Bartlett School of Environment, Energy & Resources (BSEER), a better question might be: why isn't there more noise about shipping? Around 90% of all trade is carried by the international shipping industry. This comes at a cost: CO2 emissions from international shipping for 2012 were estimated to be 796 million tonnes – more than the whole of the UK, Canada or Brazil emits in a year.

"The Paris Climate Summit set targets for countries, but it left out the supranational problems, such as shipping, which the International Maritime Organisation (IMO) controls," says Smith. "The problem is that shipping doesn't have

a comprehensive plan for controlling its GHG emissions."

Revealing the extraordinary extent of modern shipping's reach was a motivation behind ship map. "Shipping makes globalisation happen," says Smith. "We wanted to start a public debate and the map has helped us talk to people outside of the shipping bubble."

A collaboration between the Energy Institute and digital journalism studio Kiln, and funded by the European Climate Foundation, the map reveals the extraordinary extent of modern shipping's reach. To create it, Smith and his colleagues used the methodology they developed for the Third IMO GHG Study in 2014 and AIS data to estimate emissions from five different ship types. This was combined with 250 million data points to show the movements of the world's commercial shipping fleet over the course of the year 2012.

shipmap.org

RAISING DAMP UP THE AGENDA

New UK Centre for Moisture in Buildings contributes to substantial improvement in the understanding of moisture in buildings.

Spring 2016 saw the launch of the UK Centre for Moisture in Buildings (UKCMB), the country's first knowledge centre focused on the development of a moisture-safe built environment.

Many substantial building and health problems are caused by excessive or insufficient moisture. Evidence indicates that such problems may be on the increase, with factors such as increased airtightness, fuel poverty, overcrowding and changing use of buildings exacerbating the problem. And yet there is currently very little research or guidance in the UK on moisture in buildings, and public and industry understanding is minimal.

Run by UCL, the Building Research Establishment, Heriot Watt University and the London School of Hygiene and Tropical Medicine, the UKCMB is an independent, not-for-profit, public-good organisation with a primary aim to develop a moisture-safe built environment in the UK. The UCL Institute for Environmental Design and Engineering and UCL Civil, Environmental and Geometric Engineering are both core knowledge partners.

The UKCMB advances activities by working collaboratively with all stakeholders, including research bodies, industry, standards and certification organisations, building owners and occupants, and government.

ukcmb.org

THE FIRST 175 YEARS

2016 ushered in a new era for The Bartlett School of Architecture, as it marked its 175th anniversary and launched four new courses.

To celebrate 175 years, the School of Architecture published a special supplement with the *Architectural Review*, showcasing exceptional moments in its evolution, while highlighting new forms of practice to emerge from it.

The celebrations came the same year that the school took second place in the QS World University Rankings for Architecture for the second year running. The rankings are based on academic reputation, employer reputation and research impact. Among the top five institutions alongside The Bartlett are the University of California Berkeley, Delft University of Technology and Harvard.

Professor Bob Sheil, Director of The Bartlett School of Architecture, described being ranked second in the world as “fantastic news for our staff and students and credit to the hard work and dedication of many individuals and groups.”

One of the keys to the school's success is how it has always responded to the changing nature of architectural practice. From 2017, it is offering three new postgraduate programmes and one new undergraduate programme.

Each builds on the school's reputation for research-based education and aims to expand the context and practice of architecture, widening the opportunities available to students at the end of their studies. The programmes are: MEng Engineering & Architectural Design (undergraduate); MArch Design for Performance & Interaction; MArch Design for Manufacture; and MA Situated Practice.

For more on the future of architectural education at The Bartlett, see Essay 6 by Professor Bob Sheil

NIGHT-TIME POLITICS



Photography: Laura Marshall

Community surveys and archival study acted as a springboard for events such as 'Night Scenes' and participation in wider programmes such as 'Camp-er Van' at Peckham Festival, which functioned as information-gathering exercises.

Research from UCL Urban Laboratory shows impact of LGBTQI nightlife venue closures on London's communities.

When London Mayor Sadiq Khan appointed LGBTQI activist Amy Lamé as Night Czar in 2016, it was an unprecedented step to preserve a part of London's cultural heritage: its clubs.

For many, London's clubland has always been a refuge. But this also makes it vulnerable to changes in urban ecosystems that mainstream institutions are not. And, while the recent closure of some of London's most beloved clubs might be a worrying development for the city's night-time economy, research by Urban Lab shows that within the LGBTQI nightlife community, longstanding spaces, and those catering to women and minority ethnic Londoners, are suffering the most.

The LGBTQI nightlife project, led by Dr Ben Campkin and Research Assistant Laura Marshall, used surveys and archival study to map the breadth and diversity of the scene, and gather data from community members, venue managers, event promoters and performers. Previously well-defined 'queer neighbourhoods' such as Soho and Vauxhall, for example, have become the subject of particularly intense redevelopment. Inconsistencies in the attitudes and methods of different boroughs in supporting and safeguarding nightlife have made it increasingly difficult for new localised communities to flourish.

The function of LGBTQI nightlife goes well beyond leisure and hedonism, the research finds. Dedicated queer spaces are crucial to the welfare and survival of the communities they serve, providing a safe and productive space to organise and build networks. A concerted effort has to be made not only to preserve existing institutions but to keep creating diverse and inclusive spaces run by and for people of colour, women, trans and non-binary people.

Urban Lab's ongoing research in conjunction with the Raze Collective and the Queer Spaces Network, gives a clear mission for the future: to measure the impact of venue closures on the community, enact positive changes to help preserve valuable resources and create new structures for welfare and collaboration across LGBTQI groups.

lgbtqispaces.wordpress.com

THE HEALTHY REVOLUTION

More than 50 years since its inception, the EDE's expanding remit reflects new demands on buildings to deliver wellbeing.

While the UCL Institute of Environmental Design and Engineering (IEDE) was only established in 2014, the study of environmental design and engineering (EDE) is not new to The Bartlett, with a history dating back more than 50 years.

EDE developed out of the the dynamic cauldron of post-war Britain as the teaching of architecture expanded to include a wider range of environmental topics and a stronger academic base. Professor Richard Llewelyn-Davies first introduced Building Science at The Bartlett in 1960, but it wasn't until 1965 that Professor Ralph Hopkinson was appointed the first Chair in EDE.

The MSc in Environment Design and Engineering was established in 1978, followed by the MSc in Light and Lighting in 1987 and then the MSc in Facility and Environment Management (FEM) in 1992. Alongside this burgeoning teaching programme, emphasis was put upon undertaking outstanding research, which culminated in the EPSRC Platform Grants (2006-2011 and 2011-2016) and the recognition of the world-leading status of the Complex Built Environment Systems group.

After reflecting on EDE's history, where do things stand at present and what of the future? EDE Director, Professor Mike Davies, says: "Faced with the challenges of health, wellbeing, productivity, comfort, energy use and climate change, we continue to train the future leaders in the field."

It's a fact supported by the Royal Academy of Engineering recently awarding the title of 'Centre of Excellence in Sustainable Building Design' The Bartlett and Engineering faculties.

In September 2017, a new MSc in Health, Wellbeing and Sustainable Buildings will commence, reflecting increasing demands that buildings directly contribute to the health and wellbeing of the people who live, work and learn inside them. This healthy revolution comes as architects' clients concern themselves with a building's impact on the performance of the people who use it, eyeing potential productivity gains as well as health benefits.

Davies concludes: "As built environment practices and firms come to grips with new challenges and opportunities, our joined-up way of working with other specialists is increasing demand."

ucl.ac.uk/bartlett/environmental-design/programmes

WHAT'S THE HINKLEY POINT?

Analysis from UCL Energy Institute suggests that the planned Hinkley Point C nuclear plant will be obsolete within a decade of being built.

Hinkley Point C nuclear plant – which was given the go-ahead by the UK government in September 2016 – will be obsolete within a decade of being built, UCL Energy Institute and Institute for Sustainable Resources analysis suggests. The findings have significant implications for UK energy policy, the environment and the taxpayer.

The research, based on the National Grid's energy scenarios, indicates that, by 2030, wind and solar energy sources will be meeting all the UK's electricity needs on a more regular and extended basis. These findings indicate that the plant could only operate at 'baseload' – the steady minimum level of energy supplied to the market – which will likely force cheaper, cleaner and renewable sources off the system.

Hinkley is not expected to be operational until well into the 2020s, when the plant is likely to be competing with environmentally friendly, and often much cheaper, energy sources. This effectively ties the British consumer and taxpayer to an obsolete and irrelevant source of energy.

The research was led by the Energy Institute and Institute for Sustainable Resources. Andrew Smith, Principal Research Associate at the Energy Institute and Deputy Director and Academic Head of the RCUK Centre for Energy Epidemiology, says: "Large plants like Hinkley Point

were conceived during a radically different era. By 2030, we predict they could be obsolete in favour of renewable sources like wind and solar.

"Just seven years after Hinkley is scheduled to begin operating, our analysis suggests renewable sources will be able to meet the nation's minimum energy demand levels – traditionally the role of large nuclear, gas and coal plants like Hinkley Point."

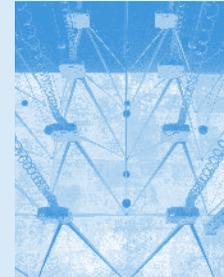
Michael Grubb, Professor of International Energy and Climate Change Policy, Institute for Sustainable Resources, says: "The wider question is whether this decision indicates a politically-driven need to secure investment into the UK after Brexit, whatever the cost to UK consumers, with little regard for expert advice about our evolving energy needs."

Contact Andrew Smith: andrew.smith@ucl.ac.uk



EDF Energy plans to build the first new nuclear power station in the UK for a generation at Hinkley Point in Somerset.

BUILDINGS FOR DEMENTIA



Photography: Nick Kane

From Niall McLaughlin and Yeoryia Manolopoulou's 'Losing Myself' – a collectively-produced drawing representing the plan of a building designed for people with Alzheimer's disease, visualised through the experience of 16 architects.

'Losing Myself' at the 2016 Venice Biennale explored a research collaboration between two Bartlett architecture lecturers and a group of UCL dementia specialists.

Architects are often called upon to design buildings for people with experiences wildly different to their own. When asked to design for a person for whom space has ceased to be a stable entity, these difficulties become even more acute.

This was a challenge faced by Níall McLaughlin and Yeoryia Manolopoulou – both Unit 17 tutors at The Bartlett School of Architecture – when they presented the Irish Pavilion at 2016's Venice Biennale of Architecture. Their installation, 'Losing Myself', is a "reflective report" on their extensive research and experimentation into designing for people with dementia, and represents the lessons learned through this process.

The installation itself is a time-based projected drawing – 16 hands, representing 16 architects, who were asked to call upon their own experiences in order to imagine the experience of people living in an Alzheimer's centre, sketch out fragments of a whole building plan, a layered network of individual journeys and interpretations of the space. It is a tentative step towards fathoming the condition of dementia and the project hopes to provide an insight into the variety of ways in which people perceive space.

Losing Myself is an ambitious yet self-aware project – considerate of the fact that dementia is a disease that remains only partially understood. It attempts to both communicate the changes in spatial perception by those with dementia, while at the same time questioning the capacity of architectural reconstructions to provide meaningful observations on dementia sufferers' experiences.

As much a part of the project as the installation itself is the website, losingmyself.ie Specially designed in collaboration with UCL dementia specialists to be as inclusive and accessible to architecture professionals and dementia-sufferers alike, it functions as a repository for McLaughlin's and Manolopoulou's research. It's intended to outlast the installation and serve as a tool for architects and researchers into the disease.

This project typifies a field of practice that continues to thrive at The Bartlett School of Architecture, that of Design Research.

losingmyself.ie

Space Syntax Laboratory

**LEARNING FROM
JERUSALEM**

The way migrant communities are integrated, or segregated, within cities in the future may determine if a city functions successfully.

The Contested Urbanism Project has launched its presentation *Learning from Jerusalem*, an analysis of some of the main changes in Jerusalem's 20th century spatial history. It overlays maps of municipal boundaries, the security barrier, and bus and light railway routes, as well as space syntax analysis of patterns of accessibility to assess how well the city's various groups have the potential for interface around the city.

Jerusalem represents a rather exceptional case study because of its unique position as the global centre of the three largest monotheistic religions since biblical times. It is both a symbolic and tangible focal point in the Israeli Palestinian conflict and competing religious and political narratives have affected the city's growth.

The presentation marks the midpoint of Contested Urbanism's research project led by Dr Jonathan Rokem with Professor Laura Vaughan of The Bartlett School of Architecture's Space Syntax Lab. The research investigates the role of political, spatial and social factors in shaping urban segregation in Sweden and Israel to compare ethnic diversity in contrasting political and welfare settings. Dr Rokem says: "We're using Jerusalem as an inspiration for how to deal with planning in other cities undergoing social, spatial and political contestation, to expand our understanding of how different mechanisms and policies affect different communities."

The aim now is to find further funding to look at how European cities – particularly Athens, Berlin and Stockholm – are affected by Syrian migration and how communities become segregated or successfully integrated over time.

ucl.ac.uk/bartlett/architecture/research/space-syntax/contested-urbanism

Institute for Sustainable Resources

DIESEL AND TAXES

New report outlines tax options to tackle the growing public-health emergency of air pollution from diesel cars.

Air pollution is a growing public-health emergency, killing as many as 50,000 people a year in the UK alone. And yet it is hard to identify its victims, says Professor Paul Ekins, Director of UCL Institute for Sustainable Resources (ISR) and co-author of a new report for Green Budget Europe.

"Most of us probably know someone who was killed by air pollution but we wouldn't realise it – that cause would not be immediately obvious."

The report outlines options for fiscal reform by government and city authorities to tackle air pollution from diesel cars – new policies that could be particularly important following the UK's vote to leave the European Union, which until now has set most pollution rules.

Higher registration taxes on new diesel cars and charges to enter cities where air pollution is worst are among the recommendations made by the team from ISR.

"The average diesel car currently sold would be charged £1,100 to £1,700 if the report's recommendation for a NOx-based registration tax were adopted", says the Institute's Paul Drummond, lead author of the report.

Alternatively, a city-based charge could be introduced in parallel with a particular focus on heavily affected cities such as London, Birmingham, Leeds, Southampton, Derby and Nottingham, where air pollution is becoming an increasingly urgent issue.

green-budget.eu/tackling-air-pollution-from-diesel-cars-through-tax-options-for-the-uk

Institute for Sustainable Heritage

**PRESERVING
FANTASTIC PLASTICS**

Dr Katherine Curran has been awarded an ERC Starting Grant to explore how polymers degrade – and how better to preserve them.

So often with complex modern materials, only time will tell how durable they are. However, thanks to prestigious new funding for research aimed at the preservation of modern materials in heritage collections, we may find out sooner.

The European Research Council (ERC) has awarded Dr Katherine Curran a Starting Grant – an award aimed at supporting talented young researchers across Europe. As one of only 325 starting grants awarded in 2016, Curran will be funded over five years to explore a new approach to understanding the degradation of polymeric materials as complex systems.

Polymers have made possible new forms of artistic expression such as photography or cinema, as well as modern sculpture and fashion, and these objects are collected in their thousands. However, despite the common perception that plastic lasts 'forever', these objects can be the least stable in collections, sometimes degrading suddenly and catastrophically. Factors such as light, temperature, moisture and the properties of the material itself are still very difficult to manage and predict.

Curran says: "Some of the best examples of this are sculptures by the Constructivist Naum Gabo who worked with the plastic cellulose acetate. Cellulose acetate is now known as a very unstable material in museum collections. As it degrades it emits acetic acid, which catalyses the degradation reaction."

Working with research partners Tate and the Museum of London, Curran's project COMPLEX will seek to address this issue by using 'system dynamics' – a new method to understanding polymer degradation – to comprehend the behaviour of materials as complex systems. In this way, COMPLEX can provide evidence-based conservation strategies for museums, and help them to preserve this unpredictable heritage into the future.

Curran says she's very excited to have been given this opportunity by the ERC. "I have been fascinated by both the complexity of material degradation and the value of plastics as modern heritage for a long time, and this is a wonderful opportunity to explore both of these topics in the detail they deserve."

Contact Katherine Curran: k.curran@ucl.ac.uk

Photography: Birmingham Museums Trust



Dr. Katherine Curran of the Institute for Sustainable Heritage performs analysis on-site in Birmingham.



DRIVING DIVERSITY

New project aims to show that urban diversity is an asset in European cities.

European cities today are more diverse than ever before. The principle aim of DIVERCITIES, which is being financed by the European Commission under the 7th Framework Programme, is to show that urban diversity is an asset.

A European research team, headed by the Utrecht University, is conducting a comparative study in 13 European cities. In the UK, the project is being led by Mike Raco, Professor of Urban Governance and Development, and Dr Claire Colomb, Reader in Planning and Urban Sociology at The Bartlett School of Planning.

They chose as their case study the London Borough of Haringey. Almost two-thirds of its population of 254,000, and 70% of its young people, are from ethnic minorities, with over 100 languages spoken in the borough.

Through a series of interviews with local residents, the study found how “common-place” hyper-diversity is to most Londoners, with most interviewees seeing diversity as improving the quality of urban life and the neighbourhoods in which they lived. The study also uncovered evidence of deepening social networks among many different groups, a thriving civil society of associations and support groups, and strong preferences for mixed communities.

These findings will be fed into the DIVERCITIES project’s final conference in Rotterdam in 2017, to which three influential Haringey residents will be invited. Dr Tatiana Moreira de Souza, Research Assistant at the School of Planning, says: “The residents will not only be able to hear about what other groups are doing in other cities but will also be able to discuss issues that are pertinent to London.”

urbandiversities.eu

70%
OF HARINGEY’S YOUNG PEOPLE ARE FROM ETHNIC MINORITY BACKGROUNDS

100
LANGUAGES ARE SPOKEN IN HARINGEY

28 KM SQ
IS THE SIZE OF THE HARINGEY AREA

5TH
MOST ETHNICALLY DIVERSE BOROUGH IN THE COUNTRY

What does a 360-degree view of western Europe's tallest building tell us?

UCL Urban Laboratory's Leverhulme Trust Artist-in-Residence, Tom Wolseley, launched his film *Vertical Horizons* about the Shard in January 2017. As the main output of Wolseley's residency, the film juxtaposes views of the Shard from different vantage points around south London, with contrasting narratives about the building and his own response to living in its shadow.

Wolseley worked closely with Dr Andrew Harris, Senior Lecturer in Geography and Urban Studies and co-director of the UCL Urban Lab, and also involved Dr Martine Drozd, based at the Research Centre on Urban Infrastructure and Regional Planning in Paris. The residency began with interviews with a range of experts in planning, real estate, energy and urban theory at UCL, to understand the context of the Shard's construction.

Wolseley's format for the film consists of a series of 360-degree panning shots from locations across London that encircle the Shard. While each location provides a unique visual perspective of the Shard, the commentary in turn provides a new angle to how the Shard can and is perceived.

The Shard – and buildings in general – represent many things to different people. Ideas about what the building symbolises are often imposed upon it, Wolseley explains. For example, people frequently perceive the Shard as a modern icon of globalisation and capitalism, funded by Qatari oil profits. But the story behind the financing and construction are complex involving at one point support from Transport for London and direct state financing, suggesting that it represents a force of political will as much as anything else.

“Among other things, the film explores the power of subjectivity in the city. Our desire to be identified in a certain way produces totems to a certain ideology in the city,” Wolseley explains.

The residency has opened up alternative ways of bringing together and presenting research material around urban verticality, especially through the use of filmmaking and storyboarding to examine different elements of urban life. The use of the Shard to develop insight around contemporary London has also inspired new academic engagement with the building at undergraduate and postgraduate level.

Contact Tom Wolseley: tom@architrope.com

Image: Graham Duerden

STRONG ACTION NEEDED ON RESOURCE EFFICIENCY

High-profile report shows resource-efficiency policy can help in tackling climate change, while increasing global economic output.

Ambitious action on climate change and rigorous resource-efficiency policy could make a significant impact on global greenhouse gas emissions, according to a report lead-authored by researchers from the UCL Institute for Sustainable Resources (ISR) for the United Nations Environment Programme's International Resource Panel.

Commissioned by the G7 group of governments, the report points with optimism towards the future, suggesting that increased resource efficiency, combined with ambitious climate policy, could both reduce greenhouse gas emissions by 63% from 2015 levels by 2050 and increase employment and economic output globally.

Nick Hughes, co-lead author of the report, says that regulations promoting eco-design, recycling and remanufacturing, plus incentives to invest in resource-saving labour are key to generating change and making a significant impact on global resource consumption.

He notes that governments have a crucial role to play in “bringing together and supporting the new coalitions of actors and supply chains that will be required to significantly increase resource efficiency”. The report also suggests that, on current trends, we are on course for an alarming increase in natural resource extraction from 85 to 186 billion tonnes by 2050. This could be reduced by up to 28% if the report's recommendations are followed.

Professor Paul Ekins, ISR's Director and lead author, presented the report's Summary for Policy Makers at the G7 Environmental Minister's meeting in Toyama, Japan in May 2016.

Read the report: *'Resource Efficiency: Potential and Economic Implications'*

HOW SHOULD SOCIETY VALUE ITSELF?

Students interested in reconceptualising prosperity for the 21st century should look no further than a new MSc in Global Prosperity.

This year, the UCL Institute for Global Prosperity launched a new interdisciplinary MSc in Global Prosperity – the first course of its kind anywhere. This intensive graduate degree has a distinctive global view, taking a critical look at prosperity from a range of fields, including business, technology and entrepreneurship to policy, law and the environment.

Set up to address the urgent need for leaders who can come up with a fresh approach to prosperity – one that balances wealth with social and environmental sustainability – the MSc has a collective, knowledge-sharing ethos.

High-profile academics and partners, alongside a multidisciplinary student body bring significant expertise and experience to the course, and students are trained to build on successes to problems already achieved around the world.

The course is led by Dr Tuukka Toivonen, Senior Lecturer in Social & Economic Innovation, and Dr Matthew Davies, Lecturer in African Studies. It includes modules on entrepreneurship, the history and roots of current social and economic inequalities, and lectures on transitioning to renewable energy systems, sustainable transport and transparent financial services.

ucl.ac.uk/bartlett/igp/programmes

Development Planning Unit

RELOCATION OR DISLOCATION?

Too often, the response to climate-related disasters is to relocate local inhabitants. The answer instead lies in managing urban growth, new research suggests.

Floods, heatwaves, cyclones, landslides. Densely populated urban areas are exposed to a multi-ty of climate-related hazards.

As a result, many governments are resettling people who live in these high-risk areas. However, while resettling and relocation may reduce a region's climate-related disaster risk, it can have a negative impact on its people, according to research carried out by The Bartlett's Development Planning Unit (DPU).

"We argue that resettlement should be the last resort," says Dr Cassidy Johnson, Senior Lecturer at the DPU, "because a lot can be done to mitigate the risk in the first place".

The research project, which is funded by the Climate and Development Knowledge Network,

seeks to understand the political, economic and institutional contexts in which resettlement takes place. It also looks at the costs and benefits of resettlement, from both the government's and individual's perspectives, and how resettlement impacts people's wellbeing and resilience over different time frames. Research has been undertaken in Andhra Pradesh and Odisha in India, Kampala in Uganda, as well cities in Peru, Mexico and Columbia, among others.

"In a lot of cities, people are being moved either after disasters or preemptively," says Dr Johnson. "Our premise has been to challenge this practice by looking at the social and economic impacts on the people who are moved and the net impact on the city. What's the real impact on the people and the larger area?"

Climate change means a lot of risks are getting worse, too. "In Iquitos, Peru, on the plains of the Amazon basin, they expect the whole course of the Amazon river to change," adds Dr Johnson. "Clearly, that affects a lot of people: some want to move; others don't."

The new research shows is that it's crucial how government makes its case about why relocation is necessary and how this multi-stakeholder consultation takes place. "The whole engagement between government and people to be settled is really important for the result of the place. It can't be rushed. Resettlement and relocation should be the last resort because our findings show that most of the time it's so unsuccessful."

ucl.ac.uk/bartlett/development/research/reducing-relocation-risk

Research has been undertaken in cities in India, Uganda and Peru, among others.



Real Estate Institute

A NEW ESTATE OF MIND

The Bartlett's soon-to-be-launched Real Estate Institute will look afresh at how we define and value the built environment.

How do you set about valuing the built environment heritage? What is the value uplift of excellent design? What are the stream of values we get from urban place-making? What do we need to do to achieve step-changes in the performance of our buildings so as tackle issues such as climate change, improvements in our economic productivity and rapid technological change? These are some of the questions that The Bartlett Real Estate Institute will seek to answer when it launches in the autumn of 2017.

The Real Estate Institute, which will be based in Here East, east London, will comprise a diverse range of experts from The Bartlett, all of whom are embedded in, fascinated with, or intrinsically linked to, the built environment. The Institute will look to extend and redefine what is meant by 'real estate', moving beyond the narrow notion of real estate as being buildings that are just investment opportunities and tradeable assets, to a wider understanding of the societal, environmental and economic value of real estate.

"We aren't limiting ourselves to the view of real estate as being the types of building that would normally get labelled as 'commercial', 'industrial', 'retail', or even 'mixed use'," says Professor Andrew Edkins, Director of the Real Estate Institute. "To us, the buildings and other elements of infrastructure that give us the spaces and places that we all use and rely on are real estate. What we are doing with the Institute is looking afresh at the value we obtain and derive from this built environment or real estate."

That's important because in almost every avenue of life – and therefore every area of our built environment – huge changes are taking place. "The costs – both financial and environmental – of heating and cooling our buildings, for example, are becoming far more important," says Professor Edkins.

There are many exciting emerging technologies and techniques that can produce new real estate. However, the existing built stock presents a major challenge in terms of the performance that can be achieved from it. Professor Edkins says that, for many existing buildings, there is no easy fix. "In the UK and other countries where we've been building for centuries, our historical buildings present an example of the growing challenge we face. In some cases we can alter the use of a building without destroying its architectural design value, but in others we simply have to preserve it as a relic from a bygone era and recognise that the cost of doing so is justified by the 'value' we get from it. These are the kinds of issues we'll be wrestling with at the Real Estate Institute."

Urban Laboratory

THE POWER OF UNLIKELY CONNECTIONS

In 2016, UCL Urban Laboratory published *Engaged Urbanism*, an edited collection of work from the long-running Cities Methodologies exhibition and event series. Here, Urban Lab Director Dr Ben Campkin talks about how these assemblages of work can help us reimagine cities and think about urban challenges with fresh vigour.

Q. Does Cities Methodologies set researchers a challenge to present their work in a way that they might not normally?

Yes, it does. It asks researchers to expose their work in-progress, so that others can see the methods they are adopting, even as they are still being formulated. This is unique, as architecture and urbanism exhibitions typically give a false sense that the processes through which urban knowledge is produced are seamless. The opposite is true, and we ask exhibitors to let others see the challenges they are facing.

Q. What is the benefit of presenting peer-reviewed work next to undergraduate projects?

There is an irreverence towards conventional hierarchies in Cities Methodologies, and that also includes academic hierarchies. This allows younger, emerging generations of urbanists to come forward. As the book and exhibitions show, they display great energy and flexibility as transdisciplinary thinkers and actors that should inspire us to rethink traditional academic and professional structures.

Q. What do you think is missing from approaches to urbanism research today?

In *Engaged Urbanism*, we are particularly interested in the sociopolitical aspects of urban knowledge production and the social life of this knowledge. Given what we deem an over-reliance, in policy and practice, of certain kinds of quantitative data, often taken out of context, our position is that more hybrid and imaginative approaches to research have the potential to lead to better decision-making and, ultimately, more equitable cities.

Q. Over the years you've been running Cities Methodologies, what's surprised you most?

I am struck by the openness of researchers to collaborate and their capacity to speak across disciplines and practices, which have very different languages and rituals, and that on the surface might not seem to connect.

Q. Why publish *Engaged Urbanism* now?

Governments and other agencies are acutely focused on the future of cities worldwide, as

the recent launch of the New Urban Agenda at Habitat III and the Sustainable Development Goals attest. With this in mind, we think it's an important moment to be making the case for an experimental turn in methods of researching and understanding cities.

In that sense, we think of the book as a kind of handbook of inventive approaches that will inspire researchers, activists, policymakers and service providers everywhere to question hierarchies of expertise, and work with available resources towards knowledge that will lead to improved practice and more equitable cities.

ucl.ac.uk/urbanlab/research/cities-methodologies

This image is taken from the series 'Images of Enjoyment and Spectacle' (2015) by Max Colson and published in *Engaged Urbanism*. It is part of a sequence of appropriated 'photorealistic' advertising images originally used to market privatised public spaces and luxury housing developments in Britain.

Max Colson, Images of Enjoyment and Spectacle, 2015

A FEEL FOR THE FUTURE

Prestigious industry-prize win for two Bartlett School of Architecture students hints at new collaborations possible in architecture.

An innovative project that aims to capture human sentiment through the medium of light offers an exciting insight into where architecture goes next. 'Sentiment Cocoon', which won the No8@ Arup Prize, is the work of The Bartlett School of Architecture PhD candidate Moritz Behrens and MSc Adaptive Architecture and Computation student Konstantinos Mavromichalis.

Sentiment Cocoon aims to represent a collective visualisation of the way people are feeling in the immediate environment of the installation. Ultimately, the aim is to foster the notion of public spaces as the social centres of our cities.

Installed onsite at Arup's offices, the design combines computation and architecture. Simple interfaces allow participants to express how they feel in the public domain by how they touch. These interactions are then transformed into pulses of light that travel throughout the Cocoon.

The Cocoon was operated 24/7 for 13 weeks inside Arup's No.8 offices. About 1,880 smart card interactions on six dashboards were logged in total. Participants actively engaged mainly on the way to their desks in the morning, during lunch time or in the late afternoon. Others simply enjoyed watching the colourful and dynamic visualisations.

Greg Chandler, Arup Project Manager, says the project highlights what can happen when all disciplines collaborate: "When you listen to each other and take on board other people's thinking and ways of working, the end result is often amazing. The fact we have been able to construct [the design] in the middle of a fully functioning office has already engaged people within No.8."

moritzbehrens.com/2015/sentiment-cocoon



Sentiment Cocoon at the VIVID Light Festival in Sydney: The suspended structure measures 20m high and 1.4 to 3.5m wide. Projected light passes through a special lenticular diffusion membrane before landing on the partially translucent skin of the Cocoon.

BEHIND THE CARBON BUDGET

UCL Energy Institute model plays pivotal role in helping to set targets to reduce UK greenhouse gas emissions.

The UK's 5th Carbon Budget announced ambitious new targets to reduce greenhouse emissions by 57% by the year 2030 – using a model developed by UCL Energy Institute's whole systems energy modelling consortium (wholeSEM) team.

The Committee on Climate Change in collaboration with the Department of Energy and Climate Change (DECC) announced the new budget in November 2015, which covers the period between 2028–2032.

The UK TIMES energy model (UKTM) – developed by the Institute's wholeSEM team – has been one of the principal tools used by DECC in setting the 5th Carbon Budget.

Professor Neil Strachan, wholeSEM Principal Investigator and UCL-Energy Deputy Director, says: "UCL-Energy strongly welcomes the 5th Carbon Budget level at a 57% reduction – from 1990 levels – in greenhouse gas emissions. This target reinforces the leading role the UK plays in the global mitigation process.

"We echo the call from the Committee on Climate Change for further UK policy mechanisms in the transport and buildings sectors to achieve this challenging goal. We particularly welcome the underpinning role of the UK TIMES model as one of the key analytical tools in assessing long-term emission pathways for the UK."

The targets set by the 5th Carbon Budget were legislated in November 2016.

wholesem.ac.uk/research-models/models

EXCELLENCE IN ARCHITECTURE

The RIBA's Annie Spink Award 2016 goes to The Bartlett School of Architecture's Professor Christine Hawley.

The award for architectural education was won by Professor Christine Hawley of The Bartlett School of Architecture in December 2016. The prestigious biennial prize – whose previous winners include Nigel Coates, Peter Cook and Dalibor Vesely – was established by architect Herbert Spink in 1974 in memory of his wife, Annie, and is open to architects from around the world.

Professor Hawley studied at the Architectural Association (AA) and was a partner at Cook and Hawley Architects. In 1993, following a stellar career at the AA and the University of East London, she started working at The Bartlett where she became Professor of Architectural Studies and later became Dean.

"I have been lucky enough to work with some of the most creative young students in architecture for the last four decades but the act of teaching, for me, has also been about learning – sometimes they are the teachers and I am the pupil," says Professor Hawley.

"I have also learned another important lesson: a creative environment is made only through people. I have collaborated with truly great teachers so this award honours both the students and teachers I have worked with."

Professor Bob Sheil, Director of The Bartlett School of Architecture, adds: "Winning the Annie Spink prize is a tremendous achievement and deserved recognition of Christine's extraordinary contribution to architectural education, The Bartlett, UCL, and most importantly students' lives."

ucl.ac.uk/bartlett/architecture

TELLING STORIES WITH BIG DATA

How CASA created the UK's largest data display for the London Transport Museum.

So-called 'Big Data' sets are often so large or complex that our traditional methodologies can't process them. How then do we make all that information genuinely useful? This was the problem London Transport Museum posed Dr Ed Manley at The Bartlett Centre for Advanced Spatial Analysis (CASA) in 2015, when he was given the task of redeveloping the museum's 'Connections' wall display.

The data for Connections would be drawn from the Capital's transport network – from underground and overground trains, buses, riverboats and bicycles, to bus stops, tracks, signals, platforms and stations. Working with interaction agency Kin Design, Manley and his colleagues Gareth Simons and Richard Milton first created Application Programme Interfaces (APIs) to capture, clean and sort the data from its myriad sources.

"We propagated the visualisation part of the Connections display with that information – all in real time," says Manley. "We then developed a narrative to describe compelling transportation phenomena in London. This took the form of 12 multi-modal case studies."

The result is the UK's largest data display, combining striking 3D design, 55,000 model buildings, projection and transport information.

This project builds on CASA's expertise in building data 'dashboards' for users such as the Greater London Authority and the Africa Centre for Population Health in South Africa.

"The dashboards enable users to visualise data in terms of key metrics and performance indicators, and enable them to monitor and act on that information in real time," says Manley.

Contact Ed Manley: ed.manley@ucl.ac.uk

Making connections

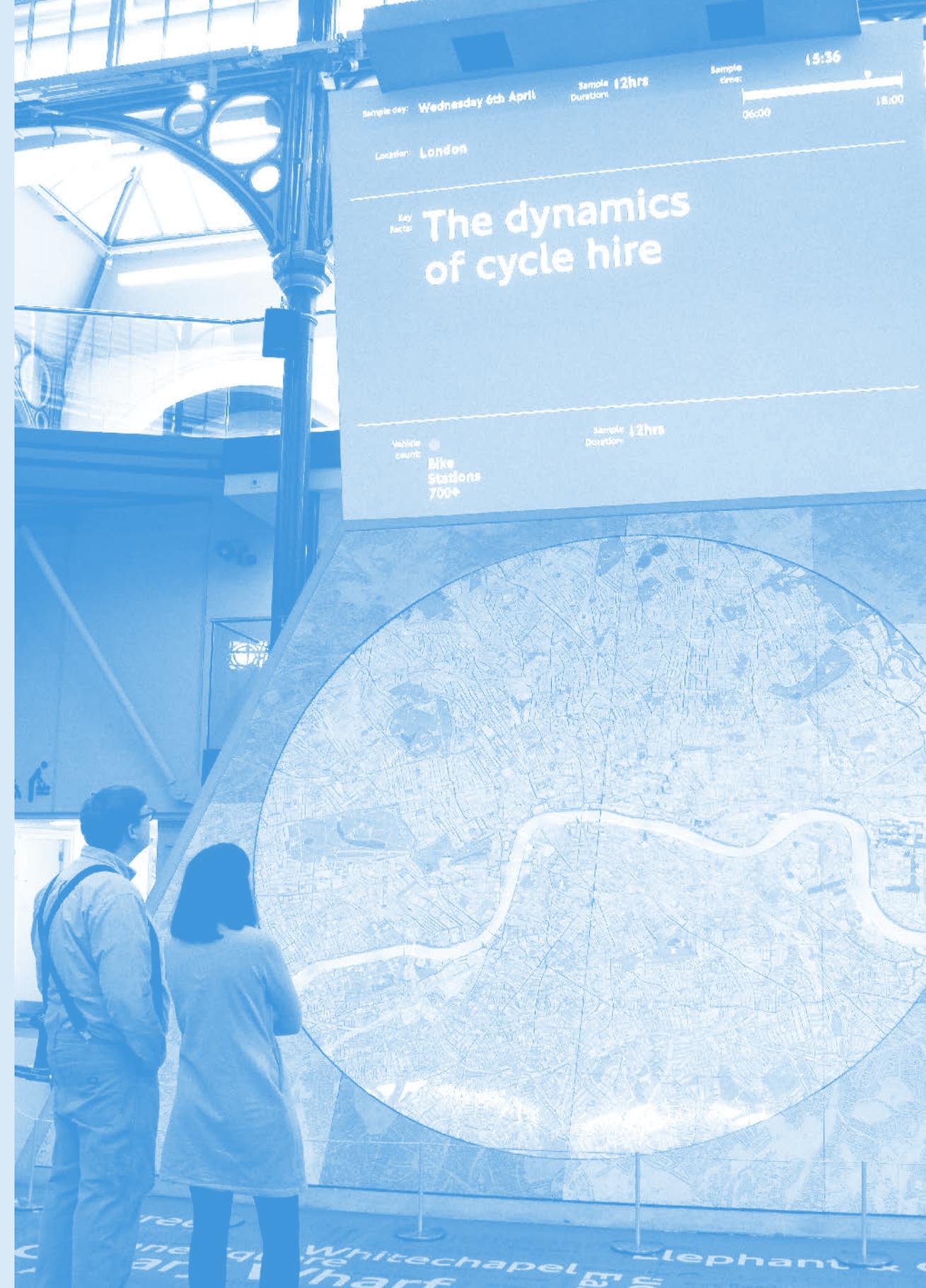
Below are two of the 12 multi-modal case studies that CASA produced for the London Transport Museum's interactive Connections display.

1: The buses of Brixton

Over half of the commuters getting onto Brixton Underground have arrived into the area by bus. The bus stops around Brixton station are the busiest by passenger numbers in London. The map shows the buses travelling from the south into Brixton station during a weekday morning. The single busiest bus stop in the city is Brixton's bus stop Q, found just outside the station.

2: Dynamics of cycle hire

With more than 700 docking stations, London's Cycle Hire scheme spreads across Central London, integrating closely with the Underground, bus and train networks. The biggest docking station on the network is at Waterloo station, with space for 126 bikes. The Connections visualisation shows the diurnal effect of demand on the Cycle Hire scheme, where bikes move from inner to outer Central London.



L O O N G S T O R I E S

AT THE BARTLETT, WE DON'T WANT OUR RESEARCH TO SIMPLY SIT IN AN ACADEMIC JOURNAL TO BE READ BY OTHER ACADEMICS. SO EACH ISSUE WE COMMISSION SIX WRITERS TO SPEAK TO THE PEOPLE BEHIND SIX OF THE BIG STORIES OF THE YEAR, AND REVEAL HOW BARTLETT RESEARCH AND COLLABORATIONS ARE HAVING REAL-WORLD IMPACT.

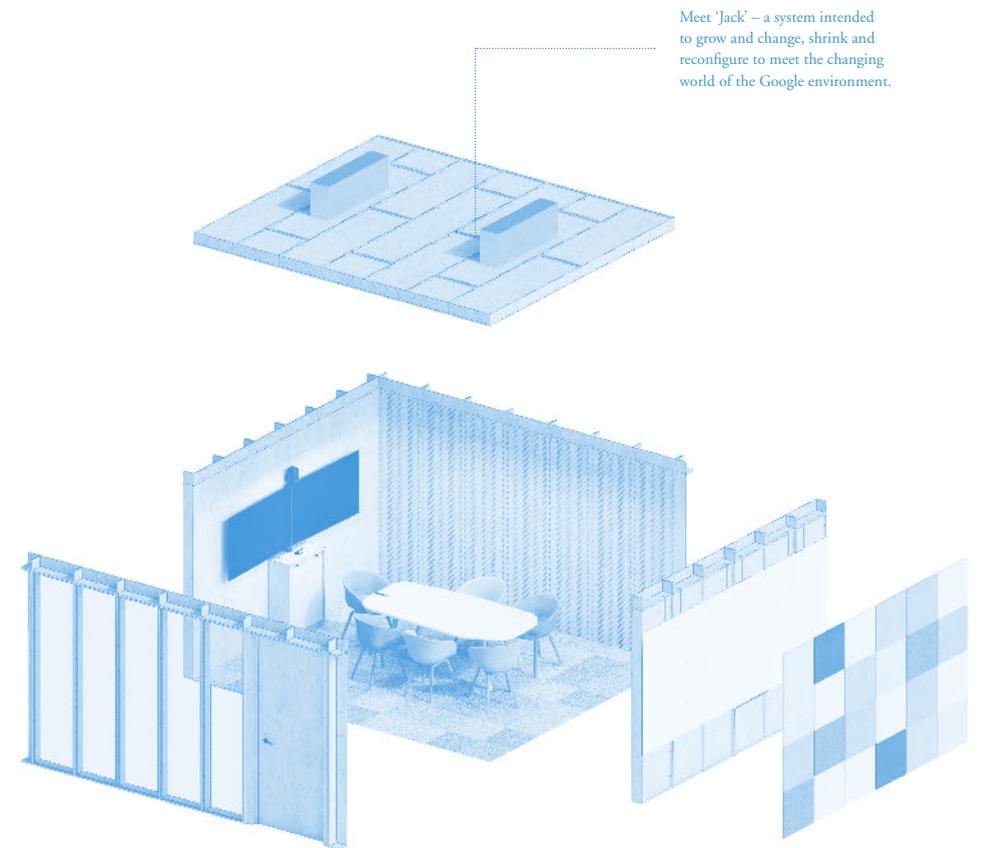
W O R

H A C K

K S P

A B L E

A C E



MODERN BUSINESS REQUIREMENTS CHANGE FAR MORE QUICKLY THAN THE PHYSICAL WORKSPACE CAN KEEP UP WITH, OFTEN LEAVING COMPANIES LOCKED INTO SPACES THAT ARE NO LONGER FIT FOR PURPOSE. BUT DOES A NEW COLLABORATION BETWEEN GOOGLE AND AHMM POINT TOWARDS A WORKABLE FUTURE? THE SPACE SYNTAX LAB IS TRYING TO FIND OUT.

WORDS: CLARE DOWDY



It's a good idea to start any visit to Google's new London HQ by taking the lift straight to the top floor. The building, on the pleasingly landscaped St Pancras Square, was supposed to be occupied by a bank. They had earmarked the top floor as the executive dining room, but so-called 'Googlers' eschew such hierarchy. The 11th floor now operates as an egalitarian café-cum-restaurant. At 11am one Friday in October, the place is buzzing with informal meetings, groups chatting, and people sitting with a laptop. There's even activity on the vast sun-lit terrace, where a sole Googler performs a burst of press-ups.

These are the sights that make contemporary workplace designers' hearts soar. These days, designers see their role as creating a variety of settings to cater for the different tasks, moods and personalities of staff. The sector jargon for this is 'activity-based working' or 'agile working', a phenomenon which was born out of a combination of the financial crisis and new technology.

The 2008 economic crash made businesses reconsider their expensive office space. Meanwhile, advances in technology have meant that people no longer need to be at their desk to be at work. The upshot has been less conventional banks of open-plan workstations – traditionally one per employee – and the introduction

of break-out spaces, semi-enclosed pods, and short-term meeting areas bedecked with all manner of quirky seating from bar stools to bean bags. Patricia Brown, Chair of the London Festival of Architecture 2016, calls it "the whirlwind changes in the demand for new workplaces".

REMAKE, REUSE, RELOCATE

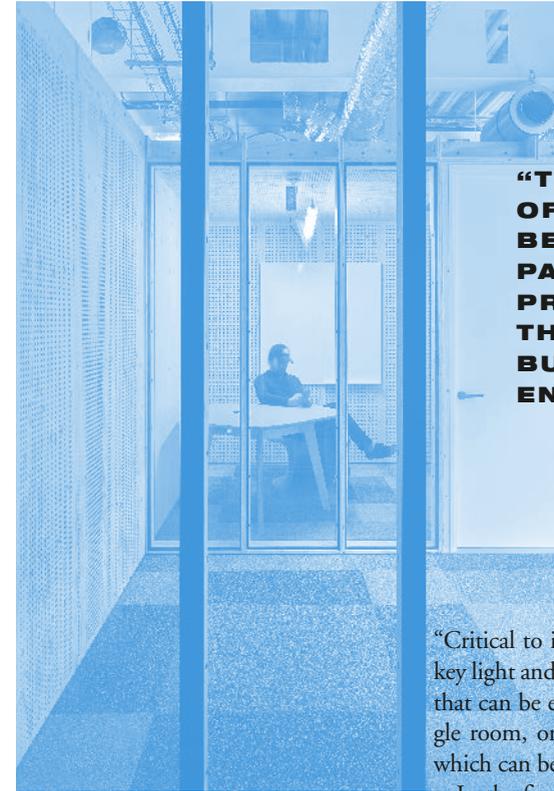
On the lower floors of 6 St Pancras Square, a novel experiment is underway that could take these 'whirlwind changes' to another level. Google has installed a series of small rooms within the large floor plates. Instead of being permanent, these are flexible and hence temporary. Called 'Jack', they can be extended, repositioned or removed completely in a few days.

Jack came out of a collaboration between Google and the building's architecture firm, AHMM, whose founders are Bartlett School of Architecture alumni. "The idea was to have a meeting room that would be deliverable to a similar timeframe to the constantly evolving business processes and team structures," says Ceri Davies, Associate Director at AHMM.

For fast-growing, fast-changing businesses like Google, an office configuration that is – figuratively or literally – set in stone, soon becomes obsolete. As subsidiaries and teams evolve, so too does the need for different sorts of spaces.



Jack can be customised in a number of ways, both internally and externally. As well as different screen positions, options include whiteboards, acoustic panels, and privacy curtains.



“THE INFLEXIBILITY OF SPACE HAS BECOME PARTICULARLY PROBLEMATIC IN THE 21ST CENTURY BUSINESS ENVIRONMENT”

“Critical to its success is that it is made of a few key light and easily handled building components that can be endlessly reconfigured to make a single room, or a series of connected spaces, all of which can be linked to address different needs.”

In the first four months of Google's occupancy of 6 Pancras Square, 93 Jacks were installed. AHMM gave staff two layout options: perpendicular or parallel, meaning they could be set out in a line running away from or alongside the atrium's glass walls. So far, Googlers have opted for the latter, "creating a corridor between the Jacks and the glass of the atrium", says Andrew Martin, Google's Project Executive Lead for UKI & CE Real Estate & Workplace Services.

As a result, sightlines from one side of the building to the other have been obscured – not, perhaps, what the architects had intended. But maybe this is just what happens if employees are allowed to make these sorts of decisions. As Dr Sailer puts it: "Is it too much to ask lay people to structure their own space?"

Regardless of the layout choices, Davies is keen that Googlers take ownership of the Jacks. "We really want them to be appropriated by the

Dr Kerstin Sailer, Reader in Social and Spatial Networks at The Bartlett's Space Syntax Lab, was commissioned by Google to write a whitepaper on the system and is now collaborating with the two firms to research the project's impact. "The inflexibility of space has become particularly problematic in the 21st century business environment," she says.

Davies echoes this: "For all the talk of flexibility, most fit-outs are actually very prescriptive. With Google's real need for reconfiguring floor plates several times a year, Jack permits a dynamic fit-out that isn't obsolete after the first day. In a wider context, the industry is notoriously wasteful when it comes to the 'churn' of tenants that might occupy speculative offices. Jack should help address that: if Google leaves 6 St Pancras Square, then Jack goes with them."

BEST OF BOTH WORLDS

Simon Allford, Director at AHMM, describes Jack as a sophisticated 'seaside hut' that is acoustically sealed, compliant with fire regulations, and taps into air conditioning if needs be.

personality of the different user groups,” she says. “Engineers, marketing and sales all have different needs and ways of working, and while Jack in its ‘raw’ state is a fully functional meeting room, they are intended over time to be ‘hacked’ and played around with. It would be great to be surprised by their future uses!”

So far, such hacking has included adding privacy to a couple of rooms, by putting screens over the glass walls and adding a lock, and extending two to make directors’ meeting rooms (or huddles, in Google-speak).

Dr Sailer became involved in this project after Google approached the Dean of the Bartlett, Alan Penn, on the hunt for an academic to write the whitepaper. The Dean forwarded their request to Dr Sailer, who remarks that “typically our work with commercial partners stems from contacts, networks and word of mouth.”

She is following up her academic analysis of Jack with research into how the rooms are used. This research, which focuses on the 9th and

“JACK IN ITS RAW STATE IS A FULLY FUNCTIONAL MEETING ROOM, BUT IT IS INTENDED TO BE HACKED”

10th floors, runs from October 2016 to March 2017 and is being funded by the EPSRC.

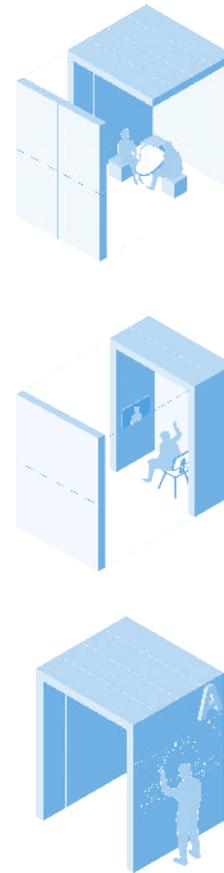
“This is a really nice research opportunity to look at what designers design, how users relate to that, and to ask whether what they have done is the ideal solution,” says Dr Sailer, pointing out that post-occupancy evaluation is rarely carried out because it’s so difficult to change anything. “My question is: do the users believe they will ever be changed? And how is it really hackable?”

She explains that the thoroughness of her research will depend on the kind of data that Google will release, beyond who sits where and who reserves Jacks. “I would like team performance data. For example, is there a difference between floors, between who is near the corridor or not?” She is keen to carry out a second phase of research with software simulations to test “if you place the Jacks differently, do you get a different social and spatial reality?”

In the meantime, Google’s Martin has another way of measuring Jack’s effectiveness: “If they allow people to work efficiently, they are a success,” he says. “They get more successful if they get recycled – if they have moved once in their lifetime, that’s a good cost story to tell.” ■

READ THE RESEARCH

- [Whitepaper: Project Jack – Google’s answer to the problem of flexible spaces \(K. Sailer, 2016\)](#)
- [Book chapter: Organizational Learning and Physical Space: How Office Configurations Inform Organizational Behaviors \(K. Sailer, 2014\)](#)
- [Proceedings paper: Spatiality and transpatiality in workplace environments \(K. Sailer, 2009\)](#)



Because Jack’s cassettes can be linked to each other vertically, horizontally and back-to-back, they can be built in a range of sizes – from ‘Booths’ for one or two, ‘Huddles’ for three or four, to meeting spaces for up to six.

MEET JACK’S MAKERS

AHMM started by researching proprietary systems, meaning off-the-shelf meeting room ‘pods’ and VC booths. But one of the key briefing criteria was to be free of a limited supply chain. “Google wanted to be able to erect and dismantle rooms quickly, without being beholden to long lead-in times or cost premiums,” says AHMM’s Ceri Davies. “So pretty early on we knew a bespoke route would be required.”

Google also wanted a system that could be rolled out across its global estate, so AHMM opted for the universal material plywood. The architects created a template that could be CNC-cut in any joinery workshop across the world.

Jack’s base module is a frame to which a front and back panel can be fitted to form cassettes. While the width (600mm) and depth (150mm) of all cassettes is constant, the heights vary to facilitate a wide range of uses.

As well as being linked back-to-back, cassettes can be linked to each other vertically and horizontally. The basic Jack module comprises two room scenarios: a two-to-three-person VC booth and four-to-six-person small meeting room, but iterations of the cassettes are also used for screens and print areas. AHMM hopes that the cassettes will be adopted for different functions in the future.

AHMM built a series of prototypes to test different criteria, and to perfect the connection system so that a room can be erected by a trained facilities management team in a day, with lighting and air-conditioning connections taking longer to set-up. “Given the individual cassettes, or a room in its entirety, need to be reused two or three times to justify its capital costs, then ease of assemble and disassemble was vitally important,” says Davies.

To minimise noise issues, AHMM worked with Sandy Brown Acoustics and tested many prototypes to ensure the joint connection in corners – at the floor and the door – were not the weak spots. “Reverberation in the room was also a key criteria, with Google doing much of their work via video conferencing,” says Davies.

She explains that AHMM doesn’t ‘own’ Jack. “As is standard for any of our projects, we retain copyright of our designs but grant our clients a license to use them for the specific purposes of the project for which they have been designed.” In this case, that includes the reuse of Jack in other Google offices.



HISTORY
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HISTORY
HISTORY

SINCE BECOMING PART OF THE BARTLETT SCHOOL OF ARCHITECTURE IN 2013, THE SURVEY OF LONDON HAS EMBARKED ON ITS MOST EXPERIMENTAL AND COLLABORATIVE PROJECT IN MORE THAN A CENTURY OF PUBLISHING: WHITECHAPEL HISTORIES.

WORDS: DOMINIC LUTYENS

WRITTEN BY EVERYONE

In 1983, when the late architectural historian Hermione Hobhouse took over as General Editor of the Survey of London, she gave this leading reference work on the city's history and its buildings a radical shake-up. Her view was that the Survey (as it's known for short) had concentrated for too long on wealthy areas – she would make it far more democratic.

During Hobhouse's tenure, two Survey volumes focused on the east London area Poplar, in the borough of Tower Hamlets, coinciding with its regeneration by the London Docklands Development Corporation. During the 1980s and 1990s, the regeneration saw a huge swathe of 19th and 20th century industrial buildings in Docklands demolished, such that a large part of the area had vanished by the time the volumes were published.

But as Andrew Saint, the current General Editor, wrote in 2010: 'The experience forced the Survey to broaden itself and describe and illustrate the infrastructure, industrial architecture, public housing and modern buildings with the care hitherto devoted to cosier or more venerable architecture.' This outcome inadvertently echoed – and expanded – Hobhouse's own democratic agenda.

Now the Survey – founded in 1894 by Arts and Crafts designer Charles Robert Ashbee and part of The Bartlett since 2013 – is entering an even more democratic phase. Last September, zeroing in once again on Tower Hamlets, it launched an interactive web-



40%

Whitechapel is home to a large Bangladeshi community, making up about 40% of the area's current population of 15,000 people.



KEY FACTS ABOUT WHITECHAPEL PAST AND PRESENT

Its east London mosque serves the UK's largest Muslim community.

A Crossrail station will open in the area in 2018.

Plans are afoot to convert the former Royal London Hospital on Whitechapel Road to a civic centre.

Successful cultural institutions include Wilton's Music Hall and Toynbee Hall.

The western part of the area, near Aldgate, is witnessing a proliferation of mainly residential towers — evidence of growing gentrification.

site, Histories of Whitechapel (surveyoflondon.org), which is currently documenting the history of the area's buildings and sites.

IN THE GRIP OF CHANGE

Whitechapel has a rich history typified by working-class hardship, but also by dissent and socialism. Today it is rapidly evolving. The area is named after a chapel dedicated to St Mary, which became the parish church of Whitechapel in the 14th century. From the 17th to the 19th centuries, destitute people from rural areas thronged there to find work in local industries. Because of its proximity to London's docks, the district has attracted many immigrants: it was the centre of London's Jewish community in the 19th and early 20th centuries as well as the location of the Whitechapel murders committed by Jack the Ripper. In the late 20th century, it became home to a large Bangladeshi community, which makes up about 40% of Whitechapel's current documented population of around 15,000 people.

The area today is culturally alive. A well-known local institution, the Whitechapel Gallery — founded in 1901 to bring art to east Londoners — has an avant-garde pedigree: Picasso's anti-war painting *Guernica* was exhibited there during its only visit to Britain, while 1970s shows on artists David Hockney and Gilbert & George hugely raised their profiles. Its exhibitions today — take the recent show *Electronic Superhighway (2016–1966)* that illustrated the impact of computer and internet technologies on artists from the 1960s to the present day — are typically leftfield. The area also boasts architect David Adjaye's boldly contemporary, glass-fronted 2005 public library, Whitechapel Idea Store (which was shortlisted for the Stirling Prize). For better or worse, Whitechapel is being gentrified: developer Berkeley Homes is responsible for the area's partially complete, seven-acre, deluxe project, Goodman's Fields on Leman Street.

Designed by The Bartlett's Centre for Advanced Spatial

“WE WANT TO CONNECT WITH PEOPLE WHO MIGHT NOT BE FAMILIAR WITH THE SURVEY”

Analysis (CASA) and supported by the Arts and Humanities Research Council (AHRC), Histories of Whitechapel records the area in an entirely fresh, collaborative, relatively open-ended way: it invites anyone with a desire to impart their first-hand experiences and memories of the neighbourhood's history to contribute these to the site in visual and verbal form — as written entries, voice recordings, or images. One major asset of Histories of Whitechapel is its ability to reach new audiences.

“The site's scale of interaction is huge,” says Peter Guillery, Principal Investigator and an editor of the Survey. “We want to connect with people who might not be familiar with the Survey. In the past, external contributions to the Survey were more ad hoc. Now we can capture the complexities of an area in a much more diverse, dynamic way.”

POSITIVE INFLUENCE

Over the years, the Survey has been influential in terms of planning. In the early 1970s, for example, a volume on Covent Garden influenced the Government's decision not to demolish many of its buildings, which had been threatened by a comprehensive redevelopment. So could Histories of Whitechapel have an impact on the area's evolution? “It's difficult to know,” says

1894

The London Survey Committee is founded.

1910

The Survey of London is published jointly with the London County Council (LCC).

1952

The LCC takes full control of publishing the Survey, passing this on to the Greater London Council in 1965.

1986

Responsibility for the Survey is transferred to the Royal Commission on the Historical Monuments of England, which was amalgamated with English Heritage in 1999.

2013

The Survey becomes part of The Bartlett School of Architecture.



Left: facade of the old Royal London Hospital building. Below: the 17-storey block, designed by HOK for Skanska, that is the hospital today.



Guillery. “We can’t stem the tide of gentrification but we can have a social impact – allowing not just scholars but people from all nationalities and cultures to produce and consume the histories we’re recording.”

The Survey has sometimes been described as ‘The official history of London’s buildings’, yet this has connotations of didacticism and stuffiness – the very antithesis of the accessible, informal, collaborative approach underpinning Histories of Whitechapel. The word ‘Histories’ in the plural is telling in itself: it accentuates the fact that it’s not produced by a small, remote team of specialists spoonfeeding the public with facts but is a collective, more popular enterprise.

It’s not the first time the Survey has had an online presence, however. The series has been available to read on the website british-history.ac.uk since 2005. Yet this simply features online versions of its traditionally blue-bound, discrete books, latterly published by Yale University Press. They come in two types: the ‘parish’ or ‘main’ series, documenting buildings within particular districts or parishes; and the ‘monograph’ series, which focuses on noteworthy individual buildings and sites.

By contrast, for the next two years, Histories of Whitechapel will offer an organic, ever-evolving digital resource for everyone, from historians and academics to the general public. A key feature of the site, built and designed by Dr Duncan Hay under the supervision of Dr Martin Zaltz Austwick – a research associate and senior lecturer at CASA respectively – is its user-friendly, interactive map. The team masterminding the project – who also work with a steering committee comprising historians and have

pored over everything from rate books and insurance records to Tower Hamlets’ archives as part of their research – are aware, however, that the internet as an online resource has its limitations. “Some people won’t have access to the site,” admits Dr Zaltz Austwick. “But there are lots of physical events in the area that people can attend to learn about our Whitechapel project.”

A key Survey member is Shahed Saleem, Public Participation Co-ordinator, who is interviewing people from different ethnic backgrounds for the site. Another academic, Dr Nazneen Ahmed, who has been based at UCL’s Department of Geography, is contributing a study about the evolving décor of Bangladeshi restaurants from the 1960s to the present. The site is also brought to life by illustrated colourful street scenes by Judit Ferencz.

“MY ROLE HAS BEEN TO TRANSLATE THE SURVEY’S METHODOLOGY INTO AN INTERACTIVE WEBSITE”

Helen Jones, Sarah Milne, Dr Aileen Reid and Amy Smith are other Survey staff working on Whitechapel, and Dr Shlomit Flint-Ashery at CASA is also involved.

A COLLABORATIVE HISTORY

The content of Whitechapel Histories is tidily divided into categories – Commerce, Brick Lane and Whitechapel High Street being two linchpins; Education, ranging from primary schools to The School of Nursing and Midwifery; Entertainment, a list that perforce includes the Jack the Ripper Museum on Cable Street; and Immigration, which lists Altab Ali Park, formerly a churchyard destroyed in the Blitz that was renamed to commemorate a Bangladeshi clothing worker murdered in a racist attack in 1978.

“Part of my role has been to understand the Survey’s methodology, then translate that into an interactive website,” explains Dr Hay. “I asked myself: ‘Who do we want to reach? Who will want to read this information? How can I create a structure into which all this fits?’ Digital information needs to be neatly parcelled up.”

The remaining categories are Industry, Markets, Medical, Politics, Poverty, Public Buildings, Public Houses, Restaurants, Transport and Worship. The Poverty, Politics and Public Buildings sections echo the heritage of the Survey itself: Ashbee was drawn as a young graduate to Toynbee Hall in Whitechapel. Founded in 1884, this campaigned against poverty, and still exists today. George Bernard Shaw’s Fabian Society met regularly in the area. Freedom Press, the oldest anarchist publishing house in the English-speaking world, which was founded in 1886, has been based here since the 1940s. And given the Survey’s democratic roots, it’s wholly appropriate that Histories of Whitechapel is its first experiment in creating a radically collaborative record of the area’s architectural and social history. ■

LANDMARK SURVEY PUBLICATIONS

1896: *Trinity Hospital, Mile End* (vol. 1, monograph series)

1900: *Bromley-by-Bow* (vol. 1, parish series)

1957: *Spitalfields* (vol. 27)

1973: *North Kensington* (vol. 37)

1977: *The Grosvenor Estate, Mayfair* (vol. 39)

1994: *Poplar, Blackwall and The Isle of Dogs* (vol. 43/44)

2008: *Clerkenwell* (vol. 46/47)

2012: *Woolwich* (vol. 48)

2013: *Battersea* (vol. 49/50)

**MAKING URBAN POLICY-MAKING
WORK FOR THOSE THAT NEED
IT MOST IN THE GLOBAL SOUTH
MEANS ELEVATING THE VOICE OF
THE URBAN POOR. THE BARTLETT'S
DEVELOPMENT PLANNING UNIT
IS SHOWING HOW IT CAN BE DONE.**

WORDS: BRENDAN MATON

AGENDA

URBAN

JUST

A

BUILDING



In the north of Peru's sprawling capital, Lima, the zone of José Carlos Mariátegui rises into steep, arid slopes dotted with informal human settlements, commonly known as *barriadas* or slums. José Carlos Mariátegui is within one of the poorest, most densely populated districts in the whole country, yet its population continues to grow fast. More than 13,000 people have arrived to the area in recent years. Chalked on the even higher slopes are new plots ready for more incomers.

Lima is situated in a mountain desert region. It is the second driest capital city in the world. But residents on the slopes of José Carlos Mariátegui take a bucket and tread a zigzag path through the rocks to reach the nearest tap – only two out of every five families have running water. Roads and buses stop far below the limits of housing.

The challenge for these residents is having their voices heard. In Peru, as elsewhere, urban planning tends to get done by experts centrally, often failing to acknowledge the right to the city of a large number of urban-dwellers. When it comes to risk mitigation, centralised priorities are often shocks such as earthquakes or mudslides, which are profound but rare. Settlers here face risks every day: rockfalls, diarrhoea from bad water, fires and harassment.

Established slum-dwellers and land-traffickers reproduce the endless occupation of the slopes by selling plots informally to newcomers, who cannot access land and housing elsewhere in Lima. As a result, everyday risks accumulate

URBAN RISK TRAPS

Risk can be understood as the combined potential outcome of hazards and vulnerabilities, mitigated by the individual and collective capacity to cope. The DPU sees 'risk traps' as cyclically recurring dangers that accumulate over time in specific places. Risk traps are often repetitive and go unrecorded, which makes them invisible.

over time in pervasive 'urban risk traps' (see box, page 49), with severe impacts on the lives, livelihoods and assets of the urban poor and the city's ecological and socioeconomic future.

"Capturing the full impact of urban risk traps, requires making such traps spatially and socially visible in the first place, only then can you trigger new ways of understanding and acting upon risk," says Professor Adriana Allen at The Bartlett's Development Planning Unit (DPU), Principal Investigator for cLima sin Riesgo – an innovative effort to capture everyday risks in José Carlos Mariátegui and Barrios Altos, another deprived area in central Lima. The cLima sin Riesgo project has used drones to photograph and create 3D maps of the two zones. Silvia de los Rios, from NGO project partner CIDAP, says that for the neighbours, having this aerial photo is "like having the urban block in their hands".

DRONE IMPROVEMENTS

In Barrios Altos, the drones reveal what official maps do not: illegal repurposing of residential dwelling as commercial storage. Another dimension of the map shows where official height restrictions have been breached. But this is only the beginning. The maps are then embedded with social information drawn from local settlers individually and collectively. Geo-referenced household interviews allow for identifying who is at risk – where, how and why – and also their means of coping with adversity.

The last category is crucial because so often the poor are not deemed to have resources. The money they spend on improving collective accessibility and services, ameliorating housing conditions, buying land, spades to level the slope or hoses to carry water, is not recorded – as if they make no financial contribution to the growing city but instead just sap its resources. On the contrary, slum-dwellers in José Carlos Mariátegui are virtually self-reliant. cLIMA sin Riesgo found that they contribute on average

1

HABITAT I, 1976

The first UN Conference on Human Settlements was in Vancouver, Canada in May 1976, as governments began to recognise the magnitude of rapid urbanisation.

2

HABITAT II, 1996

20 years after the first meeting, a second meeting, popularly called the "City Summit", was convened in Istanbul, Turkey and extended to local governments, academics and key civil society players.

3

HABITAT III, 2016

Unlike the previous two meetings, Habitat III put equity and sustainability at the very heart of the discussions and to ensure broad input into the New Urban Agenda.

"PEOPLE ARE NOT JUST CHANGED BY WHAT THEY LEARN, BUT HOW THE LEARNING IS DONE"

87% of the total to making their neighbourhood habitable. The State provides just 8.3%.

Technology harnessed to understand this way of life includes the drones, as well as geomapping conducted on smartphones using apps such as Epicollect. By collaborating with The Bartlett's Centre for Advanced Spatial Analysis and UCL Department of Civil, Environmental and Geomatic Engineering, the DPU then published the survey findings on open-access platform ReMapRisk.

But to reach into the heart of informal settlements, technology is subordinate to a methodology that begins by including residents' groups in formulating survey questions and their participation in data collection. The DPU allies its expertise in urban planning with the knowledge of local-dwellers and citizens' rights groups and the interests of municipal and national authorities. For comparability, socio-demographic questions are directly aligned with those found in surveys by Peru's National Institute for Statistics; while authorities currently engaged in cLIMA sin Riesgo include the Lima Water and Sanitation Service, the Secretariat of Disaster Risk Management and the Ministry of Housing.

For Professor Allen, the methodologies themselves transform users' thinking to build skills, confidence and aspirations. "People are not just changed by *what* they learn but *how* that learning is done." The co-ordinated project challenges the internalisation of many slum-dwellers, who demand nothing from the outside world. "The mapping process has helped to strengthen social organisation," adds Silva de los Rios.

For the authorities, this project offers a new form of risk-mapping (risk-mapping is a prerequisite for any Public Investment Project in Peru). For Peru's urban planners, however, data from the ground up presents a particular policy challenge. There is a way of thinking, for example, that says that granting the poor legal title to their land is the surest way out of poverty, but evidence from cLIMA sin Riesgo and

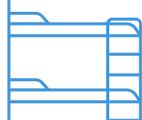
LIVING FOR THE CITY

According to the UN, 863 million people, or one-tenth of the world's human population, now live in slums. UN-Habitat defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following:

2016
863
MILLION LIVING IN SLUMS

Durable housing of a permanent nature that protects against extreme climate conditions.

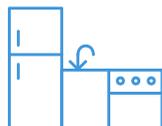
Sufficient living space, which means no more than three people sharing the same room.



Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people.



Easy access to safe water in sufficient amounts at an affordable price.



Security of tenure that prevents forced evictions.



2000
710
MILLION LIVING IN SLUMS



other projects finds that among the very poor, land titles acquired are readily sold on for cash.

“So we have to ask ourselves whether there are more appropriate policies in areas such as José Carlos Mariátegui – such as collective renting rights,” says Professor Allen.

LET'S GO QUITO

This discussion is not confined to Peru. Almost two thousand kilometres up the Pacific coast from Lima lies Quito, capital of Ecuador and home to the UN's third global convention on sustainable urban development, Habitat III, last October. The DPU has engaged with the Habitat III process by participating in different initiatives aimed at stimulating the debate around the content of the concluding policy paper, the New Urban Agenda, as well as the process by which it has taken shape.

The first principle of the New Urban Agenda is that in the process of building better cities “no one gets left behind”. This forms part of an ambitious goal that “by readdressing the way cities and human settlements are planned, designed, financed, developed, governed and managed, the New Urban Agenda will help to end poverty and hunger in all its forms and dimensions.”

Attempting to close the gap between this utopian phraseology and life on the barren slopes of metropolitan Lima, the DPU, represented by 11 academics, were active participants at the conference in Quito, hosting events, exhibitions and information exchanges.

Silvia de los Rios and colleagues from CIDAP were also there, exchanging ideas with other grassroots groups and agencies. One of the youngest, launched internationally at Habitat III, was the Sierra Leone Urban Research Centre (SLURC), represented by Dr Joseph Macarthy, an alumnus of the DPU and now Lecturer in Geography at Njala University; Sam Gibson, Mayor of Freetown; and Francis Anthony Reffell, Manager of the Slum Livelihood Project at the YMCA in

READ THE RESEARCH

- climasinriesgo.net
- habitat3.org/the-new-urban-agenda
- ucl.ac.uk/bartlett/development/sierra-leone-urban-research-centre

Freetown. They have been building the SLURC with help from Dr Andrea Rigon and Dr Alexandre Aspan Frediani at the DPU.

Like cLima sin Riesgo, SLURC's strength lies in its collaborative foundations – what the DPU calls “partnerships of equivalence”. Reffell told Habitat III that SLURC had created an opportunity to validate his project's data. “The world of academia is far removed from the poor population but SLURC recently conducted a training for the slum-dwellers. That linkage helps us to be recognised as a player especially when dealing with the municipal authorities.”

“We act as facilitators,” says Dr Rigon. “What is beautiful is when you see residents and city planners all interacting and sharing knowledge.” The role of the DPU academics in SLURC is now to step back and let the local researchers generate new knowledge with its various partners.

No one is naive about the challenge. Sierra Leone was racked by civil war for 12 years and more recently the Ebola virus. Corruption is rife and the country ranks low on the Human Development Index. Mayor Gibson admitted there are no fewer than 30 slums in the city.

“SLURC will be a very good test of how the New Urban Agenda can be put into practice... Changing people's lives for the better but also creating mechanisms for monitoring the process, and for that you do need a range of partnerships,” says Professor Julio Davila, Director of the DPU.

There have been criticisms within the DPU and elsewhere that Habitat III's aims resemble a huge shopping list that does not sufficiently protect slum-dwellers, those most likely to get left behind as more of the world's population comes to live in cities.

The research in Lima and Freetown brings to a wider audience the truth that local civic groups have long known: millions of slum-dwellers do want to be left, if not behind, then at least where they are. But with dignity, security of tenure, basic services and a voice. ■

(SMART) PARKLIFE



AT LONDON'S QUEEN ELIZABETH OLYMPIC PARK, THE CENTRE FOR ADVANCED SPATIAL ANALYSIS IS PUTTING A HUMAN FACE ON THE INTERNET OF THINGS. FLOWER BEDS HAVE BECOME TESTBEDS FOR HOW SMART TECH CAN HELP MANAGE A GROWING URBAN DISTRICT.

WORDS: KATIE PUCKETT



“The gnomes keep me up at night,” admits Professor Andrew Hudson-Smith, Director of the Bartlett’s Centre for Advanced Spatial Analysis (CASA). “There is a line between academic ideas, public-facing applications and the use of technology to understand place and space. Do academics do gnomes?” On the desk in front of him sits a 3D-printed gnome of the garden variety, unpainted and not yet fitted with the Bluetooth transmitter that will replace its feet. “Probably not,” he concludes.

CASA, however, does do gnomes. When it’s finished, this one and 29 clones will sit in solar-powered mushroom homes among the shrubbery of the Queen Elizabeth Olympic Park in east London. They will be the most visible elements of a vast technology infrastructure underpinning the cutting-edge ‘Smart Park’ project, on which UCL is collaborating with partners including Intel and Imperial College.

The London Legacy Development Corporation (LLDC) aims to create the city’s “smartest and most sustainable park”, with ubiquitous wifi, superfast broadband and a dense mesh of sensors monitoring everything from temperature and humidity, to the movement of crowds and even their emotions. Over the next decade, CASA will collect and analyse this data to understand and transform how people use the space and, looking further ahead, plan the smart urban districts of the future. So far, they have won four grants worth £13m, and Hudson-Smith leads a team of eight researchers working on associated projects, including three PhD students.

As well as crunching the data themselves, the CASA team are exploring ways to present it for policymakers and local communities, through technologies such as interactive dashboards and virtual and augmented reality. One of the first outputs, funded by the government’s Future Cities catapult programme, is a 3D model that displays data from across the park in real-time: “So as a bus travels around the park, it potters around our model,” says Hudson-Smith.

**“ALL THE PEOPLE.
SO MANY PEOPLE.
THEY ALL GO
HAND-IN-HAND
THROUGH THEIR
PARKLIFE”**

**“I KNOW WHAT
YOU MEAN.
IT GIVES ME
A SENSE OF
ENORMOUS
WELLBEING”**



Flexible enough to integrate new buildings and data sources as they become available, the model will be used by LLDC for both day-to-day management and future planning. “For example, if we can see real-time crowd flows for football matches, we might be able to persuade people to go to different exits or take different public transport home,” explains Jim Wood, LLDC’s director of IT and information services.

“We could use that crowd-monitoring data to plan future events, and we can drop new buildings into the model when we go out for planning consultations.” Many of its potential uses have yet to be conceived, he adds. “It’s a bit like a data warehouse, where you’re not sure how the data relate to each other. Sometimes you don’t get those insights until you’ve got the data and you start playing around with it.”

The Olympic Park is an ideal testbed for smart-city technologies partly because it contains such a variety of building types: as well as the green spaces, there is residential, commercial, sports and concert venues, places to eat and drink. Its other unique selling point is that it is a work in progress. “It provides a nice changing environment,” says Intel’s Dr Duncan Wilson,

A HUMAN TOUCH

Much of CASA’s work aims to take the Internet of Things (IoT) out of the realm of geekdom and bring it to life for the general public. An Engineering and Physical Sciences Research Council-funded project called Tales of Things used electronic tagging to give every object in an Oxfam shop a history and a voice. It includes a website where people can upload their memories as the objects change hands. CASA’s Andy Hudson-Smith calls it “a mix of the Antiques Roadshow, Facebook and eBay”. You can try it for yourself at: talesofthings.com. The follow-up is Tales of the Park, where trees, benches and the Bluetooth gnomes will share information with people as they walk past, and ask them about their experiences.

Director of ICRI Cities, one of its collaborative research institutes for R&D.

“We can explore how changes in the physical built environment influence the digital layers we’re creating. If you build a new building, how will that change the way the radio waves propagate around that field? And as more and more people go to the park on a daily basis, either through living or working there, or for events like a West Ham game – how do changes in the numbers of users interrupt the radio traffic?”

For technology providers, this real-world experience is crucial: “Lots of the component parts of these systems exist, but it’s still quite a young industry in terms of having end-to-end solutions that work,” says Wilson. “We don’t yet know what it takes to create a sustainable Internet of Things network.”

A key aspect of their research is in how self-powering devices can be designed to react to their environment. With billions of sensors deployed across the smart cities of the future, it won’t be viable to change their batteries or set up each one individually, Wilson points out. “The network itself needs to work out how it should run. If a device is on the east-facing side of a tree, it might start to learn that it has a good supply of solar energy in the morning but it’s going to run out at the end of the day. The devices will have an awareness of themselves as a community, and decide how often they should be sending measurements and ‘who’ should send them.”

But the physical side of the Internet of Things is only half the story. Just as we need to know how the equipment behaves, we also need to know how people will react to it. And while the full infrastructure of a smart city will take years to put in place, there is plenty of social data that we can gather now to find out how the design of a place affects people’s experiences of it.

A previous project saw CASA install a wifi prayer network in two churches. When congregants in one church posted a prayer, it appeared on the wall in both and an electronic candle lit

up. It was about creating digital empathy, says Hudson-Smith, but it also revealed something else: “Someone cleared out the church one night and all of our equipment was stolen. Which is interesting academically because you realise that the Internet of Things is not secure.”

At the Smart Park, CASA has secured a grant from the EPSRC’s PETRAS hub to investigate cybersecurity, the Internet of Things and trust. “We’re assuming a few of these gnomes will go missing, but they’ll be tracked, so we’ll know where they go,” says Hudson-Smith. The tracking data will not be used to retrieve the gnomes, just to reveal what happens to the devices out in the wild. They will also turn some into “bad gnomes” to find out how easily people give up their personal data or how likely they are to take advantage of unexpected access to a secure network. “They might ask you for your password, or the gnome might tell you its password, and we’ll see what people do with that,” adds Hudson-Smith.

This is why academics do sometimes have to do gnomes. The Bluetooth beacons could have been installed in “ugly white boxes” but then people wouldn’t engage with them in the same way: “That’s why a lot of research and devices fail. They’re too techie and no one cares about them.” Hudson-Smith is a planner by background, but his lab is a mix of mathematicians, computer scientists, geographers, architects, psychologists. They are also working with Lancaster University’s Imagination lab and artists at Edinburgh University: “You need to get artists involved in your work to get that spark.”

The Bartlett’s work at the park is set to continue with the opening of a UCL campus there in 2019. “Research grants can often come to an end whereas the point of this is that it needs to be longer term,” says Hudson-Smith.

“Having a Smart Park lab based there allows us to carry on the research for the next 10 or so years with Masters courses attached. Hopefully, in 10 years’ time, there’ll be new post-docs writing their own grants for work at the park. My job is then done.” ■

READ THE RESEARCH

- Smart London Plan (Mayor of London, 2013)
- The Future of Smart – update report of the Smart London Plan (Mayor of London, 2016)
- CEDE: Creating and Exploring Digital Empathy
- Intel ICRI Cities: Oct 2012 – Oct 2015

Images: Emma Todd

“IT’S GOT NOTHING TO DO WITH VORSPRUNG DURCH TECHNIK, YOU KNOW?”

SENTIMENT ANALYSIS

Sharon Richardson, who completed a Masters in Smart Cities and Urban Analytics at CASA, is now studying for a PhD, funded by EPSRC, exploring sentiment analysis in the park.

Q. How are you using sentiment analysis at the Smart Park?

I’m interested in whether we can use digital data sources to sense the vibe of a space, in the same way that a human can walk in and instantly have a gut feeling. With the proliferation of mobile technologies and embedded devices, I’m curious as to whether we can use all the digital traces we’re emitting to influence behaviour and spatial choices.

Q. What types of data can you use to do that?

Anything that falls under the remit of the Internet of Things. Sometimes it’s simply the awareness of presence or movement. Then there’s the communications that we share – if people are on social media while they’re in the park, we can do sentiment analysis on the words they use. People are quite vocal about football, so maybe we can sense the outcome of a West Ham game from the commentary during the match. Are they winning? Are they losing? Does that evoke a different sentiment that might affect how people behave in the park?

Q. How will mobile technologies change our relationship with the built environment?

My theory is that how we behave is tied to the situation we find ourselves in and the identity we adopt while we’re there. With all the technology we’re embedding into the built environment, we could start to create a level of artificial intuition, so rather than just collecting data about what we do, we use it as a feedback loop to help us. Human intuition normally serves us very well, but sometimes it completely blindsides us. There are examples from disasters where people didn’t know there was an emergency exit because they just followed the crowd. That’s when technology could hopefully say, ‘Woah, you’re going the wrong way.’

TIME
+
PLACE

PLANNING

**HOW THE BARTLETT SCHOOL OF PLANNING
PICKED UP WHERE THE GOVERNMENT'S
FARRELL REVIEW LEFT OFF, HELPING TO**

P

**CREATE AND NURTURE THE PLACE ALLIANCE
INTO A LEADING VOICE ON BEST PRACTICE IN
URBAN DESIGN.**

WORDS: DAVID BLACKMAN



Since its first meeting was convened at The Bartlett in July 2014, more than 100 organisations, including professional institutions and public bodies, have signed up to support what has become known as the Place Alliance. Its significance as a voice for quality in the built environment was underlined when, in 2015, the alliance won the Sir Peter Hall Award for Wider Engagement at the Royal Town Planning Institute's Awards for Research Excellence. But to really get why the Place Alliance matters, you need to understand where it comes from.

The alliance's genesis lies in Sir Terry Farrell's review of policy to improve the quality of the built environment, which was commissioned by the then Culture Minister Ed Vaizey around the same time that the Commission of Architecture and the Built Environment (CABE) was scrapped. The review, which was published in early 2014, made a host of recommendations, including the establishment within government of a new 'Place Leadership Council'.

Matthew Carmona, Professor of Planning and Urban Design at The Bartlett School of Planning, who was finishing a study on the work and impact of CABE at the time, felt that the review's proposal wasn't the right approach. One of the lessons from CABE's demise, he says, was that what the government set up, it could just as easily shut down. "With CABE, government had the whip hand," says Professor Carmona. "Rather than creating something in government, we felt it would be much better to have something more open and interdiscipli-

"ONE LESSON FROM CABE'S DEMISE, WAS THAT WHAT THE GOVERNMENT SET UP, IT COULD SHUT DOWN"

nary where we can have debates and challenge government where required, and on the other hand work with government when we feel it's going in the right direction."

In addition, a new government body was unlikely to find favour in Whitehall. "The industry was told that if it wanted to do anything, we would have to do it themselves," says Esther Kurland, Director of Urban Design London.

Rather than a formal, top-down institution, Carmona felt an alliance-style arrangement could strengthen networks within and between existing professional bodies and agencies. "It tries to be a point for bringing together diverse voices on the built environment. There's no clear voice on design quality. The Place Alliance is an attempt to fill that gap."

A MEETING OF MINDS

The Bartlett hosted a 'Big Meet', including 120 delegates representing 80 organisations, in July 2014 to discuss Carmona's ideas for an alliance. The format reflected Carmona's loose-limbed vision. "The fact it was in a big tent in the quad was a nice metaphor," he says.

The Bartlett agreed to host the alliance and to provide a £20,000 annual grant. This pays for a member of staff to run the alliance on a part-time basis. This role was initially carried

out by Lucy Natarajan and latterly by Valentina Giordano, both of whom have been critical in shaping the direction of the alliance.

The Place Alliance is certainly a far cry from the hallowed idea of the university as an ivory tower. Carmona, who has become chair of the alliance, believes this is a good thing. "While I do academic writing and research, I don't see the point unless we have an impact."

This viewpoint is becoming increasingly widespread in academia, he adds: "The university world is increasingly recognising the effect of having a real impact in the world. The Bartlett is keen on that and has been very supportive."

Carmona thinks it is important, too, that the alliance is not housed in one of the built environment's professional bodies, like the Royal Institute of British Architects. By being based at The Bartlett, the alliance can sidestep the perception that it is aligned with a particular professional agenda.

"We are seen as an open space where people can come and challenge. While individual academics may have their own agendas, the university as a whole doesn't. We are seen as an honest broker."

Debbie Sorkin, who chairs the alliance's working group on public health, agrees: "Not having something seen as the property of any one institution or organisation helps enormously."

Richard Simmons, the last chief executive of CABE, says the alliance has succeeded in reaching out beyond professions and public bodies to mobilise the involvement of community groups.

URBAN ROOMS

One of the Farrell Review's recommendations was the creation of a network of so-called urban rooms. A common idea in China, the review envisioned these rooms as places where members of a community could meet to find out about the history of, and future plans for, their area.

Since the Place Alliance's establishment, a number of urban rooms have been set up. Some, like the New London Architecture Centre, are long-established and housed in existing premises. Another example is the Architecture Centre in Bristol's Harbourside area, which originally opened in 1996. Both are open throughout the week. By contrast, the Live Works urban room was set up by Sheffield University School of Architecture in a new city centre premises.

But other urban rooms have been more ephemeral by nature. Blackburn is Open has opened for a month at a time in pop-up spaces. It has hosted exhibitions, workshops, seminars and films about the historical development of the Lancashire town and the future planning of its day- and night-time economy. A similar pop-up urban room set up in Newcastle generated 2,500 comments about the development of the city.

Find out more: placealliance.org.uk/working-groups/urban-rooms

“It’s not just the usual suspects but has been successful at drawing in people from community groups, which is an advance.”

The role of Carmona and his team has been “extremely important”, says Max Farrell, who is spokesman for his father’s review. “It wouldn’t have happened without them. They have dedicated a lot of their time and been extremely passionate about it. It has helped it be more than a coalition of the willing.”

Sorkin, who chairs the alliance’s working group on public health (see ‘Healthy Places’, right), says it is also important that the alliance is based in an academic environment. “We are always keen to work from an evidence base and obviously having something housed in a university, which by its very nature is consistent with evidence, helps in that respect.”

COORDINATED ACTION

Since that first Big Meet in the UCL quad, a further five such events have been held, which have focused on issues such as design review and raising the quality of new housing. Speakers have included Brandon Lewis, the then Minister of State for Housing and Planning.

In addition, three regional Big Meets have taken place over the past year in Birmingham, Cornwall and Wakefield. And July 2016 saw the first Place Alliance Summer School at UCL.

However, the danger of loosely structured organisations, such as the alliance, is that they can end up as talking shops that never achieve anything tangible. Carmona is alive to this

HEALTHY PLACES

Recent years have seen an increased awareness of the role that the built environment can play in promoting healthy lifestyles, such as via the creation of facilities for cycling and walking.

“Public Health England is very much thinking of its role as being about the health of the public not just epidemiology; what it means to live in a healthy place, and the difference that this can make to people’s life chances and opportunities,” says Debbie Sorkin.

Even GPs are prescribing boilers for people with respiratory problems rather than just dishing out antibiotics to deal with the symptoms, she adds. And walkability is rising up the agenda of developers such as Berkeley Homes.

Meanwhile, local government has taken over responsibility for public health from the NHS. One of the levers that councils can use to discharge this new duty is through the exercise of their planning powers. To help spread the word about best practice in the field, the Place Alliance has set up a working group on public health. The group is stocking the alliance’s website with best practice for planners and urban designers about how they can create places designed with healthy lifestyles in mind.

Sorkin says: “The Place Alliance seemed the natural home for making those connections – making sure that people could hear about what is going on elsewhere.”

Find out more: placealliance.org.uk/working-groups/healthy-places

“WE ARE NOT HERE TO COMPETE. WE ARE HERE TO BETTER CO-ORDINATE WHAT IS HAPPENING ALREADY”

concern. To keep on track, the alliance has set up a number of working groups. Some of these are taking forward specific recommendations of the Farrell Review, such as supporting the establishment of a network of ‘urban rooms’ (see ‘Urban Rooms’, page 61)

Other working groups focus on issues such as how good-quality urban design can promote better public health. Another, which meets at Farrell’s practice, concentrates on public art.

The alliance is also playing an active role in debates about the future of the built environment. Carmona served as special advisor to the House of Lords Select Committee on National Policy for the Built Environment’s inquiry into Building Better Places, which culminated in a report earlier this year. And the alliance became the forum for concerns about the government’s new system of ‘permission in principle’ – effectively providing fast-track consent on zoned sites – which was introduced in the recently passed Housing and Planning Act.

It has since prepared a paper for the Communities and Local Government department, suggesting the use of design codes to ensure good-quality development comes forward on such sites. In addition, many of the alliance’s key figures have collaborated on a new handbook on design in the built environment, which is due to

be published in 2017 by the RIBA. This publication will provide a handy annex for planners to the National Planning Policy Framework.

Another resource is the alliance’s website, placealliance.org.uk. Farrell says: “When doing the Farrell Review, it took so long to find out all the things that different institutions are doing. The Place Alliance can be a central repository and resource where all of that information is uploaded in an opensource way.”

However, a clear drawback with the alliance remains the lack of resources at its disposal. Noting transport minister John Hayes’ recent comments about the poor design quality of much transport infrastructure, Simmons says: “Although the government says it cares about design, it doesn’t actually resource it.”

For Carmona, in the meantime, it is key for the alliance to continue bringing together those seeking to raise the bar in creating good new places. “We are not here to compete with others. We are here to better coordinate what is happening already.” ■

READ THE RESEARCH

- placealliance.org.uk
- Design governance: theorizing an urban design sub-field (M. Carmona, *Journal of Urban Design*, 2016)
- Place Quality, a 2020 Call for Action (M. Carmona, *Town & Country Planning*, 2015)
- The Place-shaping Continuum: A Theory of Urban Design Process (M. Carmona, *Journal of Urban Design*, 2014)

THE BARTLETT REVIEW 2016
SCHOOL OF CONSTRUCTION
& PROJECT MANAGEMENT

WHY
LONDON
LEADS
THE
WORLD
AT

PROJECTS

NEW APPROACHES TO MAJOR
CONSTRUCTION WORKS IN LONDON
HAVE SET A MODEL OF EFFICIENCY
FOR DELIVERING MEGAPROJECTS
ON TIME AND ON BUDGET.
WORDS: JOHN MCKENNA

A decade ago anyone suggesting that the UK construction industry was a world-beater at bringing major projects in on time and within budget would have found themselves ridiculed.

In 2007, the national embarrassment that was the new Wembley Stadium finally opened a year late, and more than £300m over its fixed-price budget of £458m. That same year also saw the completion of the new £6.2bn High Speed 1 (HS1) channel tunnel rail link, delivered slightly late and 18% over its original budget.

Fast forward 10 years and the UK, and in particular London, is seen as an exemplar of best practice when it comes to managing major projects – defined as any construction project costing more than US\$1bn.

Governments from around the world are sending people to the British capital to find out how projects such as the London 2012 Olympics and Crossrail were successfully delivered.

The Bartlett is one of the leading academic institutions researching the success of these projects. Among its researchers is PhD candidate Juliano Denicol, whose work has been funded by the Brazilian government seeking insight from the UK's experience and to apply to its own infrastructure development.

Denicol has subsequently been awarded a prestigious research grant by the US-based Project Management Institute (PMI) to further fund his work looking at how clients create delivery models that can successfully deliver megaprojects on time and on budget.

“When the PMI awarded me the thesis research grants, they selected my work as one of the few pieces of research in this area that would create a real impact in the world,” says Denicol.

It is easy to see why understanding how megaprojects can be brought in on time and within budget is of global significance. According to a 2016 McKinsey Global Institute Report, the world needs to spend US\$49trn on infrastruc-

ture between 2016 and 2030. And yet, according to one estimate, 90% of megaprojects end up delayed and over budget.

Indeed, the problems major projects faced in the UK 10 years ago were also experienced at construction sites across the globe. Perhaps most notable at the time was the US project known as the Boston Big Dig. This tunnel was originally estimated at \$2.8bn when work began in 1991, but was eventually completed in 2007, nine years behind schedule at a cost of \$14.6bn.

And these problems persist today: even in Germany – a nation traditionally regarded as representing the pinnacle of industrial efficiency – the country is reeling from two hugely delayed and over-budget public projects. The Berlin Brandenburg Airport was originally scheduled to open in 2011 at a cost of €2.5bn, but is currently scheduled to open in the second half of 2017 at a cost of €6.6bn. The Hamburg Opera House, meanwhile, was finally completed in 2016, six years late and costing €789m – more than 10 times the original budget.

Anything that can reverse the trend of bloated and delayed megaprojects could have a huge effect not only from a fiscal perspective, but also a political one. As Denicol points out: “The government's main job is not building assets, but a great part of government policies are delivered through projects.”

T5 TURNING POINT

So why is London the focus of so much attention? The story of London's success begins with a project that opened just a year after the disastrous Wembley Stadium – Heathrow Terminal 5 (T5).

While problems with its baggage-handling systems marred the opening of the £4.2bn airport terminal, its actual construction was a success, delivered on time and on budget. “Today when you look at megaprojects, you look at life

before T5 and life after T5,” says Denicol. “As a delivery model, it's a breakthrough project.”

This success was achieved thanks to the client, BAA, eschewing the long-held belief in engineering and project management that “change is the enemy”.

In a paper co-written with colleagues from Imperial College London and the University of Queensland, Bartlett School of Construction and Project Management (CPM) Professor Andrew Davies says that T5 was a success because it defied conventional thinking.

‘Conventional project logic seeks to predefine all requirements and banish change once the project has started,’ says the paper, called *Five Rules For Innovation In Megaprojects*. ‘Such an approach, we believe, is the cause of many of the problems managers confront in megaprojects.’

Following a review of international airports opened in the previous 15 years and UK construction projects worth more than £1bn in the past 10 years, plus fact-finding exercises from other sectors such as oil and gas, BAA came at things differently. It ditched the traditional approach of a fixed-price contract that takes all the risk away from the client and puts it on the construction supply chain. Why? It found such an approach would have meant the terminal being £1bn over budget, a year late, and cost six lives through industrial accidents.

Instead, says *Five Rules For Innovation In Megaprojects*, ‘T5 created a radically new megaproject delivery model based on a collaborative, innovative and flexible process that

5

“CONVENTIONAL PROJECT LOGIC SEEKS TO PREDEFINE ALL REQUIREMENTS AND BANISH CHANGE”

avoided these potential failures.’ Allowing the construction supply chain the flexibility to deal with challenges in innovative ways was key to the project's success. Also key was the client's involvement in the scheme, with integrated project teams of both BAA staff and contractors working side by side.

The close working between the client and supply chain has been a key trend on major projects in London since T5. While construction of the London 2012 Olympics couldn't be run by an experienced owner-operator like BAA at T5, the Olympic Delivery Authority (ODA) created the role of a Delivery Partner filled by a consortium of CH2M, Laing O'Rourke and Mace. Like at T5, ODA and Delivery Partner staff worked on integrated project teams.

This delivery partner model developed for the London 2012 construction was then adopted and adapted for the delivery of Crossrail, a 118km cross-London railway, including 42 km of tunnel underneath Central London and 37 new stations.

PROJECT ECOLOGY

It is not only the concepts of an intelligent client, delivery partner and integrated project teams that have transferred across

London megaprojects. The steady pipeline of schemes has meant that many of the people working on the various projects are the same. For example, the leader of T5 became CEO of Crossrail; a London 2012 construction director became programme director of Crossrail; the director they replaced became CEO of London's new super sewer, the Thames Tideway Tunnel.

'London has benefitted from a project ecology,' says Davies in his forthcoming book, *Projects: A Very Short Introduction*. 'There is an ecology of firms, people and ties that is increasingly much more dense and interesting in London. We have seen programme directors on one project move to become chief executives on another. You are seeing organisations like the same contractors continually reappearing. The ties between people and companies are getting closer and closer. Traditionally, we have treated projects as islands, but you have to move beyond that and see the connections.'

Davies' colleague, Dr Vedran Zerjav, Lecturer in Infrastructure Project Management at CPM, says that while such an ecosystem is welcomed, the key to success is making sure that clients retain the lessons learned from each project and aren't solely reliant on a few experienced individuals. 'The question clients should be asking themselves is: how can I capture and retain that knowledge so that on my next project I don't have to start from scratch.'

DRIVING INNOVATION

What is significant about London is that the ideas that work on one project are not treated in isolation and forgotten on completion – they are applied and improved on every new project.

An example of this is the innovation management system developed for Crossrail that is now being used on Thames Tideway. Called 'Innovate18', this online platform is designed to provide a mechanism for the supply chain to submit ideas for innovative solutions, and then track and

report on their progress. The programme attracted more than 800 ideas by mid-2015, and supported innovations ranging from the use of high definition drone-mounted cameras for site inspections through to the repurposing of grout shafts to cool the train tunnels via geothermal heat production. When Crossrail programme director Andy Mitchell became Thames Tideway CEO in 2018, he brought the Innovate18 platform with him.

It is this focus on innovation that marks the next frontier in megaprojects. The *Five Rules For Innovation In Megaprojects* paper makes calls for this focus on innovation to extend beyond the construction phase to an asset's entire life cycle. To this end, Dr Zerjav was awarded a grant in 2016 by the Economics and Social Research Council to look at Business Innovation Dynamics in Infrastructure Projects.

'We want to transfer knowledge from the world of startups,' says Dr Zerjav. 'Infrastructure is seen as much slower and complicated – completely the opposite of the entrepreneurial space. But we want to look how we capture the value of what happens in a megaproject, and how that value is transferred across the notional boundaries in a project's lifecycle, such as the move from construction to operation.'

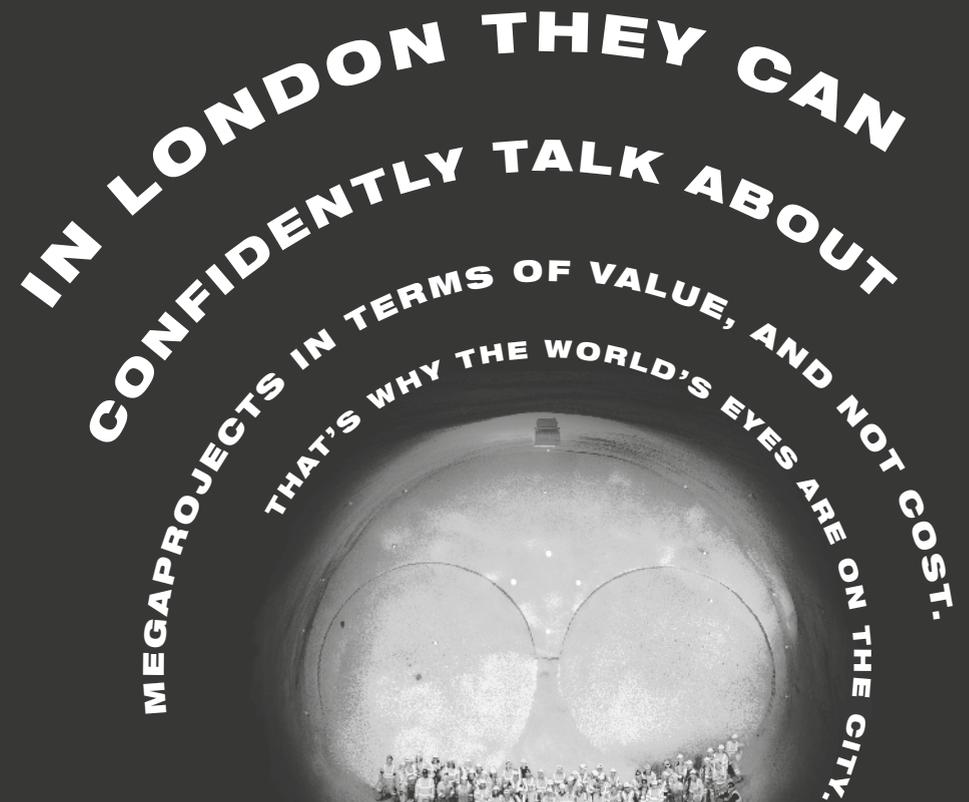
'Infrastructure is about creating value and we need to look at how we capture that value and funnel it back into the business to create a revenue stream.'

In London, they can talk confidently about megaprojects in terms of value, and not cost. That's why the world's eyes are on the city. ■

READ THE RESEARCH

- *Five Rules for Innovation in Megaprojects* (Davies, Dodgson, Gann, MacAulay, 2016)
- *Lessons learned from the London 2012 Games construction project* (Mackenzie, Davies, 2011)
- *Projects: A Very Short Introduction* (University Oxford Press, Davies, 2017)

Image: Completion of Stepney Green sprayed concrete cavern 40 metres below ground.



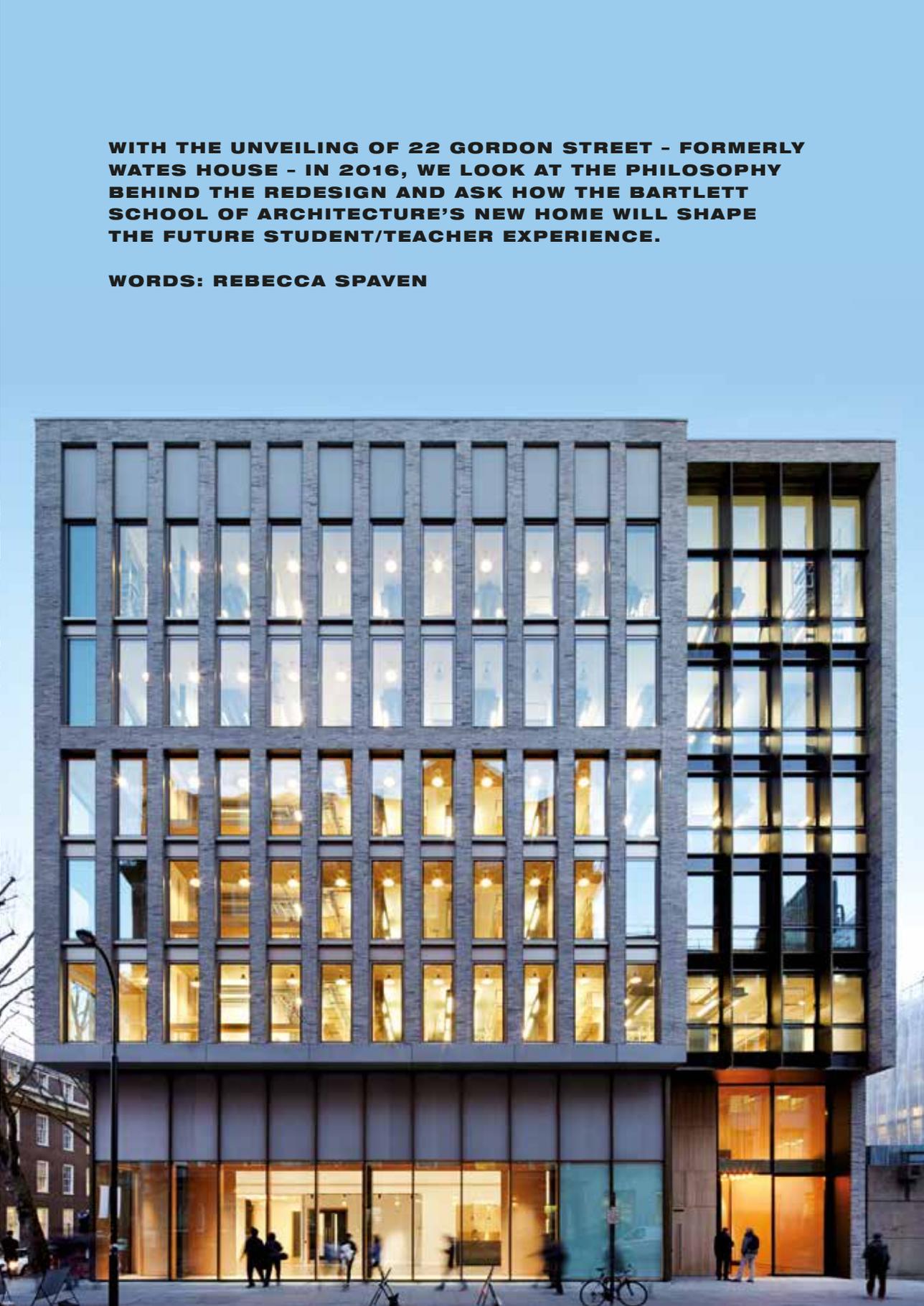
A N A T O M Y

**THIS SECTION GOES INSIDE
THE ANATOMY OF THE BARTLETT
TO EXPLORE THE BIG STORIES
HAPPENING AT THE FACULTY
LEVEL, FROM NEW BUILDINGS AND
INSTITUTES TO 2016 IN NUMBERS.**

W O R T H
T H E
W A T E S

WITH THE UNVEILING OF 22 GORDON STREET - FORMERLY WATES HOUSE - IN 2016, WE LOOK AT THE PHILOSOPHY BEHIND THE REDESIGN AND ASK HOW THE BARTLETT SCHOOL OF ARCHITECTURE'S NEW HOME WILL SHAPE THE FUTURE STUDENT/TEACHER EXPERIENCE.

WORDS: REBECCA SPAVEN



Bob Sheil, Director of The Bartlett School of Architecture, described Wates House as a “provocateur”. It’s hard to say for sure whether the students thrived despite the limitations of the original building, or whether the tightness and disorder was the grit in the oyster, producing generations of resilient and resourceful architects. Speculation aside, Wates House was used intensively for nearly 40 years, seeing The Bartlett go through decades of ideological, pedagogical and demographic evolution. But it was suffering from chronic space shortage and in 2012 urgent action was needed.

The brief to architects Hawkins\Brown was clear, albeit challenging: design a lean, efficient building capable of eking out as much space as possible on a small footprint, while at the same time making a positive contribution to the Bloomsbury conservation area. As work began, the School of Architecture moved temporarily to converted warehouses on Hampstead Road and the open-plan setup there proved a fertile testing ground for Hawkins\Brown’s proposals for 22 Gordon Street. Relieved to finally have the space to spread out, the School of Architecture flourished.

Reversing the inward-looking nature of Wates House was crucial to its new design. Hawkins\Brown has stripped the original building to its bones and dramatically opened up the space, filling the building with light. Where once a visitor would be greeted by a forbidding façade and an obscure entrance down a narrow alleyway, there is now warm timber and floor-to-ceiling windows. The main entrance is a true statement of intent by the School of Architecture: public-facing, transparent, open for business.

The building’s centrepiece is the steel staircase that slices through the southeast corner of 22 Gordon Street and acts as the main circulatory system for the building. Conceived as a ‘social generator’, the staircase and landings on each floor are some of the building’s many deliberately indeterminate, adaptable spaces. A 1.5m strip of reclaimed space has been added to the floorplate, producing flexible and intriguing areas around the perimeter of each floor, to be used as extra teaching space, or for crits and exhibitions.

These generous open spaces contrast with the densely populated studio areas, which are designed to ensure that every student has their own desk space, but also to replicate the culture of a school whose students have always thrived off working closely and intimately.

Clues that 22 Gordon Street is not an entirely new-build can be found on every floor, with the original structural elements of Wates House in rough, paint-marked concrete contrasting with the cleanness of new joinery. However disarmingly familiar some parts might be to those who knew Wates House, 22 Gordon Street is a complete transformation of both the external appearance and the internal function of the building. It signals a new stage in The Bartlett’s development and evolution.



Above: Hawkins\Brown’s ‘deep retrofit’ stripped the former Wates House to its structural concrete frame, preserving some of the old features while radically overhauling the interior function of the building.

Right: 22 Gordon Street is the first major project to be completed as part of ‘Transforming UCL’, the university’s ambitious building and refurbishment programme. It aims to represent the gateway to a new ‘university quarter’ south of the Euston Road.





**“THE MAIN ENTRANCE IS A TRUE STATEMENT OF INTENT
BY THE SCHOOL OF ARCHITECTURE: PUBLIC-FACING,
TRANSPARENT, OPEN FOR BUSINESS”**



THE BARTLETT REVIEW 2016
22 GORDON STREET





Above: A handrail in a retained stairwell brings together the old and the new. Right: Flexible modular spaces adapt to the needs of the School, providing spaces for crits, teaching or exhibitions.

Previous page: Glimpses of the raw concrete frame of Wates House can be seen throughout 22 Gordon Street, a tactile reminder of its previous incarnation. The steel central staircase is the building's 'social generator' and circulatory system, encouraging chance meetings and free movement between floors.

Above: Generous open-plan studio spaces encourage interaction and collaboration across units and year groups.

Right: The 22 Gordon Street site sits at the intersection of three distinct sub-areas of the Bloomsbury Conservation Area, bordering the elegant Georgian terraces of Tavito Street to the east and in the vicinity of several listed buildings. The new brick facade and regular, deeply recessed windows make it a far more sensitive neighbour to its historic surroundings than its predecessor.



Images: Jack Hobhouse, Paul Smoothy, Matt Clayton



A PERSONAL PROJECT

Bartlett alumni and Hawkins\Brown architect Tom Noonan describes how his experience of studying at Wates House influenced the new building's design.

As an alumnus of The Bartlett, I know from my experience that the people we were designing for were likely to break the rules of building occupation. So we had to design a vessel that supported constant change – a blank canvas that would evolve with future generations of designers.

The design of 22 Gordon Street aimed to nurture and enhance the positive qualities we discovered in Wates House, while at the same time addressing the building's historic flaws. The stairwells used to be one of the most sociable spaces, enabling chance encounters between people who would normally be contained within the studio cells. We learned from the unpredictable opportunities these 'leftover' spaces offered, and the new central staircase and landings take their cue from these.

For me, the essence of the design of 22 Gordon Street is symbolised by the moment the handrail of the existing stairs changes from steel to timber. We have retained the colours, scratches and marks to signify where the old building ends and the new one begins.

The success of the School of Architecture is partly down to the nature of the unit system, which was supported and exaggerated by Wates House's cellularised design. The new building offers a more open arrangement of spaces to encourage collaboration between units, while also allowing them to create their own identity.

BE HERE NOW



LONDON'S HERE EAST ISN'T YOUR TYPICAL UNIVERSITY REAL ESTATE. BY PUTTING CREATIVE DESIGN AND ADVANCED TECHNOLOGIES IN THE SAME SPACE, THE BARTLETT IS TAKING A BOLD STEP INTO A FUTURE THAT WILL STRENGTHEN ITS INTERDISCIPLINARY RESEARCH AND TEACHING.

WORDS: REBECCA SPAVEN





Occupying 1.2 million square feet on London's Queen Elizabeth Olympic Park, Here East is based in the former Olympic Press and Broadcast Centre, giving it a data and connectivity infrastructure that's unrivalled in Europe.

Overleaf: CGI visualisation of the robot hall and makespace.

SOLVING BIG PROBLEMS IN A BIG SPACE

Central London is dense. The Bartlett's Bloomsbury location has never cramped its style, but we could all use a little breathing room. That's why we're excited about the possibilities for innovation at Here East. Designed by Hawkins\Brown, this 32,206 square-foot space – that includes a robot hall and makespace (overleaf) capable of allowing work on full-scale components from the aviation and construction industries – opens up a new realm of potential.



Built environment professionals have a unique responsibility to actively shape not only the industry in which they work, but the world in which we all live. Here East opens a new chapter in The Bartlett's history. It provides a facility, groundbreaking in its scale and scope, to get creative with some of the most advanced technology available, and the opportunity to train a new generation of highly skilled, interdisciplinary engineers and architects.

COLLABORATING WITH ENGINEERS

When architectural education at UCL was founded in the 1840s, architecture and engineering students enjoyed a close relationship, sharing facilities and ambitions. But they have never shared a degree until now, with the launch of The Bartlett's new MEng Engineering and Architectural Design.

We asked: what happens when you take the internationally renowned design talent at The Bartlett School of Architecture and combine it with the rigorous project-based education of Civil, Environmental and Geomatic Engineering? Taught in conjunction with UCL CEGE and IEDE the MEng takes the design studio model of architecture and combines it with advanced fabrication facilities and engineering labs to evolve the model of architectural training, putting experimentation and prototyping at its heart.







TEAMING UP WITH CUTTING-EDGE ROBOTS

Here East will be home to some world-class resources. We'll have 11 robots and a whole suite of fabrication, experimentation, testing and study resources, alongside cutting-edge labs that are fully equipped with analogue and digital fabrication facilities, including robotics, 3D printing and scanning, CNC milling, water-jet and laser cutting. One of the robots already has a nickname – Professor Tickle.



Here East comprises three buildings and six spaces, and puts The Bartlett in the mix of start-ups, growing companies and large businesses working in sectors from the arts to tech.

MAKING HERITAGE MOBILE

SEAHA (Science and Engineering in Arts, Heritage and Archaeology) will be parking their unique Mobile Heritage Lab at Here East. When they get the call, the team will be able to load up their lab with specialised heritage equipment such as a ground penetrating radar, hyperspectral cameras, a weather station and pollution monitors, and head out on research and public engagement missions.

Images: Richard Stonehouse, Paul Smoothery, Hawkins\Brown and Pixelflakes



REFRAMING THE IDEA OF REAL ESTATE

The second phase of building at Here East will create a home for the new Bartlett Real Estate Institute – an innovative executive education and research hub based on valuing ‘intangibles’ in today’s development industry. The Real Estate Institute will place the previously overlooked notions of design, heritage, sustainability and urban place-making at the centre of its teaching and rewrite the rules of the sector.

REPRESENTING UCL IN THE OLYMPIC PARK

Things are moving East. The Olympics nudged the centre of London towards Stratford, and the university, arts and innovation sectors are only strengthening this gravitational pull. The Bartlett at Here East will be the first representation UCL has on the Queen Elizabeth Olympic Park, and it’ll be a great opportunity to shape this neighbourhood for years to come.

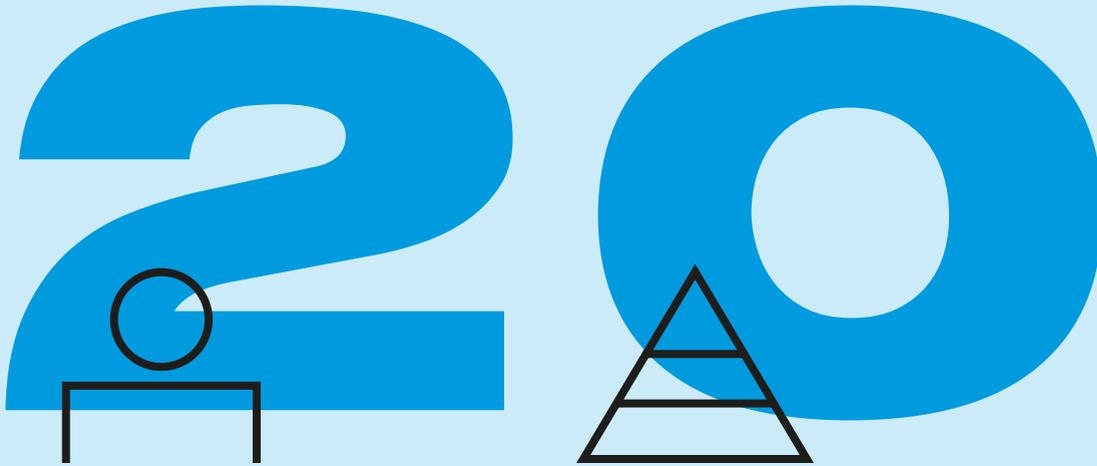
JOINING A THRIVING COMMUNITY

Here East is collecting a thriving community of residents, with manufacturing, media, education and tech at its heart. Our neighbours are as varied as an internationally renowned dance studio, Wayne McGregor, and the production hub of BT Sport. Occupying the former Olympic press and broadcast centres, Here East is an experimental and flexible place designed to foster collaboration, participation and cooperation. ■

CRITICAL MASS

NEW SPACE, NEW PROGRAMMES, AND MORE NEW STUDENTS THAN EVER - IT ALL POINTS TO THE BARTLETT'S INTENTION TO BECOME THE WORLD'S NUMBER ONE FACULTY OF THE BUILT ENVIRONMENT.

THE BARTLETT REVIEW 2016
THE NUMBERS



2363
STUDENTS
IN 2015/16

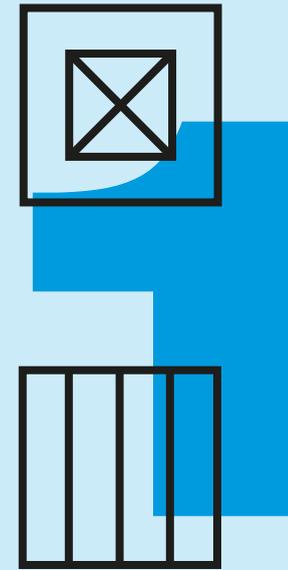
2161
STUDENTS
IN 2014/15

148
BSCs AWARDED
IN 2015/16

1285
MASTERS
DEGREES
AWARDED
IN 2015/16

34
PHDs AWARDED
IN 2015/16

21%
INCREASE
IN SPACE
FOR TEACHING,
MAKING AND
RESEARCH



8.3%
INCREASE IN
RESEARCH
FUNDING IN 2016
COMPARED TO
PREVIOUS YEAR

**NEW INSTITUTE
OPENED IN 2016**

**THE INSTITUTE FOR
DIGITAL INNOVATION IN
THE BUILT ENVIRONMENT**



NEW PROGRAMMES

2015/16
MRes Architecture & Digital Theory

2016/17
MSc in Global Prosperity
MSc in Sustainable Resources

2017/18
MSc Health, Wellbeing and Sustainable Buildings
MEng Engineering & Architectural Design
MA Situated Practice
MArch Design for Performance and Interaction
MArch Design for Manufacture
MPlan City Planning
MSc Spatial Data Science & Visualisation

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01 Welcome to the post-digital city

The newly formed UCL Institute for Digital Innovation in the Built Environment operates at the interface of digital engineering, computer science and human experience.

‘Post-screen’ or even ‘post-platform’ are often cast as hallmarks of a near-future that might be described in its entirety as ‘post-digital’. That’s not an antagonistic position – not ‘anti-digital’ – but rather envisions a time where technology is so deeply interwoven within the architectural fabric and our practice in design, engineering and construction that flickers of digital nothingness are sensed more acutely than its being (Negroponte, 1998). It speaks to a future where the building blocks (or bits) of the city are designed with social product in mind.

Nicholas Negroponte alluded to some of these qualities in a thought-piece for *Wired* back in 1998. Pre-dated, of course, by his 1970 book *The Architecture Machine*, which bore the tagline ‘Toward a more humane environment’. The closing chapter of his *Soft Architecture Machines*, published five years later, imagined computers as more than aids for architects and urban planners to design buildings – but as part of architectural form itself. Today, we sit on the cusp of such trailblazing possibilities.

The UCL Institute for Digital Innovation in the Built Environment was established in 2016 at a time when provocative ideas around the design and use of new technologies are starting to shape not only the way the built environment is created, sustained and managed, but how it is experienced. Drawing on digital advances such as Building Information Modelling (BIM), smart cities, big data and the Internet of Things, we are dedicated to improving process and cost-efficiencies, promoting sustainable futures and enabling social and cultural transformations.

*“The sentient potential entrenched in
everyday objects, and even materials for
fabrication, looks set to present radical
opportunities for change in the city”*

As this digital landscape starts to extend beyond the screen, the sentient potential entrenched in everyday objects and even materials for fabrication, looks set to present radical opportunities for change in the city. At the Institute for Digital Innovation in the Built Environment, we are leading the charge: interrogating digital innovation as it strives to enhance the design, construction, operation and experience of buildings, systems and cities.

These shifts look set to disrupt not only our built environment as it is lived, but how it is practiced. Our new postgraduate taught programmes, currently in development, embody this commitment to a collaborative and integrated digital future. Designed to move beyond digital silos in architecture, construction, engineering, asset and facilities management, they will offer a more integrated process of practice.

This could not be more timely given the UK government’s recent announcement of the melding together of their smart cities and BIM programmes into Digital Built Britain. Professor Tim Broyd’s role as President of the Institution of Civil Engineers in 2016/17 provides further signal of the city’s evolving digital relationship. The Institute for Digital Innovation in the Built Environment is committed to finding progressive, forward-thinking solutions to how we can engineer a digital future that transforms people’s lives and brings economic prosperity.

02 Jumping the species barrier

Why zoonoses – diseases that jump across the species divide from animals to humans – present a challenge for global prosperity.

Scientists estimate that over 60% of infectious diseases in humans are spread from animals. Many are relatively easy to prevent or treat, while others – such as Ebola, avian flu or SARS – have become notorious through recent disease outbreaks, which have led to fears of global pandemic. Many of these diseases are not new, but changes to food production systems, global trade networks, urbanisation, livelihoods and forms of human and animal interaction are affecting their intensity, frequency and potential global reach.

Zoonotic infection does not discriminate by class or wealth, but, as we saw with the recent Ebola outbreak, the impacts tend to be felt most acutely by those in the poorest parts of the world. These are communities where health facilities are already overextended, livelihood security is already tenuous, and household coping mechanisms are already struggling.

Though these communities are often more knowledgeable and experienced in managing disease than external aid agencies assume, nevertheless controlling outbreaks takes substantial resources: human, financial, technical and political. As such, zoonotic disease represents one of the major challenges to achieving sustainable, equitable, global prosperity. Their management and prevention takes place across multiple scales and geographies. They are, therefore, a macro-challenge in an increasingly globalised world, as well as catastrophic on a small scale for families and communities. They affect not only health but almost every other aspect of life, from food preparation to global governance.

At the Institute for Global Prosperity, we are facing up to this challenge through a set of research projects and initiatives that aim to build a networked understanding of the relationship between something as tiny as a pathogen and the future direction of family and community life, as well as national and international policy.

“As we saw with the recent Ebola outbreak, the impacts tend to be felt most acutely by those in the poorest parts of the world”

We are one of eight collaborating institutions on Ethiopia Control of Bovine Tuberculosis Strategies (ETHICOBOTS). This five-year, interdisciplinary project brings together epidemiologists, immunologists, geneticists and social scientists from Europe and Ethiopia to address the burden of bovine TB (bTB) in the country's rapidly growing dairy sector. A zoonotic infection, bTB is a major concern for a country that not only has the largest herd of cattle in Africa, but is investing in more intensive farming systems that rely on imported cattle breeds that, though more productive, are also more bTB-susceptible.

The social science component of ETHICOBOTS investigates the impact of bTB across different sectors and scales. For farmers, farmworkers and their households, increased exposure to bTB has serious ramifications. There are also downstream consequences for public health, livelihood security, export markets and national development. This all has concomitant implications for policies in these areas.

By adopting a 'One Health' approach, we are examining the management of sickness and health in smallholder households and on emerging commercial dairy farms. We situate this within a broader examination of new consumption patterns, more intensive animal husbandry techniques, formal and informal trade networks of cattle and dairy products, an increasing labour burden, and attitudes to risk and decision-making.

If control strategies are to make a significant impact, rather than issuing top-down directives, we need to ensure that techniques are co-designed with the communities who are affected by bTB. To achieve this, we have put citizen-science methods at the heart of the project.

We are exploring participatory methods for disease surveillance and aim to develop simple farmer-led monitoring systems for intervention programmes. We are also working collaboratively with government officials to develop a set of policy briefings for relevant ministries. These will inform the development of new guidelines and a set of evidence-based, appropriate interventions to minimise the burden of bTB and its consequences for prosperity and wellbeing.

03 How to run a successful lab

*“Comparing the growth of CASA
to a small startup company is
perhaps the best analogy”*

Over the past 15 years, Sonja Curtis has helped take CASA from a two-man team to a leading force in the science of smart cities. She shares her advice for new institutes and research labs embarking on the startup years.

Fifteen years in the same job isn't something I ever envisaged earlier in my career, but then I'd never worked anywhere like the Centre for Advanced Spatial Analysis (CASA) before. During that time, my role has developed and evolved enormously as the department has grown.

In the early days, there were two permanent members of staff: one academic – Mike Batty, who founded it – and one administrator – me. My role encompassed every aspect of administration, from human resources, graphic design, web design, event management and finance to research grants, PhD administration and purchasing. No two days were the same.

As a research centre, most of the staff worked on short-term contracts and it was always a challenge keeping the funding coming in order to retain people. It wasn't always possible, of course – but it's rewarding to see the career paths of many who started here have taken since. CASA alumni have academic posts all over the world. Some have their own companies, some work with government departments and others work with international organisations. And Andrew Hudson-Smith, who was one of CASA's PhD students when I started, is now a Professor, Director of CASA and Deputy Academic Lead for UCL East.

We started offering postgraduate taught courses at CASA a few years ago, and these have proven extremely popular. It's enabled us to secure an additional eight permanent academic posts and five administrative staff. It really is a close-knit team and it's fantastic to be part of a place that's training up the new leaders in these fields. The Master's students are as much a part of CASA as the rest of us.

There's a solid administration team in place now, too, which is very pleasing. Lisa Cooper heads up the academic administration, Alasdair Tatam leads on finance

and research administration, Carol Trent is our executive assistant, Jaimie Denholm supports the whole team and Yuefeng Jiang is our data and IT technician. They're all brilliant and I want to provide as many opportunities as possible for their future career development.

Comparing the growth of CASA to a small startup company is perhaps the best analogy. It's been a tireless effort from everyone since the outset. We come from a wide range of backgrounds, with very different personalities, and all with something unique to offer. When it's all hands on deck, everyone downs tools and offers to help, whatever their role. It's the people that make CASA great.

If I was to give advice to a new institute, I'd say: you need to be prepared to put in the hours. Choose your staff carefully and treat them well. Plan, and continually revise plans, for the short, medium and long term, and be prepared to adapt to change and obstacles along the way. It won't all be plain sailing, by any means, but some of the best team-building may arise from challenging situations, and some of the best discussions might happen letting off steam down the pub at the end of the week. And, of course, if you can, appoint a top-class department manager who's committed to the long haul to ensure the Institute succeeds.

04 Ethical encounters

Why is now the time to talk about ethics in the built environment, and how do we know if we're asking the right questions?

Ethical concerns are rising up the institutional agenda, manifest as codes and procedures in universities and the built environment professions. These can be read as responses to the privatisation and marketisation of knowledge, and the destruction of the welfare state, within which universities and professionals typically operated in the service of the public good. When private interests are allowed to prevail, financial value displaces social value – and we find ourselves in a moral vacuum.

In this context, where universities are being transformed, and usually not democratically, into businesses, the need to behave ethically becomes even stronger. There is also particular responsibility in research and education professionals to conceive, make, use and evolve the built environment for future generations. Research at The Bartlett, for example, often brings together scientific and artistic modes of working, develops new collaborations that go beyond disciplinary and university boundaries, experiments with new technologies and combines large data sets. This nature of intervening in the built environment calls for some deep reflection.

In January 2013, Jane Rendell, who was then Vice Dean of Research at The Bartlett, was tasked with 'owning the risks' of research expansion. UCL had recently accepted \$10m from the Anglo-Australian mining and petroleum company BHP Billiton to create the UCL International Energy Policy Institute in Adelaide, and the Institute for Sustainable Resources at The Bartlett in London. The answers Rendell received to questions regarding the environmental, social, and governance due diligence procedures undertaken when accepting this charitable gift prompted her to step down from her institutional role as a Vice Dean.

This process brought the concept of 'critical spatial practice', that she had introduced with respect to public art, into a questioning encounter with institutional

“Thinking through ethics presents an opportunity to grapple with ideas of enduring value”

ethical procedures. She has since developed this work into a wider project concerning ethics in built-environment research that has taken place at The Bartlett through an Ethics Working Group, Ethics Commission and several transdisciplinary conferences. This included the two-day symposium 'Practising Ethics'.

For the Ethics Commission, David Roberts drafted a report, based on 28 interviews that Dr Charlotte Johnson and he conducted with Bartlett staff, mapping ethical approaches, expertise and issues across the faculty. The report sets out the organisational principles, structures, procedures, research and teaching related to ethics at all levels and within each school. The report crosses the spectrum of debates in the sciences, social sciences, humanities and creative practice.

'Support' is the basic expectation for the built environment, which is to say that it will hold up – structurally and socially. Support, Roberts argues, must be an essential foundation for ethical matters at The Bartlett, too, across a continuum of research, teaching and enterprise – from the smallest ethical practice of treating a respondent with dignity to assessing funding decisions with transparency.

The interviews revealed the depth and breadth of expertise, experience, good practice and innovative teaching of ethical matters that already exists across The Bartlett. But to ensure that ethical practice is consistent across the faculty, the report calls for support in five key areas: first, vision to integrate ethical procedures within the faculty's research strategy; second, guidance for staff and students in making ethical decisions; third, collaboration to act in mutual support; fourth, support for staff and student wellbeing; and fifth, giving staff autonomy in ethical deliberations as appropriate to their expertise.

Thinking through ethics presents an opportunity to grapple with ideas of enduring value, compelling staff and students to question their ethical position and expound what kind of practitioners they want to be. The Bartlett Ethics Commission will progress from this initial mapping exercise to develop interactive resources to support built environment researchers engaged in ethical deliberations and decisions.

The Bartlett can take a lead by approaching ethics not as bothersome red tape but an opportunity to enrich research and educate with reflexive curiosity and critical investigation. This proactive stance will allow us to confront how The Bartlett can ensure its principles of autonomy, creativity, equity, integrity and sustainability inform ethical practice across teaching, research and enterprise.

“It is hard to find any evidence of an SPA for climate change, at either national or international levels”

05 Taking the fight to climate change – on time and on budget

Climate change isn't just a scientific problem or a political challenge – it's also a management issue. And there's a lot project management can do to address the threats it poses.

December 2015 saw virtually all the world's nations sign an agreement, now ratified as legally binding, to limit the rise in the Earth's ambient temperature to 2°C above pre-industrial levels, and preferably to just 1.5°C. Positive though this was, there was almost nothing on how countries planned to achieve this target, nor was there any requirement to monitor and report progress in achieving this goal.

Roughly 25% of OECD countries' GDPs is delivered by projects. Developed in the US defence-aerospace sectors in the 1950s and 1960s, project management was initially largely sheltered from environmental issues. Over the years, however, there have been many examples of projects being knocked off course by environmental issues. In the 1990s, sustainability became mainstream practice. Now the focus is shifting to the more existential crisis of climate change.

The Intergovernmental Panel on Climate Change (IPCC) calculates there is only a 50% chance of hitting the 2°C rise by 2030. To achieve this, everyone will have to cut CO2 emissions: six to four billion tonnes for developed countries – essentially halving their emissions; 15 to eight billion tonnes for developing countries. And of course things do not suddenly stabilise at 2030; we shall have to continue monitoring emission rates and, in fact, tighten targets further, to zero and into negative emissions. How can project management help in this? We can begin with the management of the overall effort, at national and international levels.

First, it can bring greater focus and drive through the creation of a 'Single Point of Accountability' (SPA). This is the place where all actions relevant to achieving a project's objectives are focused. It is hard to find any evidence of an SPA for climate change, at either national or international levels.

A second fundamental support practice in project management is a PMO – a project or programme management office. At a minimum, this is the function that keeps information on the progress of projects being worked on, but it also acts as the keeper of best practices in the enterprise. Here, too, there is hardly anyone who has such a function for addressing climate change. The possibility exists, surely, for a pre-formed PMO to be prepared at the UN level down to help countries get started.

Climate change actions can be divided between those aimed at mitigating greenhouse gas emissions, such as replacing 'dirty' power generation plants such as coal, with clean ones such as gas or renewables, and those addressed at adapting facilities to the consequences of climate change, such as flood management. Much, maybe the majority, of mitigation projects addressing carbon emissions are doing so on a business-as-usual basis – such as developing electric vehicles – possibly boosted by 'change projects' that focus additionally on behaviour and people skills.

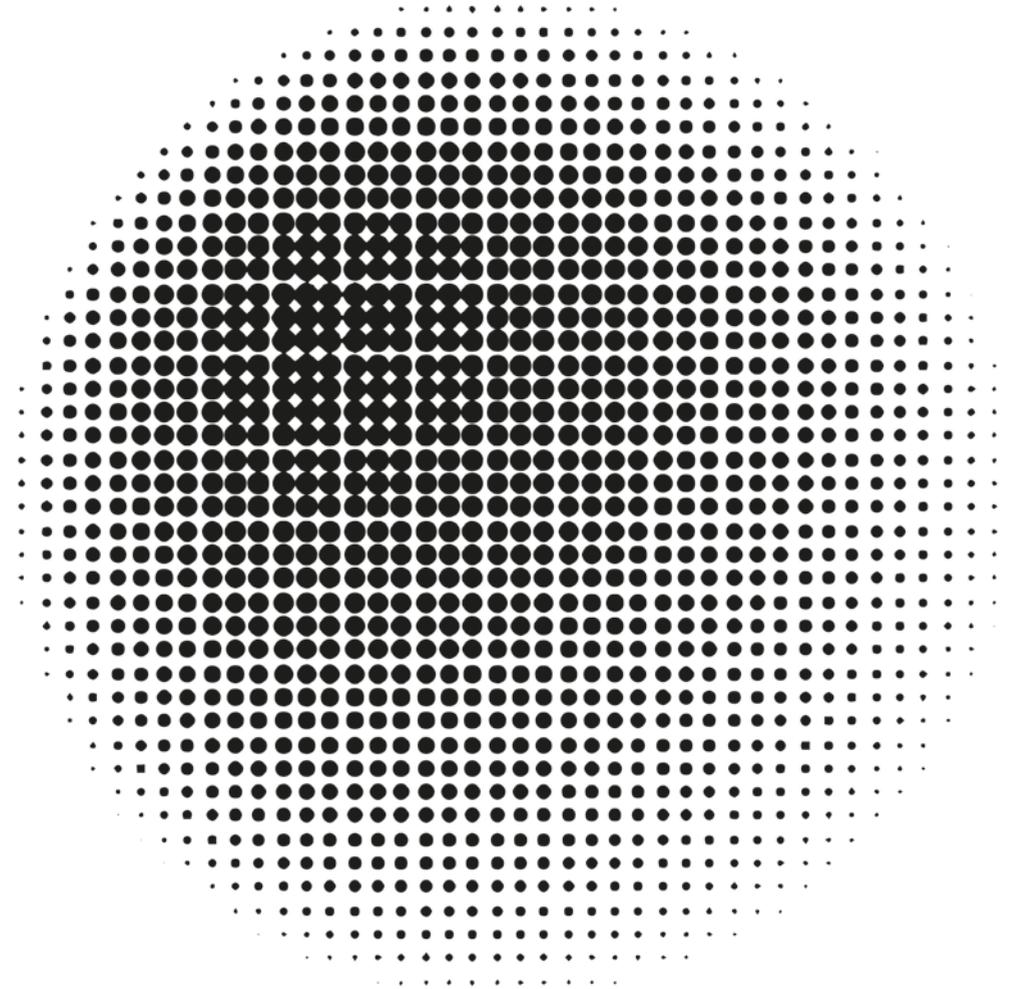
At the other end of the mitigation spectrum, project management has a role in big R&D projects, particularly in the energy sector, notably carbon capture and storage (CCS) and nuclear fusion. Many are investing a lot of hope in CCS, but there are technical, commercial and managerial issues, and so far CCS is not commercially viable. Hopes for fusion rest on a giant global project in France, Iter, which is late and over budget. We are still decades away from operational fusion.

Nuclear fission is really an adaptation technology. It is dirtier than fusion but is seen by most as a core response for meeting climate change goals. Yet the technological challenges are enormous: it is very, very expensive and, managerially, of world-class difficulty. The tortured negotiations between Electricite de France and the UK Government to build Hinkley Point C is proof of how complex the issues are.

Currently, we don't have a plan for addressing climate change in the UK. We do have the National Adaptation Programme and a National Infrastructure Delivery Plan, but they are weak – little more than lists of risks and responsibilities. There is not the energy and drive needed to address the urgent challenges of climate change.

Project Management can, and is, contributing significantly in responding to climate change effectively. In doing so, it is revealing several areas of new development and promise in the discipline. That's fortunate because climate change isn't just a scientific problem or political challenge – it's also a management issue. Project management integrates the work of other disciplines to deliver managed change effectively. And that's what we need right now.

“Our programmes are structured so that students feel that the way they operate here in academia has a legitimacy in the world outside the campus; that they will have the skills to contribute to the direction of their profession, not just be a servant to it.”



06 The future of practice

Where does architecture education go from here? With four new programmes starting in 2016/17, a new home at 22 Gordon Street, and a collaborative space with UCL Engineering at Here East, The Bartlett School of Architecture believes there's no single answer – and that's the point.

We have to remember that 'professions' are fundamentally a concept, and certain concepts that pass through centuries need to evolve. At a certain point, the core concept of a profession becomes outdated – it reaches a point where it needs to be reformed. Within the architectural profession, there's a strong case to suggest that we're at that point now. The terms that define the architect and the educational criteria that meet that definition are too narrow in comparison to the challenges and opportunities of the 21st century. On that basis, architectural education, particularly accredited architectural education, needs to be more flexible; it needs to open the door to others who have chosen a different but complementary pathway and broaden its expectations on where great architecture may be imagined, researched and delivered.

In many ways, this is about shifting the emphasis that presently lingers over the individual towards increasing the emphasis on a collaborative discipline, made up of diverse individual talents and expertise. In the past, the dominant myth was of this ideological figure that would set up a practice, win lots of building projects, publish monographs, and win medals. In reality, the discipline, and indeed the subject, is very broad – and it's not always about building buildings. It is engaged with urban design, innovation, engineering, computation, history, theory, manufacturing, performance, theatre, film, gaming, policy-making, material science, environmental design, landscape, and the many worlds within writing, drawing and making. We have students now who are able to flip between these different modes with ease, and still regard all of it to be architecture. They are the generation that will redefine the profession and fulfil Donaldson's analysis of 1842, which described architecture as "wandering in a labyrinth of experiments".

"At a certain point, the core concept of a profession becomes outdated – we're at that point now"

As a long-established and a highly successful school, we have an obligation to be vocal and active where we believe changes need to be made. Schools are not training grounds, they are testing grounds. They exist to open minds, to envisage the future and to provoke the world to respond and interact. In part, that's what our new programmes starting in 2017/18 are getting at: the MArch in Design for Manufacture, the MArch in Design for Performance and Interaction, the MEng in Engineering and Architectural Design, and the MA in Situated Practice, all reflect the many different ways that architecture and the architect can be defined.

Look at what's happened in the past two decades. The construction industry is notoriously vulnerable to boom and bust, but the design professions have survived these cycles by becoming much more diverse and entrepreneurial. Most successful design agencies now have a mixed portfolio of projects and clients – they're not all occupying the same space at the same time. What this reveals is the architect's capacity to adapt and augment their expertise across many fields, and The Bartlett has been a highly influential testing ground for graduates in this regard. Our strategy has always been to approach architecture as a living subject, one that is intimately involved with and relates to the world outside the campus – from engagement with the arts as well as industry, from exploring histories of the past to narratives of the future, and by experimenting with all forms of representation and making.

At The Bartlett, our programmes are structured so that students feel that the way they operate here in academia has a legitimacy in the world outside the campus; that they will have the skills to contribute to the direction of their profession, not just be a servant to it. We are very lucky that, thanks to our position in London, more than 50% of our 260 staff work in practice. So it's not a case of 'practice' being 'them' and 'academia' being 'us'. We're all a bit of both.

Employers have welcomed the new programmes; they think it's been a long time coming. Take the four-year MEng in Engineering and Architectural Design, for example. We involved industry from the beginning in creating the strategic proposal for this course. This will appeal to students who feel their motivation for getting into engineering is because they like design, and because they want to experience the subjects of engineering and architecture bouncing off one another from the first year onwards.

07 How universities can be better neighbours

Higher education institutions should listen to those who are less powerful when planning expansion, says Clare Melhuish.

Cities globally face grand societal challenges that often seem intractable. But universities have access to networks of knowledge, power and finance that they should be able to pull together to develop models of inclusive urban development, offering access to space and amenities that encourage urban mixing and generate opportunities for a wide cross-section of society, not only academics and students.

Of course, there is a body of opinion that would maintain that universities' primary role is to deliver higher education and routes into gainful employment for their increasingly high-fee-paying students, and question why they should take on the job of regenerating cities. Many universities have already come up with their own answers to that.

The key drivers for university development are lack of space, competition with other institutions to attract and retain the best staff and students, and the need to generate diverse additional income streams, especially through research translation and professional training opportunities. Effective spatial development, which generates a healthy relationship with surrounding urban areas and communities, and other urban agents (city councils, local enterprise partnerships, third sector groups, and regional development agencies), is increasingly recognised by higher education institutions as fundamental to achieving all these goals.

Historian Thomas Bender has compared urban universities to immigrant neighbourhoods in US cities, where residents live both in a local place and in a trans-local, diasporic culture at the same time – grounded, while globally connected. From this perspective, universities need to develop a long-term view of how they nurture and evolve those everyday interactions, as embedded urban actors with a commitment to increasing the positive social impacts of their property assets.

In the US, where universities have been proactive in urban renewal since the 1960s (not always successfully), and have widely embraced the role of “anchor institution” as part of their civic mission, both New York University (NYU) and Columbia University are actively engaged in substantial spatial development plans, shored up by negotiated deals with their urban neighbours that have been years in the making.

NYU, for example, which wants to reshape its Washington Square campus as a central symbolic site for its identity as a “global network university”, has, through “hundreds” of meetings with local stakeholders, faculty and students, agreed 7% community use of its site, with a further option for the city to build a school. It also set up an internal working group made up of faculty and management to share information and solicit feedback while “reimagining the university’s mechanisms for governance”.

The UCL Urban Laboratory’s case studies on Durham University’s Stockton campus and Newcastle University at Science City demonstrate that UK academics undoubtedly have an appetite for participatory methods of engagement with the hopes and aspirations of different groups of urban neighbours, and projects for spatial co-production, but that problems with internal structures and mechanisms for visioning and communication need to be resolved. It is not clear whose job it should be to oversee and coordinate, and how resources should be allocated to these processes, nor how to involve communities in discussions at an early stage and retain their input over time.

Well-established university-community forums, combined with long-term university engagement with planning authorities, and an effective interactive website, as modelled in the North West Cambridge development by the University of Cambridge, set a preliminary example of how to build local people and local planners into these conversations and draw on their expertise and local knowledge to shape universities’ own visions of their urban identity and relationships with their host cities.

Finally, universities need to recognise the value of appointing good quality masterplanners and architects with design expertise, but also experience in stakeholder engagement, and a willingness to load the fee on the side of working with the client to develop the brief, programme and narrative.

This was the case with Newcastle’s Urban Sciences building, following the university’s decision to take a design competition route. Cambridge also opted for procurement on its North West project via a Royal Institute of British Architects competition, consolidated in a rigorous design review process conducted by a panel representing a cross-section of internal and external interests. For the city council, this has represented a great opportunity to raise the bar on quality for other developers across other sites, setting up the university development as an exemplary model.

Certainly, universities seem to retain the advantage of being perceived by the public as relatively trustworthy, with long-term interests to sustain, compared with the average cut-and-run developer. But that is a reputation that they could exponentially enhance by developing more effective strategies for embracing and acting on the views of their more vulnerable urban neighbours.

This is an edited extract of 'In urban development, universities can be better neighbours' by Clare Melhuish, first published online in *The Times Higher Education* on April 2, 2016.

08 Culture change starts at home

How striving for gender equality can create a culture at The Bartlett that works best for everyone.

When first learning of the Athena SWAN Award, I was sceptical. My assumption was that it would be a form-filling process that would symbolise progress towards gender equality, but in reality do little to bring about genuine change. I was pleased to be proven wrong. The process demanded a thorough, evidence-based understanding of issues and convincing, realistic solutions.

Athena SWAN is a charter founded in 2005 in order to address imbalances and therefore promote the careers of women in science, technology, engineering, maths and medicine (STEMM). From 2011, when the charter was linked to research-council funding, it gained significant momentum.

For The Bartlett, there is no mandatory requirement to apply for an award. What's more, the application isn't easy. It requires time, resources and commitment to develop a genuine understanding of the issues and to build a team with purpose and commitment to implementation in order to meet the goals set.

It's obvious that there are gender imbalances at The Bartlett: only 18% of our professors are women. And what happens within our faculty – the habits, patterns and behaviours – contributes to a broader systemic under-representation of women in the built environment professions. So by being able to identify and address the root causes of this, we aspire to be a catalyst for culture change across the built environment. We are in a position to, and I would argue have a responsibility to, influence our peers across the higher-education sector, as well as our industry partners. But we must start at home, with us.

A more diverse staff and students body will enable us to do better work. Fact. Or view it the other way: our current lack of diversity is limiting our ability to fulfil

“We aspire to be a catalyst for culture change across the built environment”

our potential. Countless studies prove the business case for diversity. A study by IBM in 2014 proved that organisations with strong diversity and inclusive working environments had half the staff turnover, double collaboration, triple productivity and quadruple innovation compared to organisations that don't.

It was a proud moment when The Bartlett received the Athena SWAN Award in October 2016. It was the culmination of 12 months' hard work from 21 self-selected individuals from across the faculty. It also signalled the start of a much longer journey. The Award recognises that The Bartlett has a clear picture of the issues it faces with regards to gender equality.

We've crunched student and staff numbers, conducted a survey and held interviews. Some issues were easier to quantify than others: under-representation of women in senior roles might not be difficult to spot, but identifying that undergraduate female architecture students perform, on the whole, less well than their male counterparts, was more difficult. But awareness isn't enough: we have to be able to demonstrate that we have a plan to understand why these issues happen and how we're going to address them.

So, in architecture, we're breaking down the programme to see if specific parts produce discrepancies between men and women. We're then going to address the way we teach – to ensure that our methods supports all students. The point is not to isolate women, but to create environments that enable all students to achieve the best.

Athena SWAN is focused on promoting gender equality but the majority of our actions address wider issues around transparency, inclusion and diversity. For The Bartlett, the consideration now is how to use these outcomes not just to further gender parity but to create a culture that works best for everyone.

The newly formed Equality, Diversity and Inclusion Group is the forum in which the Athena SWAN actions will be driven forward. It's also where The Faculty will begin to identify and prioritise actions that, once implemented, will not only address issues of gender inequality, but racial inequality too.

09 Lighter, cleaner, more cost-effective

A paper published in *Nature Climate Change* in 2016, reveals cost-effective ways to reduce emissions from passenger aircraft to 2050 – and the aviation industry is listening.

Reports of significant recent growth in CO₂ emissions from air transportation have prompted government and industry to start implementing mitigation measures and targets. Most recently, we've seen the International Civil Aviation Organisation (ICAO) adopt a fleet-based CO₂ emissions offset scheme for international operations. But, in the absence of rigorous cost analyses, mitigation policies can be economically wasteful, making them even less attractive to the commercial sector.

In a joint effort with colleagues at the NASA Ames Research Center and the MIT Lincoln Laboratory, the UCL Energy Institute identified the cost-effectiveness of CO₂ emission reductions from narrow-body planes, often called 'the workhorse of passenger aircraft'. Reducing CO₂ emissions in aviation is often thought to be more challenging, and thus expensive, compared to other sectors. So our results were surprising.

Historically, energy and CO₂ emissions 'intensities' from aircraft have already declined drastically. We measure this intensity as energy use or CO₂ emissions per revenue passenger-km. Or to put it another way: it's the amount of CO₂ emissions each paying passenger is responsible for over a particular flight distance, say, from London to New York.

US data suggests that between 1970 and 1980, both intensities declined at a rate of nearly 5% per year and then 2% per year due to improvements in engine efficiency, aerodynamics and better use of aircraft capacity. Despite these past achievements, we identified opportunities for further reductions, at about the same rate of improvement, at least through to the middle of this century.

Basic physics dictates that energy-intensity reductions result from more fuel-efficient engines, improvements in aerodynamics, lower structural weight of the

aircraft, and a better use of aircraft capacity. The CO₂ intensity can be reduced further by using fuels that contain less carbon and thus are less CO₂-emitting over their lifecycle (which includes the provision and combustion of the fuel).

Using academic studies, industry sources and our own calculations, we derived the potential for reducing energy and CO₂ intensity – and the cost incurred – from all of these factors. We then introduced these mitigation options into our model to estimate the potential reduction in emissions we could achieve for the entire US narrow-body aircraft fleet and at what cost. Our fleet composition and CO₂ emissions model accounts for the evolving age structure of the fleet and allows for a realistic simulation of the introduction of improvements to existing aircraft (retrofits) of a specific age group (cohort) and of new aircraft generations.

While there is no silver bullet, we find that a combination of measures could reduce current levels of lifecycle CO₂ emissions per passenger-km by around 2% per year to mid-century. These mainly consist of technology improvements to current aircraft and future designs, complemented by advanced air-traffic management measures and enhanced airline-operational strategies.

The anticipated intensity reductions would occur at zero marginal costs for oil prices between US\$50–100 per barrel and thus continue the recent historical trend. What's more, the compounding effect of a 2% per year reduction in intensity means that, by 2050, CO₂ emissions would only be half of today's value. Even larger reductions are possible, though these could impose extra costs on industry and require the adoption of biomass-based synthetic fuels.

“Many in the industry have already started to pursue all of the options we identified”

In line with our findings, many in the air transportation industry have already started to pursue all of the options we identified as being cost effective. Some of these measures, such as blended winglets, are already being adopted.

Many others are likely to be introduced into existing and future models once they become available, thus assuring a continuous decline in operating costs (all other factors being equal) and an increase in industrial competitiveness.

As impressive as the intensity reductions may appear, there is a caveat. From a climate perspective, we need to look at the 'absolute emissions level'. This requires making assumptions about the growth in passenger travel and aircraft fleets. In the mature US market, continued growth at a rate of 1.5% per year means that a 2% CO₂ intensity reduction would still lead to a CO₂ emissions reduction of 0.5% per year – a 10% emissions reduction by 2050. But much higher demand growth rates in emerging markets – especially Asia and Latin America – will almost certainly lead to a continuous growth in CO₂ emissions globally.

Emissions from these markets can only be offset in other sectors. So until ongoing research and development enables radical changes in aircraft technology that help make possible absolute emissions reductions over the long term, there remains a need for offset programmes such as the ICAO's.

10 Life imitates architecture

In a year in which The Bartlett's flagship building – 22 Gordon Street – will be reopened, Rebecca Spaven looks back at how The Bartlett's own architecture has influenced the relationship between the faculty and its students.

If you stand at the north end of Gower Street in London, home to UCL's main Bloomsbury campus, to the right of what is now the George Farha Café, you'll see a door. You've probably never noticed it before – it's fairly unassuming and now has one of those 'Fire Exit Keep Clear' signs that don't encourage a second look.

If you'd been standing on this spot at night-time 60 years ago, chances are you'd have seen a Bartlett student opening this door with a key and sloping inside for a night of deadline-hammering. You might have seen them come out a few hours later, bleary-eyed with a friend or two, or you might be waiting all night. Some of them slept in there.

Students of The Bartlett School of Architecture who inhabited the old Bartlett Building, in the NW corner of the UCL quad, spoke of it with the warmth and nostalgia of a favoured members' club. A sense of exclusivity and ownership of the space was fostered by final-year students being entrusted with a key to this inauspicious side entrance, free to come and go as they pleased as the rest of the university slept.

This feeling of ownership clearly outlived some individuals' terms as students. One alumna recalled a time when she decided to spend the night in the studio after a long day and woke to find a long since graduated student settling down for a nap after arriving on an overnight train to Euston, clearly having kept hold of his key.

The Bartlett Building was completed in 1914, after a donation was made by a shy and retiring benefactor, Sir Herbert Henry Bartlett. Designed by Professor FM Simpson, the building had generous space and facilities, with a sculpture room and cast gallery and capacious, bright, fifth floor studios. There were no architecture

“Students in 1970 spoke of the building's appealing ‘scruffy, radical image’; another described it as ‘seedy, creaky, end-stage colonial’”

students in the building until 1919, however, as the building was immediately handed over to the government to be used as a temporary hospital for the duration of the First World War.

By the 1970s the building's interiors had been thoroughly worn in by generations of students who, post-1968, had taken to daubing the walls with political graffiti and unsparing criticisms of the staff. Incoming students in 1970 spoke of its appealing “scruffy, radical image”; another described it as “seedy, creaky, end-stage colonial”.

The Bartlett remained in this building until 1975, when Wates House was opened. Recollections from students who bridged the gap between these two homes betray an ill-disguised dismay at the switch, moving from light-filled and spacious accommodation to a honeycomb, siloed space.

A building study in the *Architects' Journal* generously described Wates House as ‘not a disaster’, and it was generally praised for its facilities and the fact that it brought the previously separate schools of Architecture and Town Planning under one roof. Over time, as predicted in the *AJ* article, the building ‘settled down’ and ‘decent grubbiness and indecent graffiti’ obscured the worst features.

Students in Wates House in the late-1970s spoke of a disrespect for the space that nonetheless encouraged a playful and rebellious engagement with it. One group, who named themselves ‘Atelier 43’, hijacked a seminar room, painting every surface black and creating a disorientating space that eventually became absorbed into the school's routine, being used for crits until someone was hospitalised after bumping their head on the low entrance portal.

Bartlett student numbers continued to grow and yet their ambition never seemed to be checked by the constraints of Wates House. Visiting the top-floor library as an Art History student (for the panoramic view as much as the books on town planning history), it always struck me as a building that was used intensively, often past the point where it could cope. Now that Hawkins\Brown have split open the beehive with their designs for an open-plan reimagining of the building, who knows what they'll achieve.

Find essays online at:
ucl.ac.uk/bartlett/review