An original brick from Wates House, home to The Bartlett School of Architecture and The Bartlett School of Planning from 1974–2012. In 2016, having undergone a deep retrofit, the building reopened at 22 Gordon Street (see p.79).

The Gordon Street Klinker was made for The Bartlett’s 22 Gordon Street home by brick maker Janinhoff. Slimmer than a standard brick, it was designed to enable an additional floor to be added to the building and to fulfil a key planning condition from Camden Council for a masonry building in the Bloomsbury conservation area (see p.81).
We are The Bartlett: UCL’s global faculty of the built environment. We develop new responses to pressing world issues.

Published once a year, *The Bartlett Review* is 100-plus pages of groundbreaking thinking and research to have emerged from The Bartlett in 2017 and its impact on the world.

In 2016, we opened 22 Gordon Street, award-winning home to The Bartlett School of Architecture. In 2017, in collaboration with UCL’s Engineering Sciences Faculty, we took possession of a new site at Here East – a cutting-edge space for large-scale experimental and manufacturing facilities in East London.

From urbanisation to automation, energy security to inequality, to shaping industrial strategy and economic policy, The Bartlett’s 13 schools, institutes and centres channel a combined research fund of £12.2m to resolve challenges on a societal scale.
### SHORT STORIES

<table>
<thead>
<tr>
<th>Page</th>
<th>Department/Institute</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>School of Architecture</td>
<td>BIO BUILDINGS</td>
</tr>
<tr>
<td>10</td>
<td>Institute for Sustainable Resources</td>
<td>HEALTH CHECK</td>
</tr>
<tr>
<td>11</td>
<td>Institute for Global Prosperity</td>
<td>FUTURE WELFARE</td>
</tr>
<tr>
<td>12</td>
<td>School of Construction &amp; Project Management</td>
<td>CLEAN GROWTH</td>
</tr>
<tr>
<td>13</td>
<td>Institute for Sustainable Resources</td>
<td>HIGH RISE</td>
</tr>
<tr>
<td>14</td>
<td>Development Planning Unit</td>
<td>THE DISPLACED</td>
</tr>
<tr>
<td>16</td>
<td>Energy Institute</td>
<td>LENDERS REPORT</td>
</tr>
<tr>
<td>17</td>
<td>Institute for Sustainable Heritage</td>
<td>EXPERIMENTAL ART</td>
</tr>
<tr>
<td>18</td>
<td>Institute for Sustainable Heritage</td>
<td>GOOD SPORT</td>
</tr>
<tr>
<td>20</td>
<td>Institute for Global Prosperity</td>
<td>PROSPERITY GAP</td>
</tr>
<tr>
<td>21</td>
<td>Institute for Sustainable Heritage</td>
<td>MAKERS MEETING</td>
</tr>
</tbody>
</table>

### LONG STORIES

<table>
<thead>
<tr>
<th>Page</th>
<th>Department/Institute</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Centre for Advanced Spatial Analysis</td>
<td>DEFUSING THE DEMENTIA BOMB</td>
</tr>
<tr>
<td>32</td>
<td>School of Construction &amp; Project Management</td>
<td>MAKE OR BREXIT: SKILLS CRISIS</td>
</tr>
<tr>
<td>40</td>
<td>School of Architecture</td>
<td>THE MANY LIVES OF DRAWING</td>
</tr>
<tr>
<td>48</td>
<td>School of Planning</td>
<td>THE LANDSCAPE OF POWER</td>
</tr>
<tr>
<td>56</td>
<td>Institute for Sustainable Resources</td>
<td>TURNING THE WATER TABLE</td>
</tr>
<tr>
<td>64</td>
<td>Space Syntax Laboratory</td>
<td>MEET THE DESIGN MACHINE</td>
</tr>
</tbody>
</table>

### ANATOMY

<table>
<thead>
<tr>
<th>Page</th>
<th>Department/Institute</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>Real Estate Institute</td>
<td>IN A CLASS OF ITS OWN</td>
</tr>
<tr>
<td>78</td>
<td>22 Gordon Street</td>
<td>A YEAR ON</td>
</tr>
</tbody>
</table>

### DE-RISKING

<table>
<thead>
<tr>
<th>Page</th>
<th>Department/Institute</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Institute for Innovation and Public Purpose</td>
<td>COST-BENEFIT OUTSOURCING</td>
</tr>
<tr>
<td>94</td>
<td>Here East</td>
<td>BUILT TO SCALE</td>
</tr>
</tbody>
</table>

### LETTER FROM THE DEAN

Professor Alan Penn, Dean of The Bartlett, sets out the drivers behind the global challenges the Faculty is attempting to solve, from rapid urbanisation to automation, and how a combination of new institutes and a radical new space in East London is supporting those ambitions.

### ESSAYS X 9

Enjoy 20 pages of radical thinking from across The Bartlett, including: Edward Denison on the moment Eritrea reclaimed its architectural history on its own terms; Flora Roumpani on how drones are democratising urban planning; Peter Mallaburn on whether we’re about to break the energy efficiency bind; and May Cassar calling on policymakers to recognise the heritage “industry”.
URBANISATION, GLOBALISATION, AUTOMATION, POLITICAL, SOCIAL AND ENVIRONMENTAL DISRUPTION. ALL OF THESE AFFECT THE WAY THE BUILT ENVIRONMENT IS CREATED - AND ALL OF THESE SET CHALLENGES THAT THE BARTLETT NEEDS TO SOLVE. MORE THAN 50% OF THE WORLD'S POPULATION NOW LIVE IN CITIES. BY 2050, THAT FIGURE WILL BE 75%, WITH SOME CITIES' POPULATIONS APPROACHING 100 MILLION PEOPLE.

This urban scale will bring with it challenges – and require innovations – far beyond what we are used to dealing with. If the world is still urbanising, it has already globalised. We live on a single planet with a single scientific culture, a globally-interdependent economy, and, increasingly, a global social and cultural life.

The world is also automating. During the 19th century, more than three-quarters of the global population were tied to the land through agriculture – that figure is less than 40% today and, in the West, it’s just 2%. Automation is accelerating in the manufacturing industry and, more recently, in the services sector. Automation hasn’t hit the public imagination yet, but it will. Robotics and burgeoning artificial intelligence (AI) are starting to transform the way we work, and the way we make and run our cities.

Climate change, energy security, resource depletion, population movement and increasing inequalities have enormous disruptive potential. These, and the resurgent nationalism that we see today – which can be read as a reaction to the confluence of these factors – pose other existential threats to our way of life.

These challenges all have built-environment dimensions that are so large that we will have to focus on them if we are to have any kind of impact. So, over the past few years, The Bartlett has established four new institutes. First was the Institute for Global Prosperity (IGP), investigating alternative models to today’s dependency on growth and consumption. This was followed by the Institute for Digital Innovation in the Built Environment (iDIBE), looking at the impact of digital technologies on the way that we design, build and operate our cities.

In 2017, came The Bartlett Real Estate Institute (BREI), focused on the valuation of intangible aspects of the built environment – the value of design, sustainability, urban placemaking or heritage, for example. The BREI has since launched a centre dedicated to the science behind designing educational spaces and a new Master’s programme in healthcare facilities. By ascribing value to these, we aim to help ensure that investment can go towards the development of public goods.

There are strong parallels here with our most recent launch: the Institute for Innovation and Public Purpose (IIPP). Founded by economist Professor Mariana Mazzucato, IIPP will investigate the role of government and the public sector in delivering innovation. In partnership with a series of high-profile organisations, it is developing a model of mission-oriented public policy, recognising that new ideas and their spillover effects take decades.

The IIPP will provide guidance on how public policy on innovation works best; the culture in which innovative findings can grow; the right kind of state structures to oversee research and collaboration with the private sector; and the right kind of metrics to evaluate fairly the progress of these entities. This work, devised with public policymakers themselves, is not currently undertaken by any other academic institute.

Innovation, then, is political. As automation removes manual and repetitive tasks, employment will shift towards high-value creation through design and the exercise of critical judgement. The UK’s industrial strategy – although largely geared towards mitigating the economic problems that Brexit will create – recognises this.

As AI begins to teach the level of the human mind, humans will still have a role to play, but it will be their ability to collaborate in creative teams – including with AI and robots – that will be vital.

In London, as part of UCL, what we’re trying to do is create the conditions for the next generation of the economy. In 2017, we took possession of a new space for large-scale experimental and manufacturing facilities at Here East in the Queen Elizabeth Olympic Park. Built in a high-specification warehouse space 100m long, 40m wide and 10m high, it makes possible new collaborations between different parts of The Bartlett and UCL’s Engineering Sciences Faculty.

Environmental chambers and structural testing rigs sit alongside robotic cells and fabrication equipment. The space at Here East makes it possible for us to develop ways to intervene in the built environment at extreme scales, from full-scale construction components to tele-robotic engineering at the cellular level. This research and teaching is vital to advancing the skills in design, creativity and collaboration that future graduates of The Bartlett will need to resolve the challenges we face.

It was the late Sir Peter Hall, Professor of Planning and Regeneration at The Bartlett, who, in shaping the vision for the Thames Gateway, made sure that East London would become a strategic part of the city. It feels fitting to me that The Bartlett and UCL should be involved in the next stage of East London’s regeneration. Here East is our first step towards that.
INSIDE: 15 SHORT STORIES SHOWING HOW THE BARTLETT HAS BEEN FORGING CONNECTIONS BETWEEN THE BUILT ENVIRONMENT AND AREAS OF PRESSING WORLD CONCERN IN 2017.
BiotA Lab is designing an architectural bark for buildings that has bio-receptive qualities – a stage set for cryptogams.

"Green walls are our friends and our enemies," says Marcos Cruz, Professor of Innovative Environments at The Bartlett School of Architecture. "They are an important part of greening our cities, but they tend to be unsustainable."

For Cruz, our current concept of green walls has something of the golf course about it: they should be green all the time, regardless of how the seasons change. The result is often a monoculture with little biodiversity that requires enormous amounts of maintenance and irrigation. "We need to look for an alternative," he says, "one where species adjust to the climate and substratum as they do in nature."

This view has fuelled a stream of work at the BiotA Lab – a cluster that Cruz leads within the School of Architecture – experimenting with the idea of living concrete, and has inspired two pilot projects with Transport for London (TfL). BiotA Lab has taken the classical architecture concept of a building’s “skin” and reinterpreted it as “bark”. Cruz explains: “Bark, conceptually different from skin, is not just defensive or decorative, but a three-dimensional host for a self-regulating ecology.”

Every external building surface becomes bio-colonised at some point in time; how much so depends on its bio-receptivity, such as its porosity, roughness and pH level. If conditions are right, cryptogams – an umbrella name for species such as algae, mosses and lichens that propagate via spores – will take over. "They are pioneers," says Cruz, "and spores are everywhere in the air. The clever thing about these species is that during drought, many of them don’t die, they just become dormant. So, as soon as they get a bit of water again, they reanimate – making them virtually indestructible."

Which is why TfL is interested. Bioreceptive walls have the potential to do away with costly maintenance and, what’s more, cryptogams are capable of absorbing vast amounts of pollutants from the air. BiotA Lab’s first pilot project for TfL will run on a retaining wall on a disused platform at East Putney station. A second pilot, at a school in Oval, will explore how the morphology of the bio-receptive design reduces noise from a busy main road running alongside the school playground.

These ideas are also the starting point for a new, two-year Master’s programme in Bio-Integrated Design beginning in 2018 that will bring together architecture and biochemical engineering, encompassing work from the cellular scale to that of buildings.
Researchers at the UCL Institute for Sustainable Resources and the UCL Energy Institute have contributed to the latest report from The Lancet Countdown, demonstrating that, not only is climate change already affecting the health of people across the planet, but also that its impacts are disproportionately felt by the communities least responsible for climate change and by the most vulnerable in society.

Funded by The Wellcome Trust and led by UCL, The Lancet Countdown: Tracking Progress on Health and Climate Change reports annually in the medical journal, The Lancet. Its latest report has found that climate change is already affecting the health of people across the planet, but also that its impacts will disproportionately affect the communities least responsible for climate change and by the most vulnerable in society.

Some of the existing health impacts include an average 5.3% fall in productivity for rural labour, estimated globally since 2000, as a result of rising temperatures. In 2016, this took more than 920,000 people out of the global workforce, 418,000 of them in India alone.

Undernutrition is identified as the largest health impact of climate change in the 21st century. Related impacts of climate change on crop production, referenced in the report, include a 6% decline in global wheat yields and a 10% fall in rice yields for each additional 1°C rise in global temperature. More than 803,000 premature and avoidable deaths in 2015 across 21 Asian countries were attributed to air pollution from coal-burning power stations, transport and the use of fossil fuels in the home.

Despite this, the authors are also clear that responding to climate change can still realise substantial gains in public health.

New report says UK needs to rethink the welfare state for 21st-century challenges.

How the UK’s welfare model functions and how it is funded needs a radical rethink if it is to be fit for purpose this century, says a 2017 report published by the Social Prosperity Network at the UCL Institute for Global Prosperity (IGP).

The report proposes ‘Universal Basic Services’ (UBS) as an affordable alternative to a so-called ‘citizens’ income’ (or ‘Universal Basic Income’) advocated by some economists. The UBS approach builds on the same ethos that established the NHS and public education – that essential services should be free at the point of delivery. The recommendations include a massive expansion of social housing, free bus travel, meal provision for those most at risk of food insecurity and basic phone and internet access.

The total cost of £42bn – representing 2.3% of UK GDP – could be fully funded through changes to the Personal Allowance, making the proposal fiscally neutral, says the report. Those in the lowest income decile would benefit the most – saving the equivalent of £126 per week in costs as a “social wage” if they accessed all the basic services. Focusing on more comprehensive provision of services rather than giving cash handouts also means there remains a strong incentive for citizens to work.

IGP Director, Professor Henrietta Moore, says: “As a society, we already accept that certain services like health and education should be provided free at the point of delivery to the whole population, because we understand that all of society benefits as a result. The concept of UBS is a logical extension of this principle.”

Published on 12 October 2017, the Clean Growth Strategy sets out the UK government’s plan to “lead the way to a low carbon future”. It includes plans to cut emissions in buildings, transport, electricity and heating, and explores energy options to 2050 using the UK TIMES model (UKTM).

The UKTM was developed by the UCL-led research consortium wholeSEM and the UK Energy Research Centre, in partnership with the Department for Business, Energy and Industrial Strategy. It models the whole UK energy system to identify how the country might achieve an affordable low-carbon economy. In the Clean Growth Strategy, the model underpinned analysis of 2050 pathways.

The first objective of the analysis was to understand the range of possible long-term outcomes of three different economy-wide decarbonisation pathways. The second objective was to confirm that these pathways were consistent with the targets set by the fifth carbon budget and the 2050 emission reduction targets.

Dr Paul Dodds, Senior Lecturer at The Bartlett School of Energy, Environment and Resources, and developer of UKTM, says its use in the strategy is, “a great example of how UK energy modelling research can be used to inform important policy decisions, when carried out in an open and collaborative environment with appropriate quality assurance”.

The UCL Energy Institute’s UKTM energy model underpins UK’s Clean Growth Strategy.
Architects’ assumptions may be steering clients away from making sustainable choices for their homes.

Some 87% of the residential buildings that will still be in use in 2050 have already been built. This means that construction projects involving existing buildings will be highly influential in achieving targets for lowering domestic energy consumption. Architects and other construction professionals therefore have a critical role in ensuring that residential projects use energy-saving solutions.

However, research by The Bartlett School of Construction and Project Management (CPM) and the UCL Department of Geography has shown that, when it comes to domestic construction projects, architects rarely discuss the energy efficiency of designs with clients, assuming that reducing environmental impact is not a priority for them.

The study, led by Dr Niamh Murtagh, Senior Research Fellow at CPM, and supported by UCL Grand Challenges funding, examined eight domestic construction projects in detail, interviewing architects and observing design review meetings with clients.

Dr Murtagh found that, while architects are highly attuned to their clients’ needs and preferences, this approach led them to make assumptions based on perceived client priorities. So, for example, while lighting was discussed at length during architect/client meetings, heating was rarely raised. Discussions about warm cosiness in winter and cool shade in summer were often postponed until much later in the construction process.

When choosing whether or not to present energy-efficient options, many architects assumed that clients either wouldn’t care, wouldn’t want to pay, or wouldn’t want to sacrifice space. This is a missed opportunity, says Dr Murtagh: “Energy efficiency could be embedded in architect/client interactions through introducing sustainable design elements by default when there is no cost implication, and including discussions about environmental impact as routine in initial meetings with clients.”

High-rise office and residential buildings use more energy per square metre than low-rise.

Researchers at the UCL Energy Institute have found that electricity use per square metre of floor area is nearly two-and-a-half times greater in high-rise office buildings of 20 or more storeys, than in low-rise buildings of up to six floors. Gas use also increases with height, by around 40%. As a result, total gas-and-electricity carbon emissions from high-rise buildings are twice as high as low-rise.

The EPSRC-funded High-Rise Buildings: Energy and Density project, analysed data on energy consumption from 610 office buildings in the UK and from residential buildings in 12 London boroughs for energy consumed “in operation” (as opposed to “embodied energy”).

Professor Philip Stedman, Principal Research Associate at The Bartlett School of Energy, Environment and Resources, says the increase in carbon emissions with height is seen in buildings both with and without air conditioning. He suspects that the findings are connected to the physical and meteorological consequences of building higher:

“Air temperature decreases with height and average wind speed increases,” he says. “Taller buildings that stand up above their neighbours are more exposed to these strong winds, as well as to more hours of direct sun. Thus energy use for heating and cooling would both be increased. But these hypotheses have yet to be tested.”

The study also found that, in many circumstances, the same densities achieved by tall towers can be achieved with lower-rise slab or courtyard buildings, suggesting that energy use could be reduced by building in different forms.

The resource nexus offers new models to manage global resources sustainably.

In recent years, the concept of the resource nexus has been widely adopted in research and policy circles as a powerful new way of understanding the relationships between multiple resources and their sustainable management.

The nexus approach focuses on five essential resources: water, food, energy, materials and land, as well as the social and institutional connections that surround them – offering a new way to better govern these relationships in an era of geopolitical uncertainty.

The Resource Nexus Handbook, edited by Professor Raimund Bleischwitz, Deputy Director of the Institute for Sustainable Resources, with co-editors Dr Catalina Spataru, Lecturer at the UCL Energy Institute, Holger Hoff, Ester van der Voet and Stacy VanDeveer, provides a comprehensive review of current thinking on the topic. Published in 2017, the book also provides case studies to demonstrate how the nexus can help illuminate issues such as land grabs, climate change and renewable energy, and the growing importance of economies such as China in the supply and demand of resources.

The handbook doesn’t shy away from proposing models for sound governance, and provides tools, methods and modelling approaches to analyse resource use from a nexus perspective.
The need for infrastructure in Nigeria is being used as a pretext to displace low-income communities to release urban land value.

Wellbeing, rather than income, is increasingly used as a criterion to measure development outcomes. For Nigeria—a country that has at times seen sustained economic growth, alongside increasing rates of both income poverty and subjective poverty—wellbeing is the aim of a key development policy: Nigerian Vision 20:2020.

For the past four years, The Bartlett Development Planning Unit (DPU) has been coordinating research under the theme ‘Wellbeing of Urban Citizens’ for the Urbanisation Research Nigeria programme, funded by the UK Department for International Development (DFID).

In 2014, the DPU’s Dr Andrea Rigon, together with partners from Ahmadu Bello University in Zaria, carried out scoping research with strategic stakeholders in five Nigerian cities: Abuja, Kaduna, Zaria, Lagos and Ibadan. The aim was to identify the key issues for urban wellbeing. The findings formed the basis for six further projects covering industrial policy to transport and water poverty.

A key issue that emerged from Rigon’s research was inappropriate planning that serves particular interests and further entrenches inequalities. For the DPU’s Dr Barbara Lipietz and Julian Walker, investigating ‘Urban Infrastructure Projects and Displacement’, this is a key factor underlying the phenomenon of mass displacement in Nigeria.

In 2007, the UN HABITAT Advisory Group on Forced Evictions reported that more than 2.3 million people had been evicted from their homes in Nigeria between 1995 and 2005. Lipietz’s and Walker’s research suggests that displacement continues at a similar scale today.

“There is a massive gap between the sophisticated de jure legal due process governing land acquisition for infrastructure ‘in the public interest’ and what happens in practice,” says Lipietz. “What we see, de facto, is a lot of ‘creativity’ in the legitimisation and governance of displacement, and that raises questions about the covert triggers of displacement.”

One important finding from the research is the critical role of information in this process. The opacity of information means that people’s sense of being able to hold on to the land they occupy is constantly threatened. Working with local NGO Spaces for Change and colleagues at Enugu University, Lipietz and Walker have started to develop a national database of evidence covering cases of infrastructure-driven displacement.

This is no easy task—records are episodic and mainly cover large cities, but Lipietz hopes that this database can be maintained and expanded. “As a next step, we aim to work with Spaces for Change to develop a live database of infrastructure-related displacement which can feed into, and help reframe, the public debate about evictions,” she says. Findings from the six individual DFID-funded projects will be presented in Abuja, Nigeria, in February 2018.
Homebuyers could borrow more if they could accurately forecast their energy bills.

A report published in July 2017 has found that, if mortgage lenders used Energy Performance Certificates (EPCs) to assess home energy bills, maximum mortgage lending could vary by up to £11,500 between the most energy-efficient properties and those that consume the most energy.

Part-funded by Innovate UK and involving a consortium of industry experts, including UCL Energy Institute researchers Ian Hamilton, Peter Mallaburn and Gesche Huebner, the LENDERS project successfully modelled the link between energy efficiency and household fuel bills. By creating a new consumer calculator they were able to demonstrate to would-be buyers the cost benefits of fuel efficiency: it could improve their mortgage affordability assessment, potentially enabling them to access a larger loan.

The LENDERS project, which included the analysis of 40,000 sets of property data, also suggests that the same change in forecasting could release thousands of pounds for those undertaking energy refurbishments.

“Mortgage lenders can play an important role in increasing the value of energy performance and improving the quality of EPC data to help drive increased investment in energy efficiency in UK housing,” says Ian Hamilton, Reader at the UCL Energy Institute. “I can envision a time when lenders will offer mortgages with an additional amount to invest in increasing the home energy efficiency because that will reduce energy bills, freeing more funds to pay back the loan.”

How do pathogens get introduced into urban populations and how do they spread?

Zoonoses are diseases that jump across the species divide from animals to humans. Escherichia coli (E Coli) is a good example of a zoonosis and the focus of an ongoing research programme on the emergence of disease in Nairobi, Kenya.

Called ‘Urban Zoo’ for short, and involving 12 partner institutions in the UK and Kenya, including the Development Planning Unit (DPU), the project aims to map the mechanisms by which E Coli spreads in the city, by combining livestock commodity value chain analysis with a public-health, environmental, social, genetic and ecological characterisation of Nairobi.

As part of the planning, policy and social sciences thread of the project, which includes researchers from UCL Civil, Environmental & Geomatic Engineering and the International Institute for Environment and Development, the DPU is exploring how local environmental hazards interact with food preparation and consumption, and socio-spatial livestock keeping practices in low-income areas of Nairobi.

“We are also critically analysing relevant policies, institutional and everyday practices that are entrenching socio-spatial dimensions of environmental and health inequity in the city,” says Professor Julio D Davila, Director of the DPU, “as well as how those practices are influencing access to land for formal-informal livestock keeping and defining livestock typologies in and around the city.”

Urban Zoo is funded by the UK Research Councils and the UK government’s Living With Environmental Change Initiative, and co-ordinated by the University of Liverpool and Kenya’s International Livestock Research Institute.

New study investigates the links between heritage science and sport science.

The UCL Institute for Sustainable Heritage (ISH) has embarked on a study to assess the risks and of integrating permanent sporting infrastructure into designed landscapes, and how to mitigate them.

For many of the UK’s historic houses, hosting events, such as horse trials in their grounds, is a crucial way to diversify their business. But little is known about how the grounds affect the performance of the horses, or how the horses and eventing infrastructure affect the grounds and any archaeology buried beneath them.

The study launched in May 2017 at Burghley Park, home to one of the UK’s most demanding cross-country horse trials and one of its top 10 most-attended sporting events. It brings together the event’s directors with professionals from social science, equine biomechanics, archaeology, landscape design and historic estate management.

Historically-important open spaces have been instrumental in the evolution of equestrian sports. Today, technology is becoming central to the ability of sporting events to attract visitors and enhance the riders’ experience.

Professor May Cassar, Director of the ISH, says: “We expect that, in the near future, caretakers of historic designed landscapes will need to address concerns on how best to integrate these technologies while maintaining the character and integrity of the landscape.”

Sporting events have become critical to local economies, but sustaining them on these sites will require many actors to use a shared language. By presenting cross-disciplinary evidence, the study aims create a decision-making process that bridges sport and heritage.
Leading scientists and artists are teaming up to research how modern art can best be preserved for future generations.

Much is known about how to conserve traditional art – typically made of natural materials like wood and stone – but little is known about the preservation of contemporary art, which is increasingly digital and made from new materials. The UCL Institute for Sustainable Heritage (ISH) is part of a landmark Nanorestart project, funded by EU Horizon 2020, that could change that.

In an unusual step, a modern artwork was produced specifically for the purpose of scientific experimentation. Engineer-turned-artist Tom Lomax designed Out of the Cauldron (see opposite page) – an intricate piece of digital alchemy that pushes the current limits of 3D printing – as part of a knowledge exchange project between the Victoria & Albert Museum and ISH called Design with Heritage. Lomax made the work freely downloadable, so that it could be reproduced in a variety of materials and be used as a research case study anywhere in the world.

Researchers at the ISH, led by Carolien Coon, subjected the artwork to accelerated testing, discovering that many 3D-printing technologies use materials that degrade particularly rapidly. This is a potentially ominous sign for today’s contemporary art, much of which is produced using 3D-printers and other rapid prototyping methods. The results were published in Preserving Rapid Prototypes: A Review, and include open access to Lomax’s artwork.

“Art is being transformed by fast-changing new technologies, so it is vital to pre-empt conservation issues, rather than react to them,” says Coon. “This research project will benefit both artists and academics alike – but ultimately it is in the best interests of the public that art and science combine to preserve works.”

The work of Coon and others in the Nanorestart project team, will provide a pool of data to help develop new methods of conservation, such as a ‘sunblock’-type coating to protect artworks from light degradation. “As an artist I previously had little idea of the conservation threat facing contemporary art – preferring to leave these issues for conservators and to focus on the creative process,” says Lomax. “But while working on this project with UCL I began to realise that artists themselves have a crucial role to play.”
The London Prosperity Board, a JP Morgan-funded coalition launched by the UCL Institute for Global Prosperity (IGP) last year, has two pilot projects underway across five sites in East London: Hackney Wick, Canning Town, Bromley-by-Bow, Stratford and Heath ward in Barking and Dagenham. The aim of both projects – managed by IGP’s Saffron Woodcraft and led by IGP Director Professor Henrietta Moore – is to gather data from people living there: what does prosperity mean to them and how prosperous do they actually feel?

The first pilot has been looking at barriers to achieving prosperity. “For example, while lots of indicators suggest that prosperity in Hackney is improving, many people who live in the community aren’t enjoying those rising living standards: in some cases, people are living parallel lives,” explains Hannah Sender, Project Manager at IGP.

The second pilot is focused on measuring the levels of prosperity neighbourhoods are offering on an institutional level and whether local people are able to take advantage of them. In both cases, researchers are concentrating on small sites within areas in order to record hyperlocal experiences of prosperity. “A lot of the existing data is at borough or ward level,” says Sender. “It’s not deep enough to give us an understanding of how prosperous people actually feel they are.”

To achieve this, the London Prosperity Board is working with “citizen scientists” to carry out in-depth interviews with residents across the five communities. “Our researchers are paid above the London Living Wage and get training in qualitative research methods, ethics and data responsibilities, as well as data analysis,” says Sender. “The qualitative data gives context to the survey data – also collected as part of the projects – and highlights inconsistencies between the numbers and people’s experiences.”

The findings will be published in 2018. The aspiration is also to create a UCL-accredited programme for working with citizen scientists.


To celebrate its 175th anniversary, The Bartlett School of Architecture organised three landmark conferences last year: the 2016 association of architectural educators (aae) conference; Fabricate 2017; and Drawing Futures.

Research-based education was the theme of the aae conference. “Research is now a measure of success in higher education,” notes Co-Chair Hannah Vowles of Birmingham City University, “and it was fitting that this year’s conference was held at the School of Architecture, widely regarded as a leading in this approach.”

The first triennial Fabricate conference, co-founded by Professor Bob Sheil, Director of the School of Architecture, and Ruairi Glynn, Director of the school’s Interactive Architecture Lab, was held at UCL in 2011. The entire series has now received over 900 submissions from more than 40 institutions in 30 countries.

Fabricate 2017 was held at the Institute for Computational Design and Construction in Stuttgart. Its theme was ‘Rethinking Design and Construction’ and the conference organisers described the chosen projects as reflecting the high-tech strategy in which design, engineering and production are leading to a fourth industrial revolution. The event was accompanied by a book, edited by Bob Sheil, Ruairi Glynn, Achim Menges and Marilena Skavara. To date, the ebook version has been downloaded 30,000 times from UCL Press.

The peer-reviewed Drawing Futures conference explored the notion that, despite developments in technological manufacture and computational design, the act of drawing still plays a central role as a vehicle for speculation. Chaired by Professor Laura Allen and Luke Pearson, the conference inspired 400 submissions from 50 countries (see ‘Drawing to an end?’ p.40).

Trio of symposia explores situated practice in contemporary art, architecture and urbanism.

‘Gateway’, ‘Periphery’, ‘Border’. These were the three locations that made up ‘Edge’, three day-long symposia organised by UCL Urban Laboratory as part of Folkestone Triennial 2017.

The events brought together practitioners and thinkers to consider creative place-making, arts-led urbanism and the use of interstitial spaces in the city. An ‘edge location’ was defined as: “where an area that is known or privileged meets another that is unknown or ignored; a point of balance between contrary or diverse phenomena; a place of connectivity and interaction.” Appropriately for Folkestone Triennial, the chosen sites were connected by the High Speed 1 (HS1) railway.

Artist Jeremy Deller gave the opening address at ‘Gateway’. This was held at UCL’s Gower Street Campus, which was built on the urban/rural edge of 19th-century London – a gateway to learning – abutting King’s Cross – a transport gateway.

At Here East on the Queen Elizabeth Olympic Park, artists Jill Magid and Do Ho Suh presided over ‘Periphery’. With Here East, this previously neglected area of Stratford is now home not only to a park but a cluster of innovators and makers – including The Bartlett.

Architect Frederick Ludewig gave the keynote presentation at Quarterhouse, Folkestone, the littoral edge of South-East England, and the location for ‘Border’. From 1842 to 1992, Folkestone was a major pivot for passenger transport between France and England. With the construction of HS1, it has been given the questionable status of a London dormitory suburb.

Edge was curated by Lewis Biggs, of Folkestone Triennial, James O’Leary, Programme Director of The Bartlett School of Architecture’s new Master’s in Situated Practice, and Kieren Reed, of the UCL Slade School of Fine Art.
AT THE BARTLETT, WE DON'T WANT OUR RESEARCH TO SIMPLY SIT IN AN ACADEMIC JOURNAL TO BE READ BY OTHER ACADEMICS. SO, IN EACH ISSUE, WE COMMISSION SIX WRITERS TO TAKE AN IN-DEPTH LOOK AT HOW SIX RESEARCH COLLABORATIONS ARE HAVING REAL-WORLD IMPACT.
Navigating Dementia: Can a Video Game and Three Million Minds Help to Defuse a Global Health Timebomb?

Words: Sophie Arie
The number of people with dementia, worldwide, is expected to double to more than 130 million by 2050 and, with no cure in sight, people struggle for years with the disease as they become increasingly disoriented and forgetful. The so-called ‘dementia timebomb’ poses a huge challenge to governments and one problem in developing effective treatment is that dementia tends to be diagnosed only when it has already caused extensive damage to brain cells. If there were a test to diagnose it earlier, the potential for treating and ultimately for curing the disease could suddenly grow. That test may not be far off now – thanks to a video game.

“I see a lot of patients that have spatial navigational problems early on,” says Michael Hornberger, Professor of Dementia Research at the University of East Anglia. “But,” he explains, “until now diagnosis has focused on memory problems, which tend to develop later. Assessing navigational skills is hard to do within the physical confines of a doctor’s clinic and there is no norm against which to compare patients.”

Hornberger noticed how many video games involve navigation and wondered whether gaming could be the key to early diagnosis. He began to explore the idea with UCL’s Dr Hugo Spiers, an expert in spatial cognition in the Department of Experimental Psychology, whom Hornberger had met when studying for his PhD at UCL. “I knew I’d have the clinical insight and Hugo would have the navigational insight,” Hornberger said.

Then the two had a stroke of luck. Saatchi and Saatchi, the global advertising giant, phoned Hornberger saying they had a client who wanted to invest in a dementia project. “I thought it was a hoax,” he says, “but I gave them my idea.”

The result was an extraordinary collaboration across academic disciplines in seven different research institutions and between academia and the private sector, through which a team of researchers, led by Hornberger and Spiers, created Sea Hero Quest.

The video game, in which players must complete tasks while driving a pink boat through arctic waters and around tropical islands, has generated a dataset that dwarfs that of conventional dementia research: more than three million people worldwide have played it since it was launched, with huge publicity, in May 2016. The largest previous similar study, according to Spiers, involved just under 2,000 people.

“THERE ARE LOTS OF ASSUMPTIONS THAT PEOPLE CHOOSE ROUTES TO OPTIMISE TIME, BUT THE CHOICE IS OFTEN SKewed”

Dr Ed Manley, Data Analyst at The Bartlett’s Centre for Advanced Spatial Analysis (CASA), played a key role by advising on how to handle the data to ensure it is as robust as possible. A post-doctoral research fellow, Antoine Coutrot, is currently crunching the data, funded for two years by the charity Alzheimer’s Research UK and Deutsche Telekom. “It’s a professionally-made game. It keeps people coming back,” says Manley. “We need people to keep playing as many different levels as possible.”

In the game, players have to find their way through mazes, send flares back to where they came from and chase animals to photograph them. The environments become increasingly complex and disorientating as the player progresses through 75 levels designed to test people’s ability to use a map and remember it, the routes they choose and the decisions they make at junctions. Basic demographic information (age, gender, country of birth etc) was also gathered, anonymously, about all the players.

“‘There are lots of assumptions that people choose routes to optimise time, but the choice is often skewed’"
work on London minicab drivers (which first brought him into contact with Spiers), he found that people often chose routes that passed the River Thames, parks or Euston Road. “What’s interesting with studying navigation in a videogame,” Manley explains, “is that, because we know what people can see at any point, we can get more data on what influences people.”

Manley was brought into the Sea Hero Quest project once it was well underway, but, despite not being involved from start, he has found it hugely rewarding. “It’s harder doing interdisciplinary work. The process might not be as fluent as usual, but the gains are bigger. Generally you’re doing something novel. You’re contributing to a bigger goal. I’ve never been involved in an application of data on this scale, and for health,” he says. “It’s a better outcome for my research than optimising traffic flows!”

Others who do not usually work on health found the experience rewarding too. Three experts in mapping designed landmarks and other features of the game to test people’s sense of direction and decision-making with scientific precision.

“Each level of the game was designed to give a specified ‘intelligibility measure’ – how maze-like and confusing or how navigable and understandable an environment is,” explains Ruth Conroy Dalton, a former senior lecturer at UCL and now Professor of Building Usability and Visualisation at Northumbria University’s School of the Built and Natural Environment, who designed the maps for each level of the game.

Landmarks, such as a big tower on the horizon or a group of penguins, were categorized by colleagues at ETH Zurich and Bournemouth University as ‘highly-salient’ or ‘non-salient’ and then rated for intelligibility according to whether they are situated on a main route or in a more obscure location. “Usually this rating is done retrospectively, to assess how navigable a building or a space is in the real world,” Dalton explains. “What was new here was that we were deliberately trying to design a level with a specific intelligibility value, and place the landmarks accordingly. I call it reverse intelligibility.”

One of the greatest challenges was to find a balance between what’s required to make a game engaging and what the scientists need to get out of it. “At times, the game-makers said ‘you can’t do that it’s really boring’, and we said, ‘you can’t do that, it’s really not scientific,” says Hornberger. “It was painful at times.”

The team went through rounds and rounds of testing to ensure that the tasks, when adjusted to the aesthetic demands of the game makers, would still produce the data needed. And they are aware that some in the scientific community will question whether the results from a virtual study can ever be as reliable as a laboratory study (see ‘Number crunch’, p.31).

The team released their initial findings on a preprint server at the end of 2017. They say it is the largest dementia study ever carried out.
“We now have the data to establish a benchmark for normal navigational skills for men and women at every age in over 50 countries,” says Spiers.

The team believe their research has confirmed crucial facts that were suspected but not previously proven due to the cost and time required to test navigation skills in laboratory conditions.

“We have found that, from the age of 20 onwards, people’s ability to navigate begins to decline,” says Spiers. “Previous studies had studied performance as people get older but this is the first study to look at every age.” The data also shows that men are better navigators than women. The third, more surprising, finding is that people from Sweden, Finland and Denmark were better navigators than others, which implies that the norm against which dementia patients are compared should be different in each country.

Spiers believes that the data may ultimately help to create a test that can distinguish between the many different types of dementia – currently patients are often diagnosed with Alzheimer’s-type dementia solely based on brain scans. He refers to one study he and Hornberger were involved in that used virtual reality to test between Alzheimer’s and frontotemporal dementia. It showed that the frontotemporal dementia patients were good at pointing back to where they had come into a supermarket whereas Alzheimer’s patients were not.

Spiers also believes that, if drugs can be tested on patients diagnosed at the earliest stage of the disease, the results may be more promising than trials have been for existing treatments. Trials could also use Sea Hero Quest, he suggests, to test patients’ navigational skills before and after treatment.

Hornberger has begun trials with dementia patients to develop a diagnostic tool based on the findings from Sea Hero Quest. “I don’t think the game itself will be a diagnostic tool,” he says. “But we’ll be able to extract the most sensitive features to create one.”

Once the team publish its first few papers, Hornberger says, “we hope people will realise that gaming is just a new vehicle for conducting population-level research”.

“Our project shows that a big commercial company can support groundbreaking research and complement charity and government funding streams.”

READ THE RESEARCH

• Play Sea Hero Quest at: seaheroquest.com
• alzheimersresearchuk.org
• “Egocentric versus allocentric spatial memory in behavioural variant frontotemporal dementia and Alzheimer’s disease” (Tu, Spiers, Hodges, Piguet & Hornberger, Journal of Alzheimer’s Disease, May 2017)
THE UK HAS A CRITICAL SKILLS SHORTAGE IN THE CONSTRUCTION INDUSTRY, ONE THAT POSES A SIGNIFICANT RISK TO THE DELIVERY OF PLANNED MAJOR PROJECTS. WILL BREXIT PUSH IT OVER THE EDGE?

WORDS: JOHN MCKENNA
Years of under-investment in construction skills in the UK, so far masked by the availability of migrant labour, risks being exposed as Brexit takes hold. What must the government and businesses do to build a better construction industry for the future?

As Britain makes plans to leave the EU, the government has promised that the UK economy will be boosted by major infrastructure projects like High Speed 2 and the promise to build one million homes by 2020. According to the Construction Industry Training Board (CITB), this promised project pipeline will mean an extra 179,000 jobs created between 2017 and 2021 as the industry grows.

This might sound like good news, but the additional demand for construction jobs comes on top of an estimated 430,000 industry workers retiring between 2010 and 2020 – the Department for Work and Pensions says that nearly a third of the 2.3 million people working in UK construction are aged over 50.

Former Chief Construction Adviser to the government Paul Morrell says the proportion of over-50s in the workforce would be even higher without EU immigration. “If you look at the average age for a typical trade in the UK, they are in the higher 50s,” says Morrell, who has acted as adviser to the government’s review of construction-related Industrial Training Boards, published in November 2017. “That average age is only brought down by migrant labour.”

Across the UK, EU migrant labour accounts for just under a tenth of the workforce, according to the Building on Brexit report, published in July 2017 by the All Party Parliamentary Group for Excellence in the Built Environment (the APPG report). It points out that there are huge regional variations in levels of migrant labour: in London, 54% of construction workers are migrants (189,000 of the 350,000), of whom about half (94,500) are from the EU.

“We have a perfect storm developing,” says Adrian Williamson QC, Honorary Senior Research Associate at The Bartlett. “There is a long-standing failure to train people domestically. Combine this with potentially stopping all immigration from the EU and a major housebuilding programme, and we have got to be heading for a difficult situation.”

**TURN OF THE SCREW**

Brexit may prove the flashpoint, but the storm over UK construction skills has been brewing for some time. For Morrell, the chief culprit must be the industry itself: “There is a market failure because of the extremely fragmented nature of construction,” he says, referring to the industry’s reliance on large supply chains comprised of SMEs, each specialising in one particular area of construction. “Training has always been ‘somebody else’s job’.”

For an industry where some projects can last up to a decade, construction is, adds Morrell, surprisingly short-sighted. “It’s a very reactive industry,” he says. “We don’t build supply chains and we don’t build skills. We wait for the phone to ring and then cobble something together.”

Morrell’s views are backed up by the government-commissioned Farmer Review of the UK Construction Labour Model, published in 2016. The report highlights how construction has the second-lowest investment level of any sector in the UK – ahead only of agriculture (see graphic, ‘Working on it’).

It says that a CITB levy – the only industry-wide training funding scheme until the government’s introduction of an Apprentice-ship Levy in April 2017 – that collects just £180 million in an industry with annual revenues in excess of £100 billion “does not bode well in terms of ability to have any scalable impact”.

In October 2017, following the CITB’s biggest-ever consultation with industry, employers voted in support of the CITB levy. The government’s Building Support: the review of the Industry Training Boards, published the following month, endorsed the levy but called for radical reforms in the way the CITB engages with industry to steer it away from a “money in, money out” culture, towards a “money in, skills out” approach to training.
Aniket’s work at The Bartlett is investigating why it is that, unlike in normal market situations, a pay rise cannot attract people into the construction industry. As well as the job insecurity traditionally associated with the sector, Aniket says he suspects there is also a fear that, in the longer term, certain trades or skills could disappear from construction sites and even move overseas, thanks to offsite construction and automation.

RAISING THE ROOF

For all the storm clouds gathering over UK construction industry’s skills base, there is the odd ray of light. This includes an embracing of digital skills through Building Information Modelling and the first steps towards automation through offsite construction.

Offsite construction might be perceived as a negative if, as Aniket suggests, jobs are seen to move overseas, but if facilities do remain in the UK, it could prove a boon to attracting those previously put off by a career in construction. Part of the industry’s challenge in recruiting the necessary skills, as the Farmer Review highlights, has been an image problem. For those who view a career in the industry as something low-skilled, working outside in a cold, dirty environment, offsite offers the tantalising possibility of turning this perception on its head.

CONSTRUCTION’S MOST WANTED

These are the skills with the highest annual recruitment requirement (ARR) between 2017 and 2021.

- **Wood trades and interior fit out:** 3,850 ARR
- **Electrical trades and installation:** 2,250 ARR
- **Labourers:** 1,980 ARR
- **Painters and decorators:** 1,900 ARR
- **Bricklayers:** 1,600 ARR
- **Civil engineers:** 1,430 ARR
- **Construction trades supervisors:** 1,440 ARR
- **Plumbing and HVAC Trades:** 1,380 ARR

Source: CITB’s Construction Skills Network. Focus is on industry-specific skills, so doesn’t include generic business roles such IT staff and senior executives, which also rank highly.
Offsite construction offers the prospect of the low-skilled repetitive work being done by machines, while humans take on the highly-skilled roles in a clean and warm factory environment. Legal & General’s modular construction factory in Yorkshire was highlighted by the Farmer Review as a glimpse into construction’s future.

At the facility, a trend seen in other industrial environments has also emerged – using multi-skilled workers, rather than those with just one trade. “This is something that trade unions, training bodies and employers have all resisted in UK construction industry,” says Morrell. And yet, multi-skilled workers are seen on plenty of UK construction sites. “We need more transferable skills,” he says. “It is something many of the eastern Europeans working on UK sites have. Most of them can do most of the jobs.”

If the construction industry can reshape its training towards a multi-skilled approach, its workers will become more flexible and adaptable, and more likely to stay with businesses in the long term as the demands of the market change. Meanwhile, the government’s promise to unify vocational qualifications under so-called ‘T-Levels’ may help to increase the supply of young people signing up for construction-industry apprenticeships.

There is also potential to bring in people already in the jobs market and retrain them for construction. For example, companies such as Skanska and Persimmon Homes run schemes to retrain ex-armed forces personnel for careers in construction, helping them transition to civilian life. “We find our ex-military recruits come to us with a wealth of transferrable skills,” says Francis. “For example, they have good self-discipline, know all about following a programme and the importance of working safely.”

The Farmer Review put the challenge for the construction industry in stark terms: modernise or die. It may be that Brexit turns out to be the catalyst for resurrecting the construction industry, rather than its kiss of death.

READ THE RESEARCH:
• “Modernise or Die: An independent review of the construction labour market in the UK” (M. Farmer, Construction Leadership Council, 2016)
THE BARTLETT SCHOOL OF ARCHITECTURE’S SELL-OUT 2016 CONFERENCE, ‘DRAWING FUTURES’, PROVED THAT OBITUARIES FOR THE ROLE OF HAND-DRAWING IN ARCHITECTURE PRACTICE HAVE BEEN PREMATURE.

WE TALK TO THE CONFERENCE CHAIRS AND EDITORS OF ITS EPHONYOUSLY TITLED BOOK ABOUT DRAWING’S MANY LIVES.

WORDS: DOMINIC LUTYENS
In 2012, the Yale School of Architecture held a symposium that posed the loaded question, ‘Is Drawing Dead?’ While its aim – to examine the role of architectural drawing in the digital age – is pertinent, given that architects increasingly use CAD software, its title might seem, to some, unduly fatalistic and sensationalist.

Last year, The Bartlett held its own conference, ‘Drawing Futures’, which addressed the same theme but in a more open-ended, positive way, as its title suggests. “We approached the question from the position of people who draw, so rather than think it dead we thought about what its new lives might be,” says Luke Pearson, Lecturer at The Bartlett, who co-chaired the conference with his colleague, Laura Allen, Professor of Architecture and Augmented Landscape. They also co-edited the eponymous book that accompanied the conference. “It’ll never be dead as it’s such a useful communication tool,” she concurs.

The event attracted over 400 submissions from architects, artists, illustrators, historians and others from over 50 countries wishing to participate. Of these, 25 were invited to be speakers, while the work of 64 was featured in the book. As the book amply demonstrates, architectural drawing cannot be reduced to purely descriptive plans and elevations, for sets of instructions for planners or housebuilders. It’s often expressive and idiosyncratic, and its history is rich and varied. It was the Italian, Renaissance-era author and artist, Leon Battista Alberti, who produced the first written description of Western perspective. Axonometric perspectives – showing a plane tilted at an angle – were popular in the 20th century until the 1970s.

“The biggest change came with computers in the 1990s and the move to digital drawing,” says Pearson. And architects are now looking again at hand-drawing as a skill, as a way of thinking, he says: “Drawing has an unpredictable quality that generates new ideas. Sketching on a computer or tablet is comparatively difficult and computers can change the draughtsman’s personality. At The Bartlett, we have a wide range of approaches. Students are asked to attempt new methods without disregarding past ones.”

Drawing is still valued by architecture practices, Pearson adds: “Architects such as Peter Zumthor make atmospheric rather than functional drawings of their projects as that’s what their clients want.”

**Drawing as Narrative**

For avant-garde, London-based architecture group Archigram, formed in the 1960s, drawing – combined with gloriously lurid collages made of cartoons, photocopies and images scavenged from magazines such as Vogue and Nova – was central. Suffice to say, its images radically broke with traditional architectural drawing. Moreover, Archigram’s pop-art-inspired projects were hypothetical and it regarded architecture – in line with the pop art movement’s belief in impermanence – as transient. Archigram’s most famous ideas included its 1964 Plug-in City – a megastructure into which standardised living units could be slotted ad infinitum – and Cities Walking – giant robotic pods resembling hybrids of insects and machines that roamed the world. The latter was designed by Ron Herron, a former Archigram member. His son Simon, who archived his father’s work after his death in 1994, analyses his contribution to architectural drawing in *Drawing Futures*.

The late-1970s-New-York-themed work of artist Madelon Vriesendorp, co-founder of Dutch practice OMA with her former husband Rem Koolhaas, is also showcased in the book. Like Archigram’s, her cartoons and collages were surreal. Yet hers differ in that they anthropomorphise iconic Manhattan buildings and portray them not as oppressively tall but vulnerable: in one drawing, two skyscrapers lie...
together in a bed, while one cartoon depicts the Statue of Liberty as a woman struggling to leave her bedroom as a huge wave gushes through the door.

One of the conference’s aims was to look at how drawing can, as Allen puts it, “move from being a basic communication tool to a medium with a strong narrative content”, and Vriesendorp’s work is a good example of this.

Yet, despite being imaginative and fantastical, Vriesendorp’s drawings were influenced by research Koolhaas did on Manhattan in the 1970s – his 1978 book, Delirious New York, celebrated the city’s ‘chance-like’ nature. So while Vriesendorp depicts its skyscrapers as vulnerable, in Drawing Futures, she points out that they were once seen as beacons of hope: “They were built largely during the Great Depression. There was a craving for optimism and it produced a celebrity culture, so buildings also became celebrities… They lifted the spirits… The same is happening now. To lift us out of the recent depression, we build iconic buildings, again mirroring celebrity culture. I’m afraid we hopelessly reflect a vision of ourselves in whatever we do.”

DRAWING AS A POLITICAL ACT

By contrast, Croatian-born, Netherlands-based architect and illustrator Jana Culek produces hard-edged, graphic images sometimes paired with text. In 2016, she created three books: A Good Life ABC, A Flat Tale and Pitch. The first represents architecture as a child’s alphabet book (each page features a letter next to a 2D image of an object whose name begins with that letter); the second renders architectural projects axonometrically and in more detail; and the third pictures well-known Dutch projects as they might appear in an academic journal.

The books progressively show a more sophisticated picture of architecture, something which is emphasised by the colour palette: in A Good Life ABC, Culek is restricted to red, blue and yellow (as well as black and white) in homage to the primary colours favoured by Dutch art and design movement De Stijl. Fittingly, this basic palette also evokes the childlike aesthetic of an alphabet book. “Reading the books in sequence allows for a gradual building up of knowledge and understanding of the context, its related visual codes and conventions,” explains Culek.

For Madrid-based publishing platform, HipoTesis, digitally generated architectural drawing has introduced conventions that need to be subverted. Its members have taken issue with CAD blocks – computer-generated drawings of people that are commonly inserted into architectural drawings – first launched in the early 1980s. HipoTesis believes that, while convenient for architects, these standardised, anonymous images have since ossified. It argues that reliance on these blocks limits creativity and fails to reflect social diversity. Its witty response has been to create an alternative, expanded cast of CAD blocks, including one based on Eurovision-winning drag queen Conchita Wurst, homeless people, a gay ‘nuclear family’ and an elderly woman with a Zimmer frame.

“One of the aims was to look at how drawing can move from being a basic communication tool to a medium with a strong narrative content”
These can also be used to challenge the way certain public spaces impose rules on visitors. For example, HipoTesis suggests that including a CAD block depicting a breastfeeding mother in a drawing of a library could raise the question of whether or not she would be allowed to stay there, given that breastfeeding in public is often frowned upon.

The book, Drawing Futures, also acknowledges the value of representational drawing. It includes London-based Jessie Brennan’s powerful 2014 work A Fall of Ordinariness and Light, a series of four graphite drawings of public housing estate Robin Hood Gardens in Tower Hamlets, designed in the late 1960s by Alison and Peter Smithson.

Brennan’s drawings were political – they highlighted the plight of this Brutalist estate threatened with demolition as part of a wider, local redevelopment scheme after a campaign to list it failed. They depict the estate’s facades in several stages of collapse. This is dramatically conveyed by the fact that the paper is crumpled or scrunched up (see p.40–41).

Today, demolition of the estate has begun, but for Brennan, her painstakingly detailed drawings reveal what she calls the building’s ‘materiality’. As such, they fulfil another important function of architectural drawing – to create a record of a building, not simply in a descriptive way, but by revealing something of its life within the space it inhabits.

READ THE RESEARCH
• drawingfutures.com
• Drawing Futures (UCL Press, 2016)
• Drawing Matter archive: drawingmatter.org
• The Drawing Center: drawingcenter.org
WHO’S THE REAL NIMBY?

We all like the idea of major renewable energy infrastructure projects but what about when they’re built next door? A major two-and-a-half-year ESRC-funded study explores why local people feel like they’re still shouting into the wind.

Words: Katie Puckett
Let’s do a thought experiment. Close your eyes and picture a NIMBY: a local resident adamant that an offshore wind farm should not be built in their back yard — a wind farm that could generate many thousands of megawatts of clean, green energy, and stop an equivalent amount of climate-changing carbon dioxide being emitted into the atmosphere. Now imagine that the same person is protesting against a new nuclear power station or against fracking underneath their home. How does that change your feelings about them, and the validity of their arguments?

Weighing local interests against national ones is a fundamental dilemma for decision-makers. When does the impact on local lives, economies and environments become a deal-breaker, outweighing the benefit to the country as a whole? This is one theme of a two-and-a-half-year, ESRC-funded study exploring how the concerns of the public are handled in the fast-track, centralised process for approving Nationally Significant Infrastructure Projects (NSIPs).

NSIPs include transport routes, power stations, offshore wind farms and, more recently, housing, and there have even been proposals to extend the definition to cover major commercial developments. But the research team chose to focus on renewable energy — an area where national policy sets a strong presumption in favour and where local people often find themselves cast as refuseniks in the face of an overwhelming public good.

“There are some very strong narratives around renewable energy, and that feeds into conversations about renewable energy infrastructure,” says Dr Lucy Natarajan, Research Associate at The Bartlett School of Planning. “Other concerns don’t seem to matter in the face of this massive climate-change issue. But even the deepest green person knows that it’s not just as simple as rolling out a whole lot of wind farms.”

Communities often raise many valid objections to a developer’s proposal, which will not always be designed with the purest green motives: “You might think an offshore wind farm doesn’t affect people, but the grid connection needs to come on land, and the developer might just choose the shortest route to save money.”

Natarajan is a member of the interdisciplinary NSIPs project team, with colleagues from The Bartlett, the UCL Faculty of Laws and the UCL Department of Science and Technology Studies. Building on the work of previous studies of the “social gap” between attitudes to renewable energy in general and public responses to actual projects, the team are using close reading techniques and thematic textual analysis to identify exactly how local voices were weighed up in the decision-making process, focus groups, interviews, surveys and planning judgments associated with 12 renewable energy projects around the UK (see map p.53).

For many stakeholders, this experience had been a negative one. “There was a real loss of faith in the system,” says Professor Yvonne Rydin, of The Bartlett School of Planning, one of the project leaders. “Local communities see themselves as relatively powerless and feel that others are more likely to be heard, which does raise issues about the legitimacy of the process. They say ‘it’s just about the birds’. Fish are considered as a species, rather than as a catch for the local fishermen.”

The current decision-making process was introduced in under the Planning Act 2008, and came into force in 2010. It’s designed to be quick: the Secretary of State will decide whether or not to approve a project within 18 months. This decision is based on the advice of the Planning Inspectorate, after an examination that is condensed into just six months. During this time, the developers, statutory agencies, NGOs and local stakeholders present evidence and the proposal is altered in response to objections and concerns. This represents a new attempt to give local people a voice; there was no such opportunity under the previous system, whereas their
Evidence must now be considered alongside all other interested parties.

Herein lies the problem: local people may get to present their views alongside everyone else, but they aren’t on a level playing field. Time, money and capacities are a critical issue. Developers employ armies of consultants to produce evidence and manage the process, and the judgements themselves run into hundreds of pages, the tip of an enormous iceberg of supporting documentation. “One of our interviewees said he had four metres of shelf space devoted to it,” says Rydin.

Examinations are extremely complex, spanning many legal, technical and scientific issues. Speaking at a hearing is daunting enough, but there is also the challenge of presenting evidence in an acceptable format. “We have a case where a local person had gone to the effort of keeping a sleep diary and presenting it, but it’s not considered acceptable compared to the type of evidence produced by the consultants,” says Rydin. “That’s in a particular format that makes it look like scientific evidence, and local people find it very difficult to do that.”

In fact, the qualitative gap between the evidence of local people and the experts may not be so large. There are a great many unknowns in how a wind farm will affect biodiversity, for example, but this uncertainty is “tided away”, Rydin says, as knowledge is ‘black-boxed’ to stay within the timetable. “If various key parties – the developer, Natural England, the Marine Management Organisation and local authorities – accept a certain piece of evidence, they don’t want to go digging away at whether it’s actually robust or not, they want to move on to some other area that is still to be debated.”

This is what made the project such a fascinating one for Dr Simon Lock of the UCL Department of Science and Technology Studies. “The foundation of my discipline was investigating the extent to which science should be treated as a neutral set of facts, rather than being contingent on social, political and historical factors. That started to break down the clear-cut division between people who have ‘expert’ knowledge and people who don’t. A lot of our work has been about making the case that members of the public do have types of knowledge and experience that should play a part in decision-making.” This has been taken on board in principle at a policy level but, as the NSIPs research shows, not necessarily in practice.

“The impact of wind turbines on bird populations is a very good example,” says Lock. “To understand that, you have to use multiple scientific models about bird migration patterns, wind speeds etc. Those models produce a set of numbers that get fed into the process as if they’re facts, but we don’t go back and look at whether the models are actually fit for purpose. Actually, those models are often evolving and different models give different answers.”

The research team first worked together as part of a UCL Grand Challenges project on governing climate change technologies, convened by Professor Maria Lee of the UCL Faculty of Laws. “The NSIPs process is incredibly rich in terms of the empirical material available, and it’s a very lively place to look at the ways in which we construct legal reasoning,” says Lee. “On issues such as biodiversity, the law demands that we create a technique for knowing something, opposed

“A lot of our work has been about making the case that members of the public do have types of knowledge that should play a part in decision-making”
LOCAL VOICES
What is it like when a wind farm is built on your doorstep? The NSIPs research team held a series of focus groups to capture people's experiences of the planning process for Nationally Significant Infrastructure Projects. These are an edited selection of their comments.

“If it’s proven that there are effects on the local community, will they ever take those things away? No, they won’t, no chance!”

“The whole thing felt like a fait accompli. There wasn’t really a consultation process, there was an information process which seemed to be poorly handled anyway.”

“Have you seen how much stuff there is to read? You need a lifetime to sit there and read it all.”

“Dormice and birds were far more important in this planning discussion than people complaining that they have already been kept awake at night by the existing turbines.”

A way of understanding, when actually understanding is impossible.”

Lee was struck by the uncertainty around the impact of offshore wind farms on bird populations: “The reports are littered with acknowledgement that we don’t actually know. Rather than trying to decide how many birds are going to be killed, you decide on a process for getting close enough to something that everyone can live with.”

Meanwhile, the public response is dismissed as NIMBYism. There is little equivalent data on the socio-economic impact – austerity-stricken local authorities do not have the resources to carry out research or to play a major role in the NSIPs process. “The socio-economic aspects are very poorly dealt with,” says Rydin. “For example, we have no idea about whether this kind of development deters tourism, or particular sectors of the tourist market, and what impact that has on businesses. Examining authorities can ask for new research to be done, but they can’t order it.”

One response to all this uncertainty would be to not build any wind farms until we do know. “But that’s not acceptable either,” Lee points out. “That’s one reason why wind farms are such a great example: because there are genuinely competing public interests.”

The research does not propose any easy answers, but it does identify areas for improvement that would at least reassure people that their voices will be heard, such as for central government to provide additional resources to support local communities through the process. Developers may employ a “community engagement facilitator” to keep people informed and listen to their concerns, but, however effective they may be, they are still employed by the developer. Compensation could also be made available for those affected – for example, there is a national arrangement for the fishing industry but no equivalent for tourism.

The affected businesses may be very small, so even a marginal decline could be enough to put them out of business. But should the prospects of a tiny coastal hotel be enough to overturn a major piece of infrastructure? “It seems incommensurate, but on the other hand, these are not just hotels, they’re local communities and economies that are going to change,” say Rydin. “Particularly in rural areas, we’ve been relying on local communities to be the stewards of our countryside. So how is it actually going to be maintained?”

The bigger picture is that there has been a vacuum in strategic planning since the government abolished England’s regional development agencies in 2011. With no nationwide plan for where renewable energy would be best sited, it’s up to developers to propose individual schemes which the government then accepts or rejects one by one. There is no de facto national consensus on which types of community or industry should be prioritised, and where. If there were, it wouldn’t make it easier for people to oppose development, but it would perhaps be more democratically robust.

In this context, major infrastructure projects that will impact a wide area have become a tool for what Natarajan describes as “spatial planning through the back door”. “High-speed rail or major housing developments might have sat inside regional plans before, but now we’re starting to build strategy through those sorts of projects.”

It is even more important that the process for approving these developments is as robust as possible. As Lee says: “It’s important that we keep trying. We will never have a perfect democracy, but we continue to strive for an ever-better democracy.”

READ THE RESEARCH
• ucl.ac.uk/nsips
• “Public Participation and Climate Change Infrastructure” (Lee, Lock et al., Journal of Environmental Law, Vol. 25, Issue 1, 2013)
A new study co-authored by a senior research fellow at the Institute for Sustainable Resources concludes that today’s food system is depleting groundwater reserves faster than they can be replenished. What happens next could determine the future of global food security.

Words: Sophie Arie
A groundbreaking study by Dalin and her colleagues across different disciplines in Europe and the US published in March 2017 in Nature, shows just how dependent the world has become on food that can only be produced using a source of water that is fast running out (see ‘Thirsty crops’, p.60). Food supply chains are long and complex, so even if one country doesn’t deplete its own groundwater, it may import its food from one that does.

By analysing land use, food trade data and the best estimates of groundwater depletion worldwide, Dalin’s team were able to calculate how much groundwater is used to grow food crops (grouped into 26 categories) in each country and then to track those crops (and the commodities they are made into) from their country of origin to where they are consumed.

The team found that “a vast majority of the world’s population lives in countries sourcing nearly all their staple crop imports from partners who deplete groundwater to produce those crops”. Pakistan, the USA and India together account for two-thirds of all the crops other countries import that depend on this unsustainable water source. And that dependence has been growing fast. Between 2000 and 2010, exports of groundwater-depleting crops from the three largest exporters increased by 70%, 57% and 100% respectively.

The study’s findings were so eye-opening that the paper was among the top 4% of Nature’s most-read articles. “Countries are importing water indirectly via food,” says Dalin, who calls this a ‘virtual water trade’. “We now know the groundwater depletion associated with each crop.”

Dalin hopes the research will help countries become aware of how insecure their sources of food are and inspire policymakers, consumers and farmers to seek more sustainable options (see ‘Underground resistance’, p.63). “There is no easy solution though,” she admits. “You could say you’re going to tax groundwater use, but then food prices would go up.”

“We knew there was significant groundwater depletion,” says Yoshihide Wada, Deputy Director of the Water Programme at the International Institute for Applied Systems Analysis in Austria,
who created the hydrological model the team used to estimate water use for individual crops in every grid cell (50km by 50km) of the global land area. “But we didn’t know that countries like Japan, which has no depletion itself, were contributing to global groundwater depletion.”

Wada says that, while people thought countries should work on this individually, now it’s clear they need to try to resolve this globally. “It will take something like the carbon credits system for trading greenhouse gas emissions. We need that type of solution,” he says.

Exactly how much water is stored in the world’s underground aquifers is not known and is too expensive to investigate. On top of this, most countries do not control, keep or share records of how much their farmers use, so researchers have to go to extraordinary lengths to estimate groundwater depletion and recharge.

Nevertheless, around the world, hydrologists have been measuring groundwater use for years and warning of the alarming rate at which it is being drained. At the same time, food security and climate experts have been charting how land is used in agriculture worldwide and which crops are produced and traded between which countries.

“People in the [academic] ‘water community’ and the [academic] ‘land-use community’ have been working on this in parallel,” says Thomas Kastner, Senior Scientist at the Senckenberg Biodiversity and Climate Research Centre in Germany, who helped refine the calculations using an algorithm he has developed to trace imported food back to its origin. “What’s been really interesting is that now the two [academic communities] are working together and realising the potential.”

Dalin worked with Michael J. Puma, a food security expert at Columbia University who works on predictability for water and food systems at NASA’s Goddard Institute for Space Studies in New York, to analyse United Nations Food and Agriculture Organization data on crop production and trade in agricultural commodities. They then combined this with groundwater depletion calculations from Wada’s hydrological model, which is itself based on painstaking collection of the best available data from academic institutes, the United Nations and governments on everything from precipitation and temperature to groundwater depletion and recharge.

The team validated their findings against those of NASA’s Gravity Recovery and Climate Experience project, which calculates groundwater depletion by measuring gravity levels on the sub-surface of the earth, which vary depending on how much water is under the surface. If groundwater resources were exhausted in major food-producing regions, agricultural production would fall and food prices would rise sharply, all else being equal, Puma explains. Yet, governments and international institutions do not have any plans in place to address this situation.

“The biggest challenge for this type of [academic] work now is crossing between physical and economic disciplines,” says Puma. “We are beginning this conversation with economists. They are now receptive to understanding the sudden weaknesses in the food system.”

**READ THE RESEARCH**

• “Groundwater Depletion Embedded In International Food Trade” (Dalin, Wada, Kastner & Puma, Nature, 543, 2017)
• “Global Modelling Of Withdrawal, Allocation And Groundwater Resources” (Wada, Wisser & Bierkens, Earth System Dynamics, 5, 2014)
1. Introduce food labelling
This would allow consumers to choose products based on their ‘water footprint’. “People need to know, for example, that meat is more water-intensive than crops,” says Dalin. “The water farm animals drink is negligible. It’s the water they consume indirectly, through animal feed, that is a problem.”

2. Encourage efficiency
Because groundwater is free, apart from the cost of pumping it up, once pumps are installed, farmers in some countries are reckless about the volumes they use and waste. Large volumes are lost through leaking pipes and by evaporation from open canals used to transport the groundwater to the fields, for example. “Some farmers ‘flood’ their crops,” says Dalin, “when they could use ‘drip irrigation’ to give their crops exactly the amount they need.”

3. Change farmer and consumer behaviour
Farmers and consumers could shift to producing and eating fewer water-intensive crops and less meat. Farmers could also grow more drought-resistant crops.

4. Get better data
Currently, farmers are not obliged to report how much groundwater they use, governments do not systematically collect this information and, if they do, they do not willingly share it. “Groundwater data is very limited,” says Wada. “We need to work hard to improve that. Sometimes the data just does not exist. Regions that have it should share it. But they don’t want to, for political reasons.”

5. Regulate groundwater use
“Regulation is the only thing that would make farmers use less of this water,” says Dalin. But regulation is tricky and difficult to enforce. California is now attempting to control groundwater use, France imposes temporary bans when groundwater levels are low and India, which not long ago was subsidising farmers to install groundwater pumps to cope with drought, is now considering legislation to control its use.

6. Create a ‘virtual water trade’ system
“We need a global framework,” says Wada, “such as a system like the carbon credits that measure global emissions of carbon dioxide being traded.”

7. Change food trade patterns
Now that governments have clear information on which crops and commodities deplete groundwater, they could change the way they invest in agriculture and adapt their trade patterns to adjust the amount of food they produce and import. Countries with low groundwater reserves could import from water-rich areas, so that they don’t have to produce so much food locally.

8. Produce less food, distribute it better
“Globally we have enough food to sustain the population,” says Wada. “But it is not allocated correctly.” Some 30% of food produced is wasted. So 30% of the water used to produce that food is also being wasted. Dalin suggests food production may be prioritised in places with a relatively stable supply of renewable water resources.
WHAT DOES AI-DRIVEN GENERATIVE DESIGN MEAN FOR CREATIVITY AND PRODUCTION IN ARCHITECTURE?

WORDS: CLARE DOWDY
Beyond optimisation and simple parameter mise its heat signature and material weight. If it is to resist wind strain, and can minimise its shape, software can work out the optimal shape of its roof. For more than a decade, for instance, given databases of designs, from which, with the help of AI, architects can learn and which have the potential to inform their ultimate design choices. These experiments are coming out of research on generative design – which might loosely be described as the place where humans and machines collaborate to create things – and have the potential to change how architects operate, believes David Kirsh, Professor of Cognitive Science at the University of California, San Diego, and a Leverhulme Visiting Professor at The Bartlett’s Space Syntax Laboratory.

Kirsh is part of a conversation between researchers from across The Bartlett – including Robert Aish, Sean Hanna and Abel Maciel – who are collaborating on an inquiry into what they see as the newly-energised promise of generative design. In architectural terms, this approach has been used to solve complex optimisation problems for more than a decade. For instance, given the dimensions of a building, generative design software can work out the optimal shape of its roof if it is to resist wind strain, and can minimise its heat signature and material weight.

However, “generative design is now going beyond optimisation and simple parameter exploration,” says Kirsh, “and this is where it gets interesting and promises to revolutionise creativity and design practices.”

One such piece of research is Autodesk’s Project Dreamcatcher, the next generation of CAD. It is based on an AI-driven generative design engine, which itself is based on a huge knowledge base created through machine learning techniques that classify pre-existing objects that perform functions.

To use Dreamcatcher, designers input specific design objectives which they characterise in terms of goals and constraints, including functional requirements, material type, manufacturing method, performance criteria and cost restrictions. Or, as Mickey McManus, Visiting Research Fellow at Autodesk, puts it:

“Now there’s the opportunity to say, I’m not going to draw what a wall looks like, I’m going to say it needs to be lightweight, to deal with stresses, it needs to create spaces that allow sunshine’, I abstract my goals.”

The system then both creates and searches a vast number of generated designs that satisfy, in varying ways, the design requirements. The resulting alternatives are presented back to the user, along with the performance data of each solution. The designers then evaluate the generated solutions in real time. They can return at any point to the problem definition to adjust the goals and constraints to generate new results. Once the design space has been explored to satisfaction, the designer can output the design to fabrication tools, or export the resulting geometry for use in other software tools.

“When successful, this process promises to radically transform the nature of design and industrial workflow,” Kirsh predicts. That doesn’t mean humans won’t continue to be important to the creative process. “It’s not all that likely that designers will want to use AI to generate designs,” says Kirsh. “Rather, I think they will use it for hints, in structural situations.”

Sean Hanna, Reader in Space and Adaptive Architectures at The Bartlett, backs this up: “AI certainly won’t be taking over,” he says, “because the design trade-offs that go on in an experienced mind are hard to make explicit. The imagination of taking a machine-proposed candidate and turning it into something wonderful can’t be easily duplicated anytime soon. Human creativity and human judgement shouldn’t be downplayed. Good taste is something hard to programme into computers.”

Where AI’s vast databases will be able to help is in imagining scenarios that are beyond human intuition. “Our intuition has always been bounded by our experience,” explains Hanna. “We don’t have intuition about things that are too big to design (such as cities), or too small to see, or that we can’t imagine. But we’re having to design these things more and more. AI can draw patterns that potentially will be the tool to make design decisions for things beyond our intuition.”

Timandra Harkness, author of Big Data: Does Size Matter? and co-presenter of BBC Radio 4’s Future Proofing series, backs this up. “Machines don’t think, in the sense that we think, but they can solve problems we set them in ways we would not think of. So a machine, incapable of original thought itself, could be a springboard to more original thought in human use. As Ada Lovelace [the 19th century mathematician who worked on Charles Babbage’s proposed computer] put it: ‘There are in all extensions of human power, or additions to human knowledge, various collateral influences, besides the main and primary object attained.’

McManus says Autodesk’s goal is “to import work and fields quite far from the field in which the person is initially working. The goal is to begin to broaden the kind of systems you should consider to give you insight.” And when a piece of computer software has access to huge amounts of data, a shift will occur in what sort of recommendations it will make.

Kirsh describes this data opportunity as the magic of mating. “You should get a whole contact sheet [of candidates] and you tick off the ones you like. You could ask to see the next generation, and AI would take two different shapes and try to marry them.”
To explore the ways generative tools change thought, Kirsh ran a five-day hackathon. A group of students, post-doctoral researchers and practising architects were taught how to use two tools: Fusion 360, a state-of-the-art 3D modelling programme, and Dreamcatcher, Autodesk’s generative design programme.

The hackathon’s goal was to explore the way designers change their approach when working with different tools. The participants were split into two groups and were asked to design a number of objects, including a table that converted into a wall divider and a chair that became a bed.

“We asked all the participants to tell us about their design dimensions and how they were thinking about design,” says Kirsh. “We asked them to annotate their intermediate sketches, and to describe the changes they made, and the rationale for those changes.”

Kirsh also points out that new tools typically lead to new solutions. “Every time there’s a new powerful tool, the designs that emerge look different from the time before that tool was invented.” He cites parametric modelling tools.

In schools and universities, the arrival of AI will change the way students are taught. “Design briefs will have to be recast in the more abstract form the tools require,” Hanna predicts. Students will have to learn this translation, and will have to shift their focus towards problem solving.

Could this mean that with AI’s involvement in architecture, a different type of student might be attracted to the discipline? “It’s an open question whether or not architects will have to be different sorts of people,” says McManus. “Anyone could learn this, and we need to capitalise on the learning potential of people. You might have to unlearn things because of automation.”

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“Certain things that had been difficult became easy.” And that is one potential outcome for AI-enabled architecture to which innovative designers will surely look forward.

In the long term, "there could come a time when AI is capable of thinking a bit more like us," says Hanna, "to be able to make ‘reasoned’ judgements, then it could act as an agent in its own right." If that’s the case, then human relationship with AI will be transformed into a more collaborative one. Hanna envisions a time when a computer will be treated as a member of the design team, with a different set of experiences and expertise.

While potential opportunities abound, the arrival of AI in the architects’ studio also throws up questions, particularly around ownership and education. To access software such as Dreamcatcher, designers freely give it access to their early ideas, concepts and intermediate steps. The software would then render that work anonymous and merely sell the patterns back to other users. However, Kirsh points out that “if you’re a great designer, then every trace of your work is worth something. So in the future, people will start saying, ‘you’re making billions of dollars from the information that we’re providing, in aggregate that’s worth a lot!’ That’s a looming user rights issue.”

Meanwhile, if an AI comes to be regarded as a member of the design team, “we don’t know what’s going to happen to the notion of authorship in design,” points out Hanna. Will we go back to the Middle Ages, when Gothic cathedrals were often designed and built by anonymous masons?

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ANATOMY

THIS SECTION GOES INSIDE THE ANATOMY OF THE BARTLETT TO EXPLORE THE BIG STORIES HAPPENING AT FACULTY LEVEL, FROM NEW BUILDINGS AND INSTITUTES TO 2017 IN NUMBERS.
Today’s real estate model is increasingly limited in its scope and lopsided – favouring the provider over the consumer. A new institute at the Bartlett aims to create a concept for the sector that’s fit for the 21st-century city.

Words: Hugo Cox
If you ask Andrew Edkins what is wrong with the current real estate paradigm, you will see his eyes lower, his brow furrow and the sort of shrug that says “where do I start?” He is, he admits, something of an iconoclast. It is no wonder, therefore, that his solution to the problem – The Bartlett’s new Real Estate Institute (BREI), which provisionally launched in July – looks radical.

The vision is to create a cross-disciplinary “sand-pit” made famous by innovation initiatives and the tech industry, upending the traditional silos that separate the real-estate professions – developers, engineers, financiers, architects, designers and so forth. This result, Edkins hopes, will dislodge the current fixation on the needs of those who supply property and replace it with a model of value based around those who use it or are affected by it.

UCL – and The Bartlett in particular – is a natural place to house such an endeavour. Both The Bartlett and Edkins himself have proved the commercial value of a well-run cross-disciplinary approach with the rapid growth and success of The Bartlett’s School of Construction and Project Management, of which Edkins was Director for four years until 2016. This part of the faculty has become a powerhouse for teaching, research and collaboration with a wide range of external parties since it launched in 2009.

A PRESSING NEED

On the face of it, new ideas and knowledge are much needed if the construction industry – and the wider built environment – is to improve the productivity of this sector and influence the wider UK economy. For one thing, Brexit seems to have hobbled the industry. In November 2016, barely five months after British voters had chosen to end the UK’s EU membership, a survey of UK building firms found that a weaker pound had driven cost inflation to its highest level since April 2011. Meanwhile, thanks to the UK’s ageing population and the continued squeeze on UK housing supply, the construction industry will need to recruit 400,000 people per year to build the houses the country needs, according to construction consultancy Arcadis.

However, tighter immigration controls following Brexit will mean a smaller pool of workers to pick from. At the moment, one in eight UK construction workers is a foreign national – in London the figure is nearly one in four. If a hard Brexit extends the points-based immigration system to EU citizens, 215,000 fewer of them will have joined the UK’s construction industry by 2020, says Arcadis.

 faced by numbers like these, you’d imagine, the industry could do with some blue-sky thinking around the value of conventional wisdom related to the finance, design, construction and use of buildings. “The need for a new approach has never been more pressing. The Institute couldn’t be launching at a better time,” says Edkins.

ANALYSE THIS

One thing that will hinder the real-estate sector’s ability to improve productivity is an increasingly incomplete measurement model – a problem the BREI will be focused on rectifying.

Given the growing recognition of the importance of factors like design, environmental impact and employee contentment and productivity on the commercial benefit of a building to owners and users, it is perplexing that there is so little agreement on how effectively to measure the value they each confer. While, elsewhere, successful innovators have refocused businesses’ processes around building a product perfectly matched to what customers need, real estate’s creaking model owes more to Adam Smith than Apple.

“The professions involved in the built environment still focus on the building as an object whose value is conferred in the process of manufacturing – closed, tangible and financial,” says the BREI’s Peter McLennan. “Service elements remain, largely, valueless.”

The result is that evaluating the quality of a building beyond a few simple financial metrics is rare. Measurement models employed by the various disciplines – from financiers and developers to planners, architects, other designers and engineers – typically fail to capture a building’s worth to those who use it or who are affected by it. The result is that questions of the value uplift of excellent design, the impact of effective place-making and the role buildings have in tackling climate change and economic productivity are not well understood.

While often viewed as a purely social problem, this framing shows clearly that the effective measuring of a building’s value is also a commercial problem. A few forward-thinking employers
Even adding the simple dimension of productivity is rare, meaning that the traditional focus on occupancy levels and yield can quickly create false economies. Fitting double the number of people into an office by knocking down the internal walls isn’t much good if they become half as productive as a result.

Real estate’s standard model of value stands in stark contrast with much of contemporary industry, which carefully measures concepts of value focused on the contribution of people – both employees and customers – processes and intangible concepts like brand. The BREI is keen to engage and learn.

“In recruiting the services of teaching and research staff, the BREI is looking even further. This ambitious remit means a combination of teaching staff you wouldn’t have seen at The Bartlett before. “In making the BREI work, we will be reaching beyond the industry’s traditional silos as we want to tempt professionals from industry, from the third sector and from government – both local and national,” says Edkins.

Students, too, can expect a practical education. The BREI’s first Master’s course, to launch in the academic year 2018-19, will explore the issues facing modern healthcare service delivery within a fixed set of healthcare buildings, to a changing healthcare service. “Practical understanding will be at the core of the other courses, too,” says Edkins. “The BREI is going to start with a clear focus on topics and activities designed for practitioners, in the private, public and third sectors.”

Precisely at the time the BREI is preparing to supply new answers to the question of what is value in real estate and how to measure it, the old answers are looking particularly fragile.

Especially questionable is the assumption that the UK’s current model of urban regeneration benefits an area’s poorest inhabitants. This idea, long trumpeted by developers – and more appealing than ever to austerity-era governments on both left and right – sounds compelling. Replace spent housing estates with modern, dense developments in which high-end private and affordable flats are combined, with developers profits from the former helping to subsidise their costs in building the latter.

Politically, it seems to make sense, too. If you want to fight housing poverty – as then-Prime Minister David Cameron did when pledging last year to level 100 “sink” estates – why not recruit the private sector to the battle?

In practice, this is an example of a traditional approach to real-estate financing that no longer works. A survey by the London Assembly in 2015 considered the effect of 50 estate regeneration projects over the previous decade on the supply of social housing. While the developments resulted in doubling the total number of homes on the estates, the total number of rented social homes fell by 8,000.

New knowledge is needed to inform government policy. It would seem that, without finding a way to monetise the impact on society of not providing social housing, simply dealing with ‘normal’ yield rates for its development will see social housing provision eventually squeezed out.

The Grenfell Tower disaster highlights the failure in understanding the need for resources over time – namely a reluctance to assess user needs and an economic model in which short-term financial costs are frequently mistaken for value – which the BREI is seeking to rectify.

Grenfell is an example, perhaps, of what happens when business as usual is allowed to happen – namely that the public sector has a hard time justifying, resourcing and managing operational aspects of their real-estate portfolio.

“At some level, the true value of real estate was bastardised here,” says Edkins. “There was a lack of connection between the use of a risky building material and a poor history of public-sector management, maintenance, and repair. The wider issue is how do you design these buildings to ensure that such a regime does not jeopardise people’s lives.”

ucl.ac.uk/bartlett/real-estate
THE BARTLETT’S 22 GORDON STREET HAS ATTRACTION PLENTY OF INDUSTRY ATTENTION. CRITICAL RECEPTION HAS BEEN GOOD: IT HAS WON OR BEEN SHORTLISTED FOR A FLURRY OF AWARDS. BUT HOW IS THE BUILDING STANDING UP TO ITS FIRST YEAR OF OCCUPANCY? WE FIND OUT WHAT THE USERS THINK.

WORDS: VERONICA SIMPSON
MADE TO MEASURE
Why the Gordon Street Klinker isn’t just another brick in the wall.

The elegant bricks that cover 22 Gordon Street deserve closer scrutiny as to their colour and composition, according to geologist and UCL Student Mediator Dr Ruth Siddall. Siddall analysed a specimen of the ‘Gordon Street Klinker’, which was made for the project to the architects’ specifications by German brick makers Janinhoff. In order not to bulk-out the building, and to free up every inch of its interior space, the Gordon Street Klinker is slimmer and longer than a standard brick. Measuring 290 x 52 x 70mm, 140,000 of them were used on the façade. They are water-struck to ensure a high moisture content, and twice fired at maximum temperatures of 1,200˚C. This process leaves marks on the brick’s surface, from ‘firing ghosts’, which pattern the bricks, as do oxydising marks revealing where they touched while in the kiln.

Using polarising light microscopy, Siddall examined thin slices of the brick to reveal mineral particles of quartz, flint, feldspar and zircon, indicating granitic rocks in their source material. Such a mix is typical of northern European brick stock, which helped reassure the planning authorities that this 21st century architecture school would have the right aesthetic and civic properties to blend into the surrounding Conservation Area.

“The new focal staircase has been really successful in adding transparency, interaction and movement.”

When 22 Gordon Street – formerly Wates House – reopened its doors to students in early 2017, the contrast with its predecessor could hardly have been more marked: now the concrete bones of the old, sealed-in bunker of a building form the skeleton of a new, expanded structure. The Architects’ Journal celebrated its transformation with a review by Bartlett School of Architecture alumnus Jean-Jacques Lorraine (of Morrow + Lorraine), who declared the building “light-filled, open-minded and open-hearted”.

Instead of a squat, cellular fortress, which whisked inhabitants up side stairs or lifts into hermetically sealed departmental silos, now there is clarity and transparency on all levels.

The dynamic heart of the building – psychologically, if not geographically – is the angular black steel staircase towards the rear, which pulses staff and students up and down its attractive oak treads. Visible even from the new Gordon Street entrance, it makes usage unavoidable, according to Dr Penelope Haralambidou at The Bartlett of School of Architecture: “The new focal staircase has been really successful in adding transparency, interaction and movement. I promised myself that I will only use the staircase and it is proving a good way to bump into everyone.”

It also provides a strong, sculptural element to a building that manages to be civic, elegant, engaging and highly sociable, but avoids the pitfalls of statement architecture – deliberately so, say Euan Macdonald and Tom Noonan, the project leads for architects Hawkins\Brown. “We tried very hard not to make it iconic. We have a problem with that word, it’s so loaded. We think it has presence but it’s not a showy building. It’s like a framework, a backdrop to the school,” says Macdonald.

This must have been a tough line to preserve when working with a skilled and opinionated client team, many of whom will have had far more radical notions of what the building should look like.

But within tight budgetary, conservational and cultural constraints, Hawkins\Brown has achieved an admirable marriage of the old structure with the new, expanding the available space...
2017 saw The Bartlett School of Architecture Summer Show held ‘at home’ – in the building’s groundfloor exhibition space – for the first time in years.
via a full-height extension, floor additions, and a clever envelope hung over the original frame which allowed them to push the interior space out another 1.5m on three sides.

Through these measures, a specially designed ‘Gordon Street Klinker’ brick (see p.81), and relocating the library and drama theatre to adjacent sites, there is now a desk for every one of the department’s 850 students, where before there was room for just over 300. “In addition,” says Macdonald, “we have designed in as much loose, unprogrammed space as possible, which the building lacked.”

These loose spaces include an exhibition area in the ground floor foyer, where The Bartlett School of Architecture held its 2017 Summer Show – the first time it has been able to host it ‘at home’ in years. Then there are the open landings that spin off the staircase at each level, leading to flexible work and meeting rooms around the perimeter, which enjoy – unlike in Wates House – ample daylight and vistas onto this eclectic urban quarter.

Hawkins\Brown sees the new building as a ‘social generator,’ broadcasting the energy contained within it from the grid of windows that perforate the elegant, grey-brick façade. It’s a building that now engages with the surrounding streetscape and culture, as well as that within its walls. As the reviewer in The Architects’ Journal declared: “The rigour and clarity of the plan and section delight, and bring a real sense of meaning to the brokerage between outside and inside.”

AWARD WINNER
• Higher and Further Education Award – AJ Retrofit Awards 2017 • Project of the Year – Education Estates Awards 2017 • Refurbishment of the Year – Education Estates Awards 2017 • Education Award – New London Awards 2017 • London Regional Award – RIBA Awards 2017

“It’s a thousand times better in terms of work space. Having a whole desk and three shelves is way better than having half a desk and one shelf.”

Previous page: Students have started to put their own stamp on the studio space.

Right: A student at work in the studio. There is now a desk for every one of the department’s 850 students, where before there was room for just over 300.
So, what effect has this physical transformation had on the school’s more than 1,000 occupants? The most obvious one is that students are now present in the building: the previous lack of desk space, according to Noonan, an alumnus of The Bartlett, “meant that nobody ever came in to work; we all worked at home”.

Professor Alan Penn, Dean of The Bartlett, says: “Having a visible staircase makes such a difference, compared to what the old building was like. And going to much more open studio spaces has radically changed what it’s like in terms of mixing between years.”

Placing units and year groups in discrete clusters within an open studio format was trialled during the school’s two-year relocation to a site on Hampstead Road. It proved hugely popular with students, so it has been transferred to the new building. In fact, Penn quips: “You can’t really tell the difference between the undergraduates and the postgraduates anymore… which is a bit worrying.”

However, when asked if the culture of the school has changed significantly, Penn says: “I think it’s probably early days.” He refers to the old building as a “very political one”. Its strict segmentation encouraged an atmosphere of suspicion and intrigue: if a member of staff was seen outside their usual department floor it “led lots of people to putting two and two together and making ten.” Having a central staircase used by everyone has definitely cleared the air: “there’s no question whether you should be there or not. The atmosphere in school now is less political.”

As for the students, one graduate, who spent two years in the interim Hampstead Road space and completed his degree in 2017, calls the new building “a thousand times better” in terms of work space. “Having a whole desk and three shelves is way better than having half a desk and one shelf,” he says. He appreciates the daylight and the studio’s open floor plan. “It never gets old”, he says. “There’s always another route through.”

There have been, as ever, a few teething problems. Some students have grumbled that the landings are too acoustically leaky to function as crit spaces and too dark to work in. There were also issues with overheating on the hottest summer days, especially on the upper floors. Macdonald explains that the building has opening windows, which should help regulate the building temperature but – perhaps counter-intuitively – these should not be opened when it is hotter outside than in. At this point, the building’s ventilation and cooling system should kick in. But this requires inhabitants to pay attention to a “traffic-light” indicator system on each floor and respond. Shuttering windows when it’s hot is not the most logical of actions, so there will be training for the facilities management team, staff and students. Ultimately, Macdonald says: “The theory is that the systems are intelligent and minimise energy consumption, and also that users learn to adapt their environment according to seasonal variations.”

A full post-occupancy evaluation is planned. “As for the landings,” Macdonald says, “they were conceived as raw, flexible areas, evolving over time.” Acoustics can be addressed if problematic. In the meantime, “supplementary power and lighting have already been added to maximise their usage”.

Providing a truly fit-for-purpose, 21st-century architecture school – one that carves out a dramatically different typology and culture within an existing building frame in a protected urban setting – is a huge achievement in itself. Industry awards (see p.85) point to widespread peer approval. But perhaps the last word should go to a student. Ellie Sampson, year 5 MArch, experienced every recent iteration of the school and declares: “It feels like all the aspects I enjoyed about Wates House have been retained and very much improved upon.”
FROM BROADBAND AND COMPUTER CHIPS TO GENETIC SEQUENCING AND SOLAR PANELS, THE PUBLIC SECTOR HAS ALWAYS BEEN A PRIME MOVER IN NURTURING INNOVATION THAT HAS GONE ON TO TRANSFORM ENTIRE ECONOMIES. YET THE DOMINANT BELIEF IS THAT THE STATE IS ENTREPRENEURIAL. IT’S TIME THE STATE’S ROLE AS INNOVATOR IS RECOGNISED.

WORDS: BRENDAN MATON
Everyone in academia knows what a business school is. But what is the equivalent institution for civil servants? This is the question that Professor Mariana Mazzucato hopes to answer by founding the Institute for Innovation and Public Purpose (IIPP) at The Bartlett.

Mazzucato – who joined this year from the internationally renowned Science Policy Research Unit at the University of Sussex, where she held a chair in the Economics of Innovation – is a rarity: a working academic who not only has a media profile and the ear of political leaders, but also one whose arguments are also widely understood (everyone recognises Stephen Hawking but can you summarise his ideas?).

Mazzucato’s The Entrepreneurial State, rated by the Financial Times as one of 2013’s books of the year, overturned the myth of the “sluggish state”, by showing that some of the greatest innovations in capitalism trace their funding back to the state. Her goal is that the IIPP becomes an institution that can learn the lessons of bold and mission-oriented state agencies – how to organise themselves internally and how to work on new missions with other types of actors.

According to Mazzucato, the state is far more entrepreneurial than people understand. If organised in strategic ways, it has had, and can have, the deep pockets and patience to fund frontier research and invention – but rarely gets the praise due for this work. Among a generation that has grown up to believe in “small government” and the propensity to determine any endeavour’s worth by its monetary value, it is easy to succumb to the narrative that all the best ideas have been dreamed up and implemented by the private sector. (One institution she praises is the BBC, which created the widely used iPlayer, but which, as a public service, received fewer plaudits than YouTube or Spotify).

While the world lionises Apple, Facebook, Google and the tech giants of Silicon Valley, Mazzucato draws the thread of this particular narrative back to the governmental agencies that, at the height of the Cold War, were tasked with keeping the US ahead of Russia in terms of technological prowess. Organisations such as the Defense Advanced Research Projects Agency (DARPA) – well-funded, autonomous, decentralised and long-termist – fostered the development of microchips, personal computers and early internet technology. Its success encouraged US administrations – well into the Reagan era of small government – to back similar institutions investigating various fields, not just defence, but also new energy, nanotechnology and healthcare.

Silicon Valley has done well to market publicly-funded inventions in computers, smartphones and pharmaceuticals. But, as Mazzucato never tires of pointing out, by not giving the state its credit, enriched companies have been able to lobby for lower tax and lower regulation, rather than contribute more to the public purse they have depended on. And this dynamic also reduces the confidence of state agencies: “There is such a lack of confidence in state leadership on innovation in the UK, for example. The government department responsible has changed its name four times since I started working here!”

However, while she approves of a bolder role for the state, she is not advocating old fashioned dirigisme, and warns that politicians must be kept away from the actual management of innovation organisations. For a real example of Mazzucato’s recommendations on national policy, read her strategy report for Brazil, co-authored with one of her research fellows Caetano Penna (see Read the Research). This clarifies where Brazil has achieved success, such as in agichemicals; where it has failed, such as in technology parks that have not transferred research knowledge into production; and how macro-economic strategy interacts with meso-level ecosystems.

Which brings us back to the IIPP. There are plenty of business schools offering to make better CEOs by getting them to think outside narrow frameworks, with concepts such as “rejuvenating the mature corporation”, but what is the equivalent for the public sector? There are already plenty of universities – including UCL – offering a Masters in Public Administration to make better
department heads, but none offers the heady cocktail of innovation and public purpose to rethink the notion of public value so that what the public sector does is more than just fix markets, or de-risk “wealth creators”. Mazzucato’s programme aims to build confidence in the civil service to see themselves as wealth-creating agents too, with the need to be flexible, and to welcome risk-taking, experimentation and learning.

Furthermore, as innovation has not only a rate but a direction, the IIPP wants to open up a new debate about how to learn from mission-oriented policies, in order to direct innovation towards modern problems concerning the environment, healthcare and space. Mazzucato argues that industrial policy should not be focused on sectors but rather on big problems – missions – that multiple sectors need to solve. One of the IIPP’s most exciting projects regards the emerging Low Earth Orbit economy with NASA, possibly the world’s most famous mission-oriented innovation agency.

But it is not inventions per se that motivate her. It is new forms of public-private partnerships that can make sure that missions funded by the public don’t only socialise risks, but also rewards. Her message is a bi-partisan one, appealing not to parties but to common sense about what shape future capitalism should take and how to build symbiotic forms of partnerships that create opportunities for future investment while also fulfilling societal goals.

Given Mazzucato’s own preference to think big, it is no surprise that the first courses available at the IIPP are likely to be for public-sector executives from different types of global public organisations. It is the people with the greatest responsibilities now that she wants to reach. But, as policymakers don’t work alone, the programme will be aimed at creating a new framework for partnerships that will only work if the people in the classroom are also from the private sector and the voluntary sector.

Mazzucato admits that alumni of the IIPP will need to be careful. The paradox of her success is that public agencies tasked with innovation will now be under far more scrutiny from commentators and political paymasters than the likes of DARPA were in the 1960s. “We don’t live in a patient culture,” she says. All the more reason to fight for change.

There was a buzz in the air for the IIPP’s sold-out launch on 12 October 2017. Among those in the audience were music producer Brian Eno, artist Cornelia Parker, British Library CEO Roly Keating and venture capitalist Hermann Hauser, all of whom are also part of the IIPP’s interdisciplinary Advisory Board. Mazzucato used the launch to announce one of the IIPP’s most ambitious programmes starting in 2018: the Mission Oriented Innovation Network or MOIN, an idea she and the IIPP’s new Deputy Director, Rainer Kattel, have been planning for some time. MOIN is a platform for public agencies around the world to learn from each other’s experiences of working outside the box of fixing markets, towards a new framework of actively co-shaping and creating markets. And, in the process, creating value.

Mazzucato’s forthcoming book, The Value of Everything, tackles the ‘value question’ head on. It will no doubt raise as many questions as The Entrepreneurial State, making sure that the IIPP remains at the centre of the debate for years to come.

**READ THE RESEARCH**

- The Entrepreneurial State: debunking public versus private sector myths (M. Mazzucato, Anthem Press, London, 2013)
- “Mission Oriented Innovation: Challenges and Opportunities” (M. Mazzucato, IIPP Working Paper 2017-1)
HERE EAST IS THE BARTLETT’S FIRST SIGNIFICANT FOOTPRINT OUTSIDE ITS TRADITIONAL STOMping GROUND IN BLOOMSBURY. WE SPEAK TO ITS ARCHITECTS ABOUT HOW THE DESIGN OF THIS VAST INTERIOR SPACE WILL FACILITATE AMBITIOUS COLLABORATIONS BETWEEN ARCHITECTS, ENGINEERS AND ROBOTICISTS.

WORDS: DOMINIC LUTYENS
"It wasn’t always like this,” says Hawkins\Brown Partner Euan Macdonald. “It was dull before it was transformed, inactive, utilitarian, sterile.” He is talking about the original state of The Bartlett’s new home at Here East – a gargantuan building that was formerly the Broadcast Media Centre for the London 2012 Olympic Games. Though it might have been abuzz with TV journalists then, the building had little architectural merit. Its interior was vast and soulless and, post-Games, it was scheduled for demolition. That was until Here East, a company owned by clients of real-estate investors Delancey, decided to transform the site (which also includes the Games’ former Press Centre and a new auditorium) into ‘London’s Home for Making’.

The Bartlett and UCL’s Engineering Sciences Faculty are in good company, coexisting with: established corporations, including BT Sport; innovation hub Plexal; the studio of choreographer and director Wayne McGregor; Loughborough University London; and startups. This is deliberately symbiotic, says Macdonald. “The idea was to create an ecosystem whereby small businesses benefit from the knowledge and mentorship of blue-chip companies, which in turn gain from the freshness, enthusiasm and youthfulness of smaller concerns.”

Hawkins\Brown has been behind the entire site’s transformation, but the opening of UCL’s Here East space is the latest chapter in a five-year collaboration between the practice and the university. According to Macdonald: “The main challenge was to make this 100m-long, 40m-wide, 10m-high temporary structure habitable, comfortable and safe.”

The practice has done just that: giving this cavernous, hangar-like interior a more human scale by adding new floor levels, including mezzanines. There were other practical reasons for this, too – a need to capitalise on the space, since the building’s footprint couldn’t be enlarged. “Another constraint was the lack of daylight, and one of our tasks was to maximise it,” says Macdonald.

The building was originally divided into two spaces by a wall, behind which there was no daylight. Hawkins\Brown has removed the partition, allowing light to permeate the building’s huge glazed façade and, beyond this, to a series of interconnected 5m-high studios and workshops and a multi-purpose, 330-seat auditorium that accommodates several open but acoustically self-contained teaching spaces.

“We worked closely with academics from both The Bartlett and UCL Engineering to understand their teaching methods, along with specialist acoustic engineers at BuroHappold, to develop a design that could allow lectures, crits, seminars and social activities to run concurrently,” says Macdonald.

Beneath the auditorium are laboratories. The area behind it, towards the back of the building, incorporates several artificially lit, 10m-high fabrication spaces. “The building is split into two sections,” he explains. “The front part is more human-focused, the rear area more machine-focused.” Linking the two areas is a corridor or ‘runway’, which is wide enough to drive a forklift truck down.

Above all, Here East reflects an exciting paradigm shift in architecture education that will promote deeper cross-pollination between disciplines. It’s no accident then that the building’s design is commensurately fluid, flexible and interconnected – in contrast to 22 Gordon Street’s layout, which is designed specifically for the School of Architecture’s pedagogy. Here East will also offer innovative Master’s courses in Engineering and Architectural Design, Situated Practice, Design for Manufacture, Design for Performance and Interaction [see p.98], as well as Robotics and Computation.

“In architecture and design, there’s immense
MODEL BEHAVIOUR

Performance and interaction is a burgeoning, cross-disciplinary area of architectural study and the subject of a new programme being taught at Here East.

How objects, environments and their inhabitants perform and interact, chiefly in performing venues – as a form of architectural study – has been a subject of growing interest at The Bartlett in recent years. This led to the formation in 2012 of UCL’s Interactive Architecture Lab, which is engaged in a range of related academic research activities and industry collaborations, including Arup, Nike and Twitter.

At the heart of this is its new, experimental, interdisciplinary course – the 15-month Master’s programme, Design for Performance and Interaction – which welcomes students from both arts and technical backgrounds. It explores how design using interactive technologies can turn objects, spaces, people and systems into potential performers, and can be applied to such disparate fields as scenography, theatre design, public interactive installations and kinetic art.

Connected to UCL’s Robotics Centre, the programme will explore how emerging technologies such as artificial intelligence will increasingly play a part in the behaviour of all buildings. The programme’s core belief is that the creation of spaces for performance and the creation of spaces within them are symbiotic design activities.
collaboration with technical and pragmatic disciplines like engineering,” says Noonan. “To engage more with this is exciting. It opens up new directions of teaching and learning. When the two disciplines collaborate, architects can learn from engineering about the limits of materiality and structures, while engineers can learn about problem-solving in a more subjective way.”

“The building’s design was developed through an intensive dialogue with the client, stakeholders and project team in order to establish the project’s key goals and its complex technical requirements,” continues Noonan. “At Here East, factory-like spaces equipped with large robots, CNC-routers and waterjet-cutters were required, all of which don’t fit naturally at 22 Gordon Street.”

The demand for these spaces reflects another trend in architecture and engineering for off-site manufacturing and prefabrication of components by robots, which is safer, quicker, cheaper and more ecological, since less waste is generated on site. In view of this need for heavy-duty fabrication equipment, the depth of part of the building’s concrete floor had to be increased from 180mm to 600mm. The building also houses prototyping facilities.

A flexible and future-proofed layout is another key characteristic of Here East. “We needed to create spaces that could adapt to change. Many of the courses are new and will likely evolve over time, the technologies used are emerging and the student population is set to grow,” explains Macdonald. It helps that most of the furniture isn’t fixed and that partitions are kept to a minimum.

Noonan and Macdonald were also keen to create a playful interior with pop-art touches that enliven the space: the auditorium’s tiered seats are covered in sunshine yellow rubber – a far cry from conventional, institutional auditorium seating.

Asked if their design has any architectural precedents, the two cite Cedric Price’s 1961 Fun Palace, conceived as a theatre for Stratford in association with director Joan Littlewood, but never built. It’s not altogether surprising that they mention this, given that Price’s design was flexible, interactive and embraced emerging technologies, including cybernetics and IT.

But the Here East site as a whole references contemporary London too, says Noonan: “To generate the Here East masterplan, we were inspired by the neighbouring area of Hackney Wick, whose tight-knit light-industrial factories and yards are home to one of the highest concentrations of artists anywhere in Europe.” It is often creative enterprises that pioneer new places: where they go, others will follow.
GROWING AMBITION

A new cutting-edge space in East London and two new institutes with bold cross-disciplinary mandates underline the Bartlett’s goal: to be the world’s number-one faculty of the built environment.

2,363 students in 2015/16

3,252 students in 2016/17

1,282 masters degrees awarded in 2016/17

172 bachelor’s degrees awarded in 2016/17

45 research degrees awarded in 2016/17

+38% increase in space for teaching, making and research by end of 2017 (13,567m²)

+13% increase in research funding in 2016/17 (£12.2M) compared to previous year

New institutes:
- Institute for Digital Innovation in the Built Environment (2016/17)
- Real Estate Institute (2017/18)
- Institute for Innovation and Public Purpose (2017/18)

New programmes:
2016/17
- MSc Global Prosperity
- MSc Sustainable Resources

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

2018/19
- MArch Biointegrated Design
- MSc Biointegrated Design
- MA Landscape Architecture
- MLA Landscape Architecture
- MSc Healthcare Facilities
- MSc Learning Environments
- MSc Energy Systems & Data Analytics
- MSc Integrated Building Systems Design & Operation
01 Prosperity on the move / Hannah Sender & Nikolay Mintchev
02 Space for education / Clare Melhuish & Alexi Marmot
03 Encounters with modernity / Edward Denison
04 Piloting democracy / Flora Roumpani
05 Breaking the code / Claire McAndrew
06 Night vision / Ben Campkin & Laura Marshall
07 The future past / May Cassar
08 Cracking energy efficiency / Peter Mallaburn
09 Reimagining the potential of urban design / Catalina Ortiz
Large-scale displacement is one of today’s greatest challenges to global prosperity. While media attention in Europe and North America has largely focused on the arrival of refugees in Europe, what is often overlooked is that the majority of refugees – 86% – are living in low-and-middle-income countries. The UNHCR estimates that there are 65 million forcibly displaced people worldwide, including 40.8 million people who are displaced within their own countries. This may not seem like a large number in the context of a global population that exceeds seven billion, but we must remember that the majority of displaced people are concentrated in and around a small number of conflict zones, most notably Syria, Afghanistan and Somalia. The countries that host the most refugees are thus the ones that border these conflict zones: Turkey, Pakistan, Lebanon, Iran, Ethiopia, Jordan and Kenya. The high concentration of refugees in a few recipient countries puts enormous pressures on local resources but also has economic, social, and political repercussions that spread to other parts of the world.

The ESRC-funded RELIEF Centre aims to understand what sustainable prosperity looks like in the context of large-scale displacement. Led by Professor Henrietta Moore, Director of the UCL Institute for Global Prosperity, the RELIEF Centre is a partnership between UCL, the American University of Beirut and the Centre for Lebanese Studies. Narrowing its focus to Lebanon – the country with the highest number of refugees per capita in the world – the Centre will deliver a programme of research and education to improve the prosperity of local urban environments, as well as the host and refugee communities that live in them.

Lebanon is inhabited by around 1.5 million refugees, over a million of whom are Syrians fleeing a conflict that has been ongoing since 2011. For a country as small as Lebanon, with a population of only six million, this influx of people poses a number of challenges. It puts a strain on resources, public services and jobs, and it creates social tensions and hostility between hosts and refugees. The fact that the conflict in Syria has now lasted for more than six years also raises concerns about disruptions to refugees’ education, training, and working lives, which will have significant consequences for the reconstruction of Syria when the conflict ends.

The RELIEF Centre aims to address these challenges of displacement through the theoretical lens of prosperity. Its starting premise is that, although the challenges in question are linked to insufficient funding for services and slow economic growth, solutions to them must not be narrowly focused on economic growth alone. Prosperity is about more than just economic wealth; it also includes non-monetary forms of value such as skills and knowledge, wellbeing, social capital and capacity for entrepreneurship, all of which are key for improving people’s quality of life.

The Centre’s research will identify the ways in which such values are already embedded in communities in Lebanon, as well as the most efficacious ways in which universities can support them to boost local and national levels of prosperity. It will train and work with researchers from local communities, who will be members of the RELIEF team, taking part in research planning, collecting data, disseminating findings and implementing impact activities. The findings of the research will inform the development of an educational programme that includes both online learning and face-to-face interaction to support the educational needs of local communities.

Crucially, this work in research and education, like any initiative that promotes genuine prosperity, is designed to be inclusive from the beginning. It engages both Lebanese hosts and refugees in recognising and enhancing their existing capacities and using them to design services, educational programmes and a public domain that works for all.

“Prosperity is about more than just economic wealth; it also includes skills and knowledge, wellbeing, social capital and capacity for entrepreneurship”
The Bartlett's 2016 Research Exchange was held at the UCL Institute of Education and marked a significant step forward in bringing together researchers across UCL to consider spatial and design issues linked to the provision of education. It underscored the vital contribution that education makes to unlocking solutions to the world’s most pressing issues and the increasing demand for academic and applied knowledge to guide real-world investment in educational environments.

The Bartlett already hosts a wealth of valuable work in this field across its different schools and institutes. Since 2006, it has produced some 50 published articles relating to the design, management and impact of learning environments and 10 architectural design projects per year. However, because of the dispersed and distributed nature of the research and teaching across the faculty, this expertise is under-recognised, and has not been actively promoted. This gap prompted Professor Alexi Marmot to conceive the new Bartlett Global Centre for Learning Environments. Urban Lab’s Clare Melhuish organised a Town Hall meeting in March 2017 and the Centre is now underway.

Education provision and the environments that support it are inextricably linked to rapid population and urban expansion and the growth of knowledge-and-technology-based economies. They are recognised as vital to combating rising inequality – which can lead to conflict and tension – and providing learners over their lifetimes with the range of skills needed to adapt to accelerating social and economic change. Educational environments are also key drivers for the creation of new and regenerated, safe, healthy and sustainable urban spaces, which foster quality of life, civic participation, social interaction and opportunities for innovation.

UCL Grand Challenges has placed these issues at the core of the university’s activities and impact. UCL continues to be actively engaged in developing exemplary new educational facilities framed by the dual agenda of providing top-quality educational opportunities and outcomes for students at secondary and tertiary levels, and wider community benefits through outreach, engagement, widening access, and sustainable physical regeneration. Examples of this are the UCL Academy, Here East, UCL East, as well as the new and refurbished buildings in Bloomsbury.

Evidence-based guidance in this field is in short supply and constantly in demand. In 2004, the architect and CABE Commissioner Emeritus the late Richard Feilden noted that “the science of designing learning environments, is currently remarkably under-developed”. In a Design Council literature review on the impact of school environments the authors observed that “the first thing that will strike you… is the relative paucity of research on effective learning environments”. This lack of research-based knowledge continues, despite the value of the UK education estate being estimated to be around £28bn for higher education alone; and new annual capital investment of £3-4bn for higher education and £4.5bn for schools.

The Bartlett Global Centre for Learning Environments will be ideally situated to provide a focus for existing and expanding specialist knowledge, within The Bartlett and across the university, that is fundamentally multi-disciplinary and far-reaching in its implications beyond academia. It will provide not only the opportunity to co-ordinate, frame and communicate this knowledge within a context of academic excellence, combining a high level of theoretical and practical understanding based on rigorous empirical research, but also, crucially, to disseminate and translate it effectively into the public domain.

Over the next decade and beyond, the Centre will take a lead in driving the research agenda in this field. It will also play a key role in shaping public policy and practice in the UK and overseas relating to the design, provision and management of educational estates and learning environments, firmly located within an understanding of wider urban issues and spatial challenges.

Educational environments are integral to effective learning and safe, healthy, and sustainable cities. So why has the science of designing them been overlooked for so long?

"This lack of research-based knowledge continues despite the value of the UK education estate being estimated to be around £28bn for higher education alone"
When perspectives of the world are framed largely by a Western media that, in the case of Eritrea, constructs unhelpful and inaccurate analogies like “the North Korea of Africa”, engaging with problems and finding solutions becomes very much harder. However, architecture has the potential to make a very real difference to the fortunes of this determinedly self-reliant country.

In July 2017, Eritrea's capital city, Asmara, was added to the list of UNESCO World Heritage Sites. The 1,300-page listing application, “Asmara – Africa’s Modernist City”, refers to the exceptional Modernist heritage built during the Italian colonial period before the Second World War. The 481ha site contains more than 4,340 buildings, all of which have been extensively surveyed and catalogued, along with more than 80,000 digitised documents and technical drawings from the municipality’s phenomenal archive. Prepared by the Asmara Heritage Project, the work comprises nearly two decades'-worth of research by countless local residents and professionals, supported by numerous international bodies, including The Bartlett School of Architecture. In December 2016, this collective effort was recognised by RIBA, with the award of its President’s Medal for Research.

Eritrea’s encounter with modernity was particularly brutal. Italy claimed the territory in the late-19th century, but it was the 20th century, the century of Modernism, that defined Eritrea. Asmara was planned before Mussolini came to power in 1922 and embarked on his fantasy project of creating a new Roman Empire in Africa. The apogee of this odious campaign was the invasion of neighbouring Ethiopia in 1935. Asmara became the jewel in the crown of Italy’s African empire, which also included Libya, Somalia and Ethiopia. It was in this brief period, from 1935 to Italy's defeat by the Allies in 1941, that most of Asmara’s Modernist buildings were constructed: designed by Italians and built by Eritreans.

It is an unfortunate fact that, for many people, the word “Eritrea” is more likely to conjure up images of ongoing migrant crises than outstanding architectural heritage. Asmara’s listing as a UNESCO World Heritage Site could change that perception.

When perspectives of the world are framed largely by a Western media that, in the case of Eritrea, constructs unhelpful and inaccurate analogies like “the North Korea of Africa”, engaging with problems and finding solutions becomes very much harder. However, architecture has the potential to make a very real difference to the fortunes of this determinedly self-reliant country.

In July 2017, Eritrea's capital city, Asmara, was added to the list of UNESCO World Heritage Sites. The 1,300-page listing application, “Asmara – Africa’s Modernist City”, refers to the exceptional Modernist heritage built during the Italian colonial period before the Second World War. The 481ha site contains more than 4,340 buildings, all of which have been extensively surveyed and catalogued, along with more than 80,000 digitised documents and technical drawings from the municipality’s phenomenal archive. Prepared by the Asmara Heritage Project, the work comprises nearly two decades'-worth of research by countless local residents and professionals, supported by numerous international bodies, including The Bartlett School of Architecture. In December 2016, this collective effort was recognised by RIBA, with the award of its President’s Medal for Research.

Eritrea’s encounter with modernity was particularly brutal. Italy claimed the territory in the late-19th century, but it was the 20th century, the century of Modernism, that defined Eritrea. Asmara was planned before Mussolini came to power in 1922 and embarked on his fantasy project of creating a new Roman Empire in Africa. The apogee of this odious campaign was the invasion of neighbouring Ethiopia in 1935. Asmara became the jewel in the crown of Italy’s African empire, which also included Libya, Somalia and Ethiopia. It was in this brief period, from 1935 to Italy's defeat by the Allies in 1941, that most of Asmara’s Modernist buildings were constructed: designed by Italians and built by Eritreans.

“03 Encounters with modernity

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The successful retention of the city’s physical integrity through a turbulent century is remarkable enough, but what makes Asmara particularly special is the extent to which Eritreans have since assimilated the city’s complex past. Although Eritrea was conceived by colonialism and furnished by fascism, Eritreans reserve a special love for their capital for its association with national independence – a hard-fought struggle that ended in 1991.

This pride is reflected in Eritrea’s pioneering approach to its colonial heritage, which uses research as the basis for encouraging the city’s sustainable development. This transcends both the reactionary attitudes that, in many post-colonial contexts, have led to the deliberate destruction of physical reminders of the past or the equally destructive forces of a heritage industry whose pursuit of preservation has sucked the life out of many of the world’s great historic cities.

History has not been kind to Eritrea, and its Modernist historiography is no exception. The common conflation of modernity and the West has had a detrimental effect on the way we engage with and understand built environments globally. The problem manifests itself variously, from the writing of history to the creation of institutions charged with researching history or protecting historical artefacts. UNESCO’s World Heritage Site List is itself a fitting example – a veritable international inventory of cultural prejudice: together, Italy and Spain boast more UNESCO World Heritage Sites (47 and 39 respectively, a total of 86) than all the 54 African countries combined (85).

Asmara’s listing therefore goes beyond merely pursuing international recognition for its cultural assets. Viewed in a wider context, Asmara’s UNESCO World Heritage Site status – as a Modernist site in Africa – challenges some of the fundamental principles underpinning the heritage industry. It calls for a recasting of Modernist history to more fairly reflect and better understand global encounters with modernity, and to allow formerly subjugated territories to reclaim and represent their own histories on their own terms.
04 Piloting democracy

Drones can do a lot more than deliver the shopping. How about making urban planning a more democratic process?

Last year, Amazon pushed forward with its plans for drone deliveries by delivering its first two packages to customers by drone. The drones successfully carried the packages over the Cambridgeshire countryside in a process described by Amazon as “just 13 minutes from mouse-click to delivery”.

The delivery of goods has made drone technology popular for use in public service. The consumer drone market has skyrocketed in the last couple of years, prompting the US Federal Aviation Administration to make publicly available guidelines and regulations for using ‘Unmanned Aerial Vehicles’ for commercial purposes. Drones in the form of ‘quads’ and ‘hexacopters’ are now cheap to buy, versatile and mechanically simple, making the technology accessible to multiple sectors.

The expansion of the use of drones signifies a new city infrastructure. Operators fly beyond the line of sight in rural and suburban areas and, because drones can sense and capture the environment as they fly, they have unleashed a wave of predictions about their role in the future of city planning and architecture. Much of this role is accomplished by a generic mainstream tool: the camera.

Aerial imagery has been in the toolkits of cartographers and planners for years. However, putting an “imagery capture set” in the hands of the public raises the prospect of a more engaged planning process. Drones can now be programmed to follow accurately designed paths, avoid obstacles and reach non-accessible areas to perform surveys that would previously require expertise and months of work to complete. To quote Jordan Petersen ASLA, founder and CEO of Lift Aerial Marketing LLC: “UAV imagery can help bridge the gap between two-dimensional, temporarily-devoid satellite imagery and the more prosaic ground-based conventional camera.”

The mass distribution of drones enables wide access to captured urban data and, in combination with traditional forms of planning participation, it heralds a truly open planning system. Groups like Spatial Collective and Zoom Advocacy Organization in Nairobi, Kenya, already use these techniques to engage people with unmapped areas and reveal potential risks in unco-ordinated planning, creating awareness and seeking solutions to challenges facing the residents of the city’s shanty towns.

But perhaps a more powerful use of mapping drones is their role in rendering 3D outputs – models that people can see, touch and feel. Currently, images taken from drones can be used in combination with freely distributed applications, such as Trinio or Recap 360, to produce highly-detailed 3D models of captured objects and, by extension, entire areas.

Projects such as 2013’s RemapLima, a joint mapping expedition between The Bartlett’s Development Planning Unit and CASA, used images taken from a generic camera placed on an Ebee (a fixed-winged drone) to create a near real-time model of two areas in Lima, Peru. The team climbed the hills of Lima to fly the drones and captured overlapping photos for each area to create high-resolution point clouds. These were then sent to London to be digitally reconstructed and 3D printed. The result was two installations: a physical 3D printed model and an interactive digital 3D platform, built for community planning purposes and augmented with different layers of digital planning data gathered throughout the expedition.

Such drone outputs can be used as the basemap for the development of models and applications that have the capacity to help the public better understand complex problems relating to the urban environment and evoke more informed feedback. As greater public participation is increasingly seen as essential to successful planning, built environment professionals working in both developed and developing countries need to embrace drones as a way to broaden the discussion and drive more inclusive planning.
The ways in which we define and engage with digital city systems is changing. They no longer lie exclusively in the hands of architects, designers, engineers, computer scientists and urban planners; open-source tools and open-data platforms are starting to unlock collaborative opportunities for citizen participation.

Some say that making and remaking the city through distributed, participatory systems offers the possibility to re-shuffle the power of city-making. Others are more critical. For all the promise of greater accountability, new forms of democracy and participation in urban processes, they say that, in reality, it can be difficult for communities to engage.

At Base KX in July 2017, community groups, academics and digital practitioners were brought into dialogue at a panel event called “Power to the Citizen! Data and Co-Creation in the Digital City”. A collaboration between EngEx and The Bartlett’s Institute for Digital Innovation in the Built Environment, Urban Lab and CASA, and supported by the UCL Grand Challenge of Transformative Technology, the event generated ideas that we have since translated into an eponymous manifesto.

**Power to the Citizen!** is a manifesto for the public authoring of our cities. Its starting point is that the rhetoric we have been sold as citizens – of convenience, efficiency, predictability and connectivity – is simply not compelling enough; not when the “smartness” of cities is so often devoid of social value and empty of true public purpose. So it is up to us, in this moment, as academics, digital practitioners and citizens, to rewrite the narrative. Open-access datasets and open-source code are the tools we find at our disposal.

We need to act collectively, because those at the top won’t necessarily grasp what is of most benefit to those at the bottom and also because data is not always neutral: there can be political agendas hidden deep within it, out of sight. Data fluency is useful, of course, but, as Sarah Bell, Director of EngEx, has asked: “There must be a way for us all to collaborate without us all going off to learn how to code in R!”

This new paradigm calls for deep-seated change. CASA’s Adam Dennett urges us to peel back the smart cities label and see digital city-making as a continued dialectic. Architecture critic and curator Lucy Bullivant suggests that the aspiration for local government ought to be adaption – treating citizens as collaborators rather than as passive spectators in a process. This resonates with what Ava Fatah gen. Schieck at The Bartlett School of Architecture describes as “the desire for more asynchronous modes of engagement, with content exchanged fluidly on an ‘as and when’ basis.” Such “data dialogues” are going to be contingent on producing digital content that is predictable and regular in nature, to enable widespread sharing.

This brings us back to those who code – not just in R, but Python, QGIS, and other languages. “We need to ensure our efforts in citizen-led digital city making are complementary,” says JustMap’s Nicolas Fonty. This is true in terms of their technical foundations as well as their inherent value because, as Stephen Lorimer at the Greater London Authority has noted, “the tension in this rests somewhere between local experimentation within communities and boroughs, and scaling-up to deliver for many different groups of people, without losing value.”

We will almost certainly have to uncover new digital tools and processes in the quest to achieve this. Today’s rhetoric of the smart city will not be easily erased. But *Power to the citizen!* dares us to lessen its technocratic tone and flesh out new forms of digital democracy within the city. We are at the beginning of a transformative conversation.
Research by UCL Urban Laboratory has found that the number of LGBTQ+ venues in London has more than halved in the past decade, eroding a crucial social infrastructure.

A proliferation of closures of night-time and day-time venues serving London’s LGBTQ+ communities in recent years has led to the creation of campaign groups fighting to protect threatened establishments and to re-open long-standing venues that have already closed. Growing unease around the closures has been well documented in the local and national press, and widely acknowledged by LGBTQ+ communities and organisations, as well as by the Greater London Authority (GLA) and the Mayor of London, Sadiq Khan. Yet, the evidence for what has been happening was largely anecdotal and piecemeal.

To provide more robust evidence, Urban Lab began researching London’s LGBTQ+ nightlife in May 2016. We wanted to understand the factors driving closures, on-going threats to venues and the impact on members of London’s LGBTQ+ communities. The first phase of our research was designed in collaboration with Raze Collective (which represents LGBTQ+ performers) and Queer Spaces Network (a group interested in supporting spaces for the LGBTQ+ community). This pilot examined LGBTQ+ nightlife in London between 1986 and the present – 1986 being the year when the Greater London Council was disbanded, which instigated significant shifts in urban regeneration policy and practice.

Combining archival research, surveys, public workshops, interviews and literature reviews, the research evidenced – for the first time – the recent intensity of closures among London’s LGBTQ+ nightlife spaces and demonstrated significant impacts upon the most long-standing and community-valued venues. The findings illuminated the distinctive diversity of the capital’s LGBTQ+ nightlife and the important contributions that venues make to neighbourhoods and community life, wellbeing, culture and the night-time economy. However, the research also highlighted unequal representation, power dynamics and access to space within LGBTQ+ communities. In other words: how members of LGBTQ+ communities have been affected by closures and threats to venues is not clear cut. It is shaped by intersecting structural oppressions and aspects of people’s identities and experiences, including age, ethnicity, gender, sexuality and disability. For instance, venues serving women and Black, Asian and Minority Ethnic (BAME) LGBTQ+ communities have been disproportionately vulnerable to closure. However, the most prominent media, activist and community conversations largely focus on venues that have predominantly served communities of white, cisgendered, gay men.

Recognising the significance of these findings, the Mayor of London commissioned Urban Lab to develop the project further in order to positively inform his new Cultural Infrastructure Strategy and the work of the newly appointed Night Czar, Amy Lamé. In this second phase of work, we ascertained that the number of LGBTQ+ venues in London had fallen by 58% (from 121 to 51) since 2006.

News of this dramatic drop received high-profile press coverage, including on BBC London News and ITV News, and in The Architects’ Journal, The Daily Telegraph, The Economist, The Guardian, Time Out and The New York Times. Behind the statistics, Urban Lab’s research identified three key factors driving closures: the negative impacts of large-scale developments on venue clusters; a lack of safeguarding measures in the existing planning system; and the sale of property or change of its use by landlords. Venue owners, operators and clients have severely limited negotiating power compared with large organisations, and disproportionate rent increases were often implemented in the context of redevelopment and/or gentrification.

Beyond accounting for licensed establishments, we also highlighted the need to recognise the significance of LGBTQ+ nightlife events, hosted in a range of venues, in order to capture a comprehensive understanding of London’s LGBTQ+ nightlife. Doing so evidences a growing number of events serving women, trans, non-binary and BAME communities, who would otherwise lack dedicated venues (which are overwhelmingly owned and managed by – as well as predominantly serving – white, cisgendered, gay men). Findings also showed that long-standing events have important and enduring social outreach functions and value to LGBTQ+ communities, and illuminated a resurgence of venues in South-East London, where LGBTQ+ nightlife existed historically but had declined until recently.

Our findings were documented in the report LGBTQ+ Cultural Infrastructure in London: Night Venues, 2006-present, released in July 2017 and will inform the GLA’s forthcoming Cultural Infrastructure Strategy. In the short term, the research findings have already shaped the Mayor’s LGBTQ+ Venues Charter – a pledge designed to help safeguard venues for London’s LGBTQ+ communities and to act as a tool for communities and developers to work productively with the GLA and Night Czar to retain and re-provide venues. Beyond planning and policy realms, Urban Lab has presented findings from the research in a range of settings such as Tate Modern, the Science Museum, Sutton House, the Peckham Festival and the Royal Academy of Arts. The research is now moving into a new phase, which will see it include further historical and international comparative work.
Thirty years ago, the English academic Robert Hewison coined the phrase “heritage industry” to describe how the past had been commercialised as heritage in the UK. It was a reflection of societal changes taking place as a result of de-industrialisation and globalisation, in particular the impact of rapid and widespread internal migration and immigration on the sense of being rooted, or uprooted, in the 1980s.

The idea of heritage as an industry received a bad name that stuck. “Industry” has been written in inverted commas, imparting a sense of scepticism if not outright hostility; the comfort imparted by the woolly description of heritage as a “sector” continues today.

Yet sectors and industries are classification systems that are used to group similar business operations. Sectors are seen as broader definitions than those assigned by industries. For example, theatre performances and museum exhibitions are parts of the same “culture sector” based on their manifestation and participation of the public in culture; however, each would be listed in a different industry (theatre industry, museum industry) based on the specifics of the services or products they provide. Heritage, then, can also be defined as an industry that is part of the Culture Sector.

Recent policy, specifically the UK government’s proposal to build a modern industrial strategy for the UK, has prompted me to consider why, today, it is vitally important that heritage should be described positively as an industry – not as a factory-style process of managing historical sites, buildings and museums with the aim of encouraging tourism – but more broadly: as an industry that interacts with heritage assets across policy, finance, professional and business networks.

The heritage industry connects strongly to a range of assets beyond traditional collections, buildings, landscapes and their records, to encompass the digital, languages, literature, history, folklore and the human resource whose knowledge adds value to these assets. While it is the physical elements that give the heritage industry its purpose and character, the industry itself adds value to these assets. It is a reciprocal relationship.

So what might we gather under the term “heritage industry”? Firstly, research, as our understanding of heritage is predicated on this. The UCL Institute for Sustainable Heritage is a world leader, not only among universities, but also among museums, galleries, libraries and archives, as well as national science facilities and enterprises, all of whom can engage in research. All generate science, scholarship, skills and publications, data and technologies that are transferable to, and can be reused or re-purposed by, other industries as products, services, company prestige, enhanced marketing and networking opportunities. It can also give them access to funding and resources that would otherwise be beyond their reach and the exchange of formal and informal advice.

The heritage industry has therefore gone beyond the single claim that tourism revenue is generated by increased access to heritage (which in itself is made possible by heritage conservation and interpretation activities). But in order to seal its claim as an industry, heritage urgently needs to develop these downstream services – new services and products that are based on heritage data and assets for non-heritage sectors. Downstream services are likely to be an effective vector for the translation of heritage research into commercial or economic impact. Here are three examples:

- Start-up companies, SMEs and large companies should support the development of new heritage-based services and products for non-heritage sectors.
- The heritage industry should provide teaching resources to enable heritage to be used to support education programmes.
- The heritage industry should lead on knowledge exchange and transfer of heritage science and engineering know-how to other industry sectors.

These vital downstream services will seal the recognition and contribution that the heritage industry makes to the wider UK economy. Rather than being ashamed of describing heritage as an industry, it is time we recognised it as a vital development in ensuring not only its survival, but as the most effective way of spreading its benefits to wider society, including schools, companies and other sectors. A heritage industry that fosters entrepreneurship – now that is what will make policymakers listen up!
On 12 October 2017, the UK government published its long-awaited Clean Growth Strategy. Although it has since been widely covered in the press, relatively few commentators have mentioned the fact that climate policy is now officially part of industry policy again. I say ‘again’ because there is a neat circularity here – it is exactly 25 years since energy efficiency policy (as climate policy was then known) was taken away from the Department of Trade and Industry (DTI) to form the basis for the UK’s first Climate Change Programme.

When climate policy was absorbed back into the DTI’s successor, the Department for Business, Energy and Industrial Strategy (BEIS) in 2016, many were worried that it would get diluted or even cancelled. My view at the time was that BEIS could be a good thing for two reasons. First, we now have the Climate Change Act (CCA) which enshrines our climate obligations in law and, so far, the CCA has proved to be resilient, mainly thanks to the excellent work of the Committee on Climate Change. The second reason is that recent research shows that industry policy can be a pretty good way of delivering climate policy objectives. In the old Department of Energy and Climate Change (DECC), climate mitigation was isolated in Whitehall; DECC had the policy lead on energy efficiency, but no delivery mechanisms – the levers for reducing energy demand lay elsewhere. BEIS still doesn’t have all the levers – for example, building regulations are controlled by the Department for Communities and Local Government – but it does control industrial policy and thus has far more clout in the Cabinet.

Putting climate and industrial together has another, more subtle advantage when you get into the detail of how policy works. The current generation of energy efficiency programmes (developed in the early 2000s) try to leverage the value of energy cost savings, the so-called “win-win” approach. But for most companies the savings are so small compared to the hassle, up-front investment cost and the compliance risk required to implement them. The UK’s Carbon Reduction Commitment is a good example of this problem. The policy created many winners, but far more losers, and their voices have prevailed – it is due to be scrapped in 2019.

These problems led many countries, including the UK, to review their policies. The emerging consensus on what to do about it is to understand what motivates the winners. For example, why do some companies make a big fuss about energy efficiency when the cost savings are marginal? Can we exploit this understanding to create more winners? When you start looking, there are more winners than you expect. Retail chains flaunt their green credentials. Food companies and retailers advertise the carbon footprint of their products. FTSE 100 companies compete to occupy the most efficient office buildings. Local government replaces all their street lights with LEDs. Something other than profit is at play here.

Academic research shows that what is happening is that energy efficiency is being used to deliver wider company objectives, such as reputation. This is raising the internal profile, or “salience”, of energy efficiency to senior managers and the Board, which in turn makes it much more likely that the company will invest. These “salience drivers” are predictable: for retailers, energy efficiency boosts their reputation and staff welfare. For banks and energy utilities, it helps to offset the bad reputation of the sector. For the public sector, it shows leadership and fiscal responsibility.

The value of salience is that it allows policymakers to focus on where climate and competitiveness drivers reinforce, rather than conflict. This should help politically because it should only produce winners, and, as they get better at the policy, more winners should emerge. More importantly, in a post-austerity world, aligning climate and competitiveness allows government to work with the grain of the market and let industry do the heavy lifting without the need for costly subsidy programmes. In the past few years, a new generation of programmes have emerged based on this principle, such as energy performance labelling for buildings in Australia and SME networks in Germany and Switzerland.

So far, the UK government hasn’t copied any of these programmes. But a number of UK sectors are experimenting with salience principles and the Clean Growth Strategy shows that the government is starting to build the right platform for these types of programmes to flourish in the future.
Urban design education has an imperative to address rising socio-spatial inequalities and the acute proliferation of disputes over urban space. This imperative requires examination of the assumptions about how cities operate, the agency of design and the sources of innovation in the city. Yet orthodox approaches to urban design education have instead been complicit in normalising the processes that deepen uneven urban development, the commodification of design practices and the production of space. When these trends prevail, universities lose the ability to influence the new generations of professionals able to shape "just" urbanisms. Global universities cannot preclude their role in contributing to educate ethical, socially sensitive and politically committed practitioners of the built environment. At the Development Planning Unit, where almost three quarters of graduate students come from outside the UK and the EU, the MSc Building in Urban Design and Development (BUDD) course explores alternative urban design pedagogies to tackle spatial challenges in global south cities. For us, the notion of "global south" offers a perspective, rather than a fixed geography, to understand variegated, uneven urban development patterns and the potential to transform them. We frame cities in the global south as sites of innovation and our wide range of international students as an asset to engage in pluralist perspectives of city-making.

In this context, how do we explore the agency of urban design while pushing the boundaries of the praxis? Our MSc BUDD urban intervention studio focuses on a comparative account of contested urban settings as an introductory phase to the central practice module. In these settings, territorial control is disputed and the configuration of borders is central for shaping the urban form and spatial narratives. Here's an example: in conflict prone urban situations, urban design practices could operate as catalytic platforms for reconciliation between parties, helping to reclaim practices' political relevance.

changed the ways in which we frame and intervene in the built environment requires a critical engagement with the political nature of the production of space.

Changing the ways in which we frame and intervene in the built environment requires a critical engagement with the political nature of the production of space. Contemporary urban design practitioners often operate simultaneously in several regions. Using trans-local design frameworks to think across regions serves to frame the multiplicity of spatial agencies at work in each locality. Ultimately, exploring this approach aims at nurturing new spatial imaginations and future trans-local communities of progressive praxis, that weave new scales of solidarity among emerging urban design collectives.
An original brick from Water House, home to The Bartlett School of Architecture and The Bartlett School of Planning from 1974–2012. In 2016, having undergone a deep retrofit, the building reopened as 22 Gordon Street (see p.78).

The Gordon Street Klinker was made for The Bartlett's 22 Gordon Street home by brick makers Janinhoff. Slimmer than a standard brick, it was designed to enable an additional floor to be added to the building and to fulfil a key planning condition from Camden Council for a masonry building in the Bloomsbury conservation area (see p.81).