KNOWLEDGE CAPITAL

Making places for education, innovation and health
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A few years ago I visited Pittsburgh, not quite sure what sort of place I would find. ‘Steel City’ had born the brunt of the United States’ deindustrialisation of the 70s and 80s with the loss of hundreds of thousands of jobs. The resulting northern rustbelt is a key driver of President Trump’s current economic policies.

But instead of the down-at-heel city that one might have expected, I found a thriving economy – the regeneration of which observers ascribed to its burgeoning ‘eds and meds’ sector. Over the previous thirty years, education and health had grown to be major contributors to the city’s wealth creation. Today Pittsburgh has among the highest rates of employment in education and health care in the US.

The partnering of ‘eds and meds’ was first identified as a key economic driver of cities by the Brookings Institution’s metropolitan think tank some twenty years ago and since that time, with the growth of wider knowledge-based industries, universities are increasingly viewed not only as institutions of higher learning but as engines of economic growth and innovation.

Listed as the world’s top university city, with 14 in the world’s top 500 list, London is in prime position to benefit from the strength of the knowledge economy – an asset which is further reinforced by the London/Oxford/Cambridge ‘Golden Triangle’ in the wider metropolitan region. The strength of the sector will be of increasing importance in a post-Brexit economy, especially since – unlike banks and financiers – these institutions are wedded to the city and will not move away.

This NLA Research paper looks at how London must plan for the needs of this fast-changing economy. NLA itself sits in the shadow of the University of London’s Senate House and we see around us the impact of the clustering of knowledge-based institutions – from the Francis Crick Institute, the Sainsbury Wellcome Centre for Neural Circuits and Behaviour, and the UCL Cancer Institute, to the construction of the new Google and Deep Mind HQs at King’s Cross. The quality of the built environment, infrastructure, clustering and the location of amenities are essential if the knowledge economy in London is to thrive. We hope this paper will assist in the informed shaping of the city in response to its requirements.

Peter Murray
Chairman, New London Architecture
In the 21st century, knowledge and innovation are among the key drivers of urban prosperity in the age of greater automation, disruptive technologies and global communication. However, greater mobility and digitisation mean that physical location and proximity to other like-minded people have become ever more important in order to support the spontaneous personal interactions, sharing of ideas and inspiration that lead to innovation and advances in research to flourish.

The importance of collaboration as the prerequisite for innovation, and the need to accommodate ‘translational research’, i.e. the use of research to inform the development of commercial uses and applications, mean that buildings and spaces have to become more flexible and work ever harder to allow both for continuity and changing multiple uses over time. Universities, medical centres and research institutions are adjusting and adapting to new technologies, changing trends in working and methods of learning, and, most importantly, the increasing need for co-location of functions and people.

London has long been internationally recognised as a foremost global centre for higher and further education, a pioneering research hub for science and technology, and a home to some of the world’s leading medical centres, institutes and hospitals. Contributing to its advantageous position is its status as one of the world’s leading financial centres, giving businesses access to venture capital, specialist services and investment, and legal expertise – and its wealth of cultural and leisure amenities. Research and Development (R&D) expenditure in London has previously been estimated at £3.7 billion, accounting for 1.2% of London’s Gross Value Added (GVA). These sectors also play a major role in employment in the capital, with an overall total of 424,000 education sector and 575,000 health sector employees in 2016 – numbers expected to grow to 617,000 and 741,000 by 2050. It also forms one part of the ‘Golden Triangle’ alongside Oxford and Cambridge, a term referring to the area’s world-leading research institutions but also high growth in the technology, medicine, ICT and life sciences sectors.

However, in an age of rapid social and technological change, buildings and places for education and health will need to not only be digitally networked, but also even more highly adaptable, responsive, well-connected and even demountable – as well as affordable. They will need to continue to facilitate collaboration and personal interaction to drive forward innovation in research and personalisation of services and treatment.
The key priorities for future-proofing the education and health estate will be:

**A) GREATER FLEXIBILITY AND INTEGRATION ACROSS SERVICES, FACILITIES AND POLICY**

To create the truly ‘long life, loose fit’ city that will meet the changing demands of the health and education sectors, we will need different building typologies and approaches to planning – including transitional health facilities such as ‘patient hotels’ built adjacent to hospitals. At a citywide level, as noted in a 2018 NLA forum, policy frameworks need to be looser and more flexible to support closer collaboration, complementarity and connectivity across London and the South East.

**B) A WIDER RANGE OF LABS FOR START-UPS AND MORE SPACE IN WHICH TO SCALE UP**

The co-working model has already been adopted in London and the South East to meet demand among start-ups in tech and the commercial sector for offices with integrated business support and flexible leasing terms. Incubators and accelerators often linked to universities and institutes also provide valuable space for development of spin-off enterprises emerging from research. There is still, however, a significant lack not only of start-up but especially of grow-on space for companies that want to scale up but that need laboratory facilities alongside offices. A more nuanced understanding is required of market demand, especially in relation to relative price points.

**C) MORE QUALITATIVE AND CREATIVE APPROACHES TO UNDERSTANDING COLLABORATION OUTPUTS**

The success of collaboration is conventionally measured quantitatively, for example in scientific achievement and citations, number of businesses established, economic outputs and so on. However, there is still a gap in in-depth qualitative research into how collaboration leads on a practical level to innovation and how workspaces in education and health can foster this. In this area, built environment research itself can provide a way forward through interdisciplinary projects.

**D) BETTER AND MORE COHERENT TRANSPORT AND DIGITAL INFRASTRUCTURE**

London’s lack of effective digital infrastructure still poses a major potential barrier to growth for the city’s tech and science industries, including those in the fields of digital health and other emerging sectors. Digital infrastructure standards could be improved if developers and London’s great estates, both new and old, present a coordinated approach. In terms of physical infrastructure, there could be potential to further explore the use of drones in fast, targeted delivery of blood and medical products, for example. However, continued emphasis must also be placed on improving rail and transport connections in the Golden Triangle, especially between Oxford and Cambridge.

**E) AFFORDABLE HOUSING IN A MIX OF TYPES AND TENURES**

Across London and the South East, huge increase in demand as the population grows, combined with a lack of supply and new build, has made housing a critical issue in every city. While micro-homes might be a solution for undergraduate and postgraduate students, affordable housing for sale and rent for postdoctoral researchers, junior doctors and other early career professionals – as well as support staff who may not always qualify as ‘keyworkers’ – is especially scarce. Modular family housing and mixed-use schemes that integrate living with other functions may therefore be part of the way forward for future development, alongside the building of affordable homes within NHS estates that are looking to restructure and rationalise assets and land ownership.

**F) KEEPING CITIES ‘MESSY’**

Collaboration – especially between divergent disciplines – is rarely a simple, linear process in reality: it involves communication, deliberation and discussion, often at length. Cities such as London, with intricate economic ecosystems and networks built up over centuries of agglomeration, are also ‘messy’ and ‘unprogrammed’ in places, and it is this indefinable quality that is often most valued in the search for unforeseen breakthroughs. Ambitions to create world-class places for education, health and research, dedicated to the pursuit and applications of knowledge, must be integrated with the wider city economically, socially and culturally, but not at the expense of distinctive, layered urban character and quality that allow those unexpected encounters and revelatory discoveries to take place.

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6 EXECUTIVE SUMMARY
CHAPTER ONE

THE SHAPE OF LONDON’S KNOWLEDGE ECONOMY: HIGHER EDUCATION, SCIENTIFIC RESEARCH AND HEALTH

“Cities have been engines of innovation since Plato and Socrates bickered in an Athenian marketplace … The great prosperity of contemporary London, Bangalore and Tokyo comes from their ability to produce new thinking.”
Edward Glaeser, The Triumph of the City (2012)

1.1 WHAT IS THE KNOWLEDGE ECONOMY?
While cities have always been centres of knowledge – as places where like-minded people come together to discuss ideas – in the 21st century it is knowledge and innovation that are among the key drivers of urban prosperity. With the decline of economies based on natural resources, physical labour and manufacturing, the production of new knowledge – that is, innovation – can provide a city with competitive advantage in the age of greater automation, disruptive technologies and global communication.

Definitions of the knowledge economy or knowledge-based capital are still widely debated, but generally knowledge-based industries are those that relate to ‘a broad range of intangible assets, like research, data, software and design skills, which capture or express human ingenuity’ and that create high-wage employment1. In practical terms, this relates to industries and economic sectors broadly encompassing higher-level education and graduate research: science and technology; medicine, life sciences and healthcare; and advanced manufacturing. Some definitions also incorporate the wider creative and cultural industries; these will be referred to here briefly in relation to placemaking but are otherwise beyond the scope of this paper, which focuses briefly in relation to placemaking but are otherwise beyond the scope of this paper, which focuses

1.2 HOW DOES THE KNOWLEDGE ECONOMY SHAPE A CITY?
With the rise of the knowledge economy, a city’s economic growth and competitiveness in an age of globalisation has come to depend on its social and intellectual capital – the results of uniquely human qualities of creative analysis, critical thinking, sophisticated judgement and invention. Machines and technology can supply the data – and with the advance of artificial intelligence (AI) can also take on production, analytics and services: the burger-flipping robot being one of the latest publicised inventions2 – but it is human minds, working together, that still spark previously hidden connections, and challenge established modes of thought or approaches to products and services.

Businesses have always sought well-connected locations in order to reach markets and customers, but in the globalised economy a distinctive high-quality urban environment is vital to attract talented staff and entrepreneurs. Technological advances including Skype and virtual reality (VR) have made it possible to work in almost any place at any time, and to collaborate in real time, but conversely, greater mobility and digitisation mean that physical location and proximity to other like-minded people have become ever more important in order to support the spontaneous personal interactions, sharing of ideas and inspiration that lead innovation and advances in research to flourish. At the same time, these fundamental transformations in the way that we work, live and learn have started to break down barriers between established sectors, leading to a greater interest in interdisciplinary collaboration, for example between science and art, to generate new ways of thinking and practice. In academic discourse, knowledge itself is no longer seen as a fixed ‘truth’, but a fluid, non-hierarchical and changing set of concepts.

This emphasis on greater integration is being reflected in the urban environment. ‘Places for knowledge’ are not new – indeed, one of the best-known examples is ‘Albertopolis’, the South Kensington estate developed with the profits from the 1851 Great Exhibition in order to ‘increase the means of industrial and education and extend the influence of science and art upon productive industry’, through the foundation of

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2 Ian Brinkley, Defining the Knowledge Economy, Work Foundation (July 2006), p. 3.
Top: Napp Pharmaceutical, the first of the iconic buildings on the Cambridge Science Park, completed in 1981

Above: Laser-Scan, the first company to move onto the Cambridge Science Park in 1973

Right: Map of Albertopolis area 1951, an early example ‘Place for knowledge’