

White City and Imperial College London: a vision for growth, innovation and community

A WPI Economics report for Imperial College London

July 2020

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Matthew Oakley
Director

About Imperial College London

Imperial College London is one of the world's leading universities.

Founded in 1907, Imperial builds on a distinguished past – having pioneered penicillin, holography and fibre optics – to shape the future. Imperial researchers work across disciplines to improve health and wellbeing, understand the natural world, engineer novel solutions and lead the data revolution. This blend of academic excellence and its real-world application feeds into Imperial's exceptional learning environment, where students participate in research to push the limits of their degrees.

Imperial is developing its newest campus across 23 acres adjacent to White City station in West London. As it evolves, the White City Campus is fast becoming a centre of discovery and innovation, supporting the College's mission to achieve enduring excellence in research and education in science, engineering, medicine and business for the benefit of society. The campus will further enable co-location and collaboration between students, academics, businesses, entrepreneurs and the local community.

Foreword

In these unprecedented times, we need world class innovation and effective collaboration.

Imperial is the only university in the UK to focus exclusively on science, medicine, engineering and business. Our mission has always been to apply our world leading education and research for the benefit of society by working collaboratively.

Today, our founding mission is guiding us in the creation of a major new campus at White City where we are bringing together academia, business and the local community to innovate and collaborate in new ways. Our goal is to build a twenty first century campus that sustains a unique innovation ecosystem, powered by science and technology, that makes a difference locally and globally.

Situated in one of London's most exciting, dynamic and rapidly changing neighbourhoods, the White City campus is a major investment over 23 acres in West London.

The area is already home to pioneers in arts, culture, innovation, science and learning – including BBC, Westfield, Royal College of Art and Novartis – who together with the London Borough of Hammersmith and Fulham and the Greater London Authority are driving forward a shared vision for sustainable growth and inclusive regeneration.

We believe that the emerging innovation ecosystem at White City represents a new model for university campus development and community collaboration. The value of this ecosystem has been demonstrated in the recent COVID-19 pandemic – where we have seen researchers, health services, business and community partners come together in exceptional ways in order to improve our understanding, find solutions and support the most vulnerable in society.

In this report by WPI Economics, which was commissioned and completed before the COVID-19 pandemic struck, we hope to distil some of the key ingredients for creating a successful innovation ecosystem, based on our experience at White City and what we have learned from elsewhere. We continue to learn and refine our approach, but we believe the principles outlined in this report remain highly relevant as we seek to recover, rebuild and forge a brighter future.

Professor Neil Alford

**Associate Provost (Academic Planning)
Imperial College London**



Executive Summary

This report is about Imperial College London's new White City campus, a new investment across a 23-acre site situated at the heart of the White City Opportunity Area, with close links to Imperial's existing campuses at Hammersmith Hospital and South Kensington. It demonstrates the role the College is playing as an anchor institution in the area and shows how, with the right approach, the College can support the development of a thriving innovation district.

This report is not about quantifying the economic and social value already created by the College and likely to be created in the future. An accompanying report from WPI Economics quantifies the social value already created by the College's significant investment in programmes targeted at enhancing the lives of those living in and around the White City Campus. Future work will also be needed to quantify the scale and nature of the significant local and national economic and social benefits created by Imperial's presence in White City.

However, even without this work, it is already clear that Imperial's approach could be both transformational and provide key insights to other universities and local policymakers looking to regenerate deprived areas and create significant economic and social value.

The importance of this for White City and the surrounding areas is clear: in parts of West London, despite many economic strengths, growing industries and strong productivity, many personal economic outcomes are worse than in many parts of the Midlands and North of England and, when considered alongside the very high living costs in the Capital, this contributes to rates of poverty that are higher than in any other UK region.¹ The diversity of outcomes in the areas is clear to see and includes that:

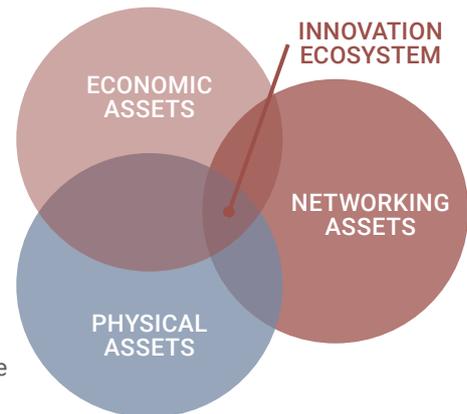
- The rate of worklessness in Kensington and Chelsea (22.7%) is the highest of all London boroughs and Hammersmith and Fulham (15.7%) is in the worst 10 performing London boroughs.
- Almost half of areas in Hammersmith and Fulham and over 35% of areas in Kensington and Chelsea are amongst the worst performing areas on the crime dimension of the Indices of Multiple Deprivation.
- Both Hammersmith and Fulham and Kensington and Chelsea have very low rates of education, skills and training deprivation, with 66% and 80% respectively of areas in the boroughs amongst the best performing in the country and none in the bottom fifth.

The causes of these mixed outcomes are varied, but whatever the causes, there is a clear potential to drive sustainable and inclusive growth in the area by building on the shared vision for regeneration which began with White City Opportunity Area. The creation of an innovation district could be a major part of that vision.

Why an innovation district?

Examples from around the world demonstrate that innovation districts attract and combine world class scientific research, businesses, innovators and investors, to create significant economic and social benefits. The approach that the College is taking in White City is built on international evidence which shows that a successful innovation district relies on supporting the perfect blend of economic, physical, and networking assets.ⁱⁱ

- **Economic Assets** consist of innovation drivers, innovation cultivators and neighbourhood amenities - they are the firms, institutions and organisations that catalyse and support growth in an innovation-rich environment.
- **Physical assets** refer to the public and privately-owned space, buildings, streets and other infrastructure which are arranged to stimulate connectivity, collaboration, and innovation.
- **Networking assets** are the relationships between individuals, firms, and institutions that have the potential to generate, sharpen, and/or accelerate the advancement of ideas.



When these three assets come together, they can create an *innovation ecosystem*. Within this, the College is leveraging its position as a global top ten university with a world-class reputation in science, engineering, business and medicine to adopt an “anchor plus” model of innovation districts. The approach relies on large scale mixed-use development that is centred around a major anchor institution and a rich base of related firms, entrepreneurs and spinout companies involved in the commercialisation of innovation.

This approach is different to the numerous initiatives like Enterprise Zones, Business Improvement Districts and various forms of clusters and research parks, which have had mixed success in the UK.ⁱⁱⁱ There are three ways in particular that innovation districts navigate the failures of previous approaches to deliver transformational, inclusive and sustainable growth and opportunities:

Opening up ideas: Innovation districts focus on bringing together disparate sectors and specialisations (e.g. information technology and bioscience, energy, or education) and cross-fertilising ideas or approaches in order to create new products, technologies and solutions.^{iv}

Growth without boundaries: In innovation districts success is not about just delivering economic benefits to the entrepreneurs and businesses that are part of the district. Instead, innovation districts are about bringing benefits and opportunities to existing residents and businesses. Examples include employment and educational opportunities and investment in affordable housing, education, physical and social infrastructure.

Sustainable and inclusive regeneration: Creating an open community is one aspect of the approach of innovation districts that contributes to a greater likelihood of sustainable and inclusive regeneration. Another is the focus on placemaking. This ensures that the introduction of modern and aesthetically pleasing architecture, shared spaces, green spaces and areas to socialise, all encourage people to utilise the area.

Developing a successful innovation district

This means that, as well as bringing talent, investment, businesses and research into an area, successful innovation districts leverage the existing resources and capabilities of the communities that are already resident in the area. In doing so, they create further economic benefits as well as providing opportunities and improved outcomes for local communities.

There are many examples of innovation districts around the world, with the most commonly cited example being the Kendall Square area that is often regarded as ‘the most innovative square mile on Earth’. Now home to some of the world’s largest technology and biotech companies and over 55,000 jobs,^v and all spurred by the work of MIT to develop an innovation district.

Each of the examples in this report demonstrates the potential of innovation districts. However, as with all approaches to regeneration and development, they show that delivering transformational, inclusive and sustainable growth is not always straightforward. Based on these experiences, we have drawn out five principles that appear to drive the success of innovation districts.

1. **Planning for success:** Build and share a vision with the local community, anchor bodies, businesses, employees and local government. This is not just about the development of the district but also its evolution over time and how opportunities can continue to be opened up to residents, business and entrepreneurs.
2. **Do not try to pick winners:** Provide the space and infrastructure for the organic growth of innovative clusters and ensure that the focus of innovation district matches the specific strengths of the city or region in which they are based.
3. **Diversity is key to success:** Innovation districts succeed by bringing together seemingly unrelated sectors and industries to collaborate and innovate. So actively encourage and support organisations of different sizes, sectors, specialisms and status to collaborate.
4. **It’s good to be together:** Facilitate business, social and developmental interactions between people and businesses by using space and activities. Here, social interactions and chance meetings are as important as structured business interactions. Programmes to develop skills and networks can also drive the connectedness of the district.
5. **Embed inclusion:** Plan, invest in and deliver opportunities for the local community, which improve outcomes and facilitate new insights and knowledge. This is about using the expertise and position of the anchor institution to deliver programmes and support that can be transformational. It is also about being open with innovation, involving the community and inspiring the next generation of talent. The key here is that this is not a given; it needs significant planning and commitment.

Imperial is already taking forward significant work in each of these areas, summarised in the section below.



Figure 1: Five key principles for developing a successful innovation district, and the approach of Imperial at its new campus centred on White City



Maximising the potential of an innovation district in White City

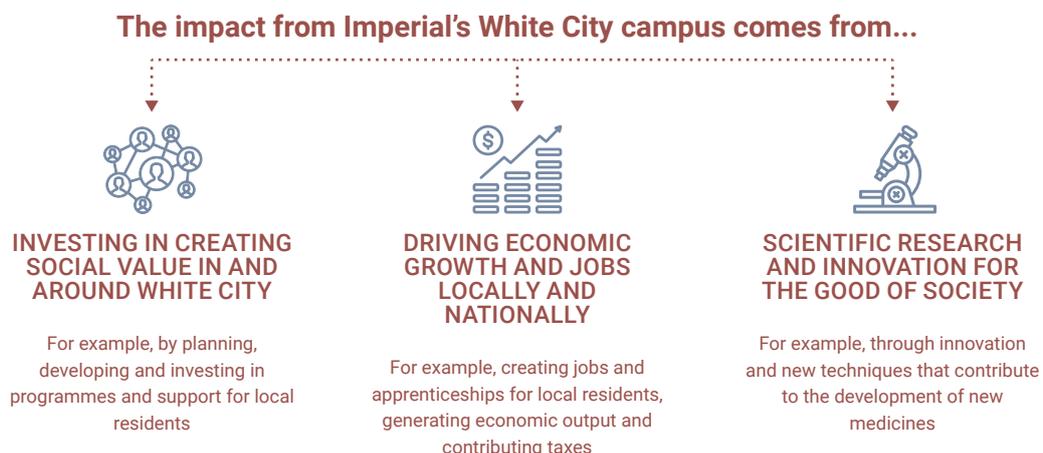
It is clear that the College has already taken great steps to develop the foundations of a thriving innovation district in White City. The benefits of this to local residents and businesses and the West London economy should be significant.

There could also be significant benefits to the national economy. The obvious benefits include attracting world class talent and international investment to the UK. However, there could also be significant spillovers from the work that is being undertaken in White City and the chance to build the principles of successful innovation districts out across the UK. A key example of this is the real opportunity to think more broadly about the role that Imperial and its partners could play in the wider network of clusters, hubs and innovation centres that are developing across London and the rest of the UK. More broadly, the products, approaches, techniques and services developed and delivered by researchers and businesses in White City could have transformational impacts on the whole of society.

The progress made is already clear. For example, Novartis has moved its UK headquarters to the WestWorks building at White City Place. This is a significant development; Novartis were one of the first major businesses to locate at Kendall Square. The similarities and potential here are clear, and the announcement of its relocation made it clear that significant drivers of this choice were both the emerging cluster centred around White City Place and the presence of Imperial’s White City campus.^{vi}

The challenge now is to ensure that this early success is continued, and a thriving innovation district is developed. This will require a consistent focus on each of the five principles that drive successful innovation districts. International evidence shows that this has proven more difficult for some of the principles. In particular, many innovation districts have failed to realise their potential to embed inclusion and spread benefits to the local community. In this respect, the College has already made a good start by developing a business plan for its social investment and a separate report from WPI Economics has developed a framework for understanding the impact of this and provided estimates of the social value created to date.

Going forward, the College will also need to focus on understanding what works and what needs to change. To do this effectively, the College will need to understand the impact it is having both in terms of social value and much more broadly. Given the scale of the College’s operation and diversity of its actions, this will require a range of factors to be considered. In particular, there are three key areas where the College’s impact from its investment in White City could be measured.



Understanding the College’s impact in each of these areas will be fundamental to ensuring that the College’s future investments and activities maximise the impact of the innovation district emerging in and around White City. This understanding can also support other organisations, for example:

- Local and national policymakers with a role in supporting economic growth and living standards in West London, who can draw on this evidence to better target and tailor their actions to support the College’s work;
- Policymakers looking to regenerate and drive economic growth and living standards in other parts of the country, who can use the experience of the College as an exemplar for how to undertake place-making and local economic development; and
- Other universities looking to maximise their economic and civic impact, who can draw on the experience of Imperial to develop their own similar approaches.

This means that, as well as Imperial playing a role in directly delivering significant economic and social value, its actions could also have an indirect effect by supporting others to learn from the work it has done. This underlines the importance of the work currently being undertaken by the College in White City. By taking this forward, continuing to invest in social value, as well as economic value, the creation of an innovation district could be transformational both for the area and for economic policy and practice right across the UK.

Table 1: Summary of locations at Imperial’s White City Campus

FOCUS	LOCATION	WHAT?
Enterprise, innovation and commercialisation	Imperial College Advanced Hackspace (ICAH)	A unique community of like-minded makers, hackers, inventors and entrepreneurs. Includes bio lab, electronic and digital manufacturing, metal and wood workshop and electrical and electronic engineering, amongst others.
	The Invention Rooms	Shared space aimed at fostering innovation through a collaboration between the College and the local community. Includes cutting-edge workshops, design studios and interactive spaces, which are used to run a range of programmes for young people from the local area or simply for people or relax over a cup of coffee.
	Translation & Innovation (I-HUB)	The I-HUB provides space for companies to work alongside Imperial researchers and turn scientific and technological innovations into new products and services. Its 185,000 sq ft offers a range of fully fitted and bespoke laboratories, research facilities and offices. It is designed to support businesses large and small, including start-ups and fast-growth companies as well as established biotech and scientific research organisations.

Enterprise, innovation and commercialisation	Imperial White City Incubator (at the I-HUB)	The I-HUB is home to the Imperial White City Incubator (IWCI). A wholly owned subsidiary of Imperial College London, IWCI offers flexible workspace and support for young businesses.
	Central Working (at the I-HUB)	The I-HUB is also the location of Central Working White City – a shared workspace collaboration between Central Working and Imperial College London ThinkSpace.
	Scale Space	The 243,000 sq ft Scale Space will be the first stage of development of the south side of the Campus. It is a joint venture launched by Imperial and digital-venture builder Blenheim Chalcot to support, research and scale fast-growth digital businesses.
	Forest House	Forest House has been home to Autolus since 2015. Autolus is a biopharmaceutical company developing next-generation, programmed T cell therapies for the treatment of cancer. It was founded and spun-out from UCL in 2014, and launched an IPO in 2018.
New Imperial multi-disciplinary research Hubs	Molecular Sciences Research Hub (MSRH)	A new research home for the Department of Chemistry, the Molecular Sciences Research Hub (MSRH) encourages collaborative scientific working. It brings together nearly 800 scientists, clinicians, engineers and business partners who are collaborating under one roof in a way that they have never been able to before.
	Sir Michael Uren Hub	Once in use, the Sir Michael Uren Biomedical Engineering Research Hub will combine the latest medical research and engineering to improve the treatment and diagnosis of diverse medical conditions, from finding ways to treat dementia to creating bionic limbs.
	School of Public Health	Once built, the School will pioneer new approaches to society's most pressing healthcare challenges. The multidisciplinary hub will provide collaborative, flexible, and interactive spaces for the College's world-leading academics, talented students, and outstanding community engagement with the local White City community. With a focus on intervention and prevention, the School will harness the power of data and technology to understand trends in population health and bring health innovations to those who need it most.

	GradPad Wood Lane Studios	Gradpad at White City opened in September 2012 and comprises 606 all-inclusive studio flats for postgraduate students. It has a gym, laundry, 24 hour reception, and secure bicycle storage.
Residential	Eighty Eight Wood Lane	Eighty Eight Wood Lane has 59 apartments that are available to rent for Imperial keyworkers at a range of discounts to market, with the remaining 133 units to be rented on the open market. One- and two-bedroom accessible apartments are available.
	Shinfield Street	The Shinfield Street apartments next to the campus are purpose-built for staff of Imperial College London and Imperial College Healthcare NHS Trust.

Section 1: Introduction

This report is about White City, its place within the wider West London economic and social ecosystem, and the opportunities that lie ahead for the area. It centres on the role that Imperial College London can play as an anchor institution as it develops its new campus (box 1). It shows how, with the right approach, the College and other organisations located around it can develop a thriving innovation district that links into clusters developing in other parts of West London and, indeed, more broadly across the Capital.

Of course, the College is not alone in seeing the opportunities in White City; other developers including Westfield London, Stanhope, Mitsui Fudosan and St James are all undertaking (or have recently undertaken) significant new developments or largescale extensions of existing sites. There is also significant development taking place across the rest of West London, most significantly as part of the work of the Old Oak and Park Royal Development Corporation (OPDC). This means that while, as an anchor institution in White City, Imperial will play a major role, the potential of an innovation district at White City and, indeed, West London will only be realised if each of these major organisations work together.

Box One

Imperial College London and White City

Imperial's new White City Campus is a new investment across a 23-acre site. It is situated at the heart of the White City Opportunity Area, with close links to Imperial's existing campuses at Hammersmith Hospital and South Kensington, as well as developments underway across West London.

State of the art research facilities are open for scientists, engineers, medics, businesses and the community to co-locate, prototype ideas and build new business opportunities. For example, multidisciplinary research facilities (including molecular sciences and biomedical engineering) are already open in the northern section of the site, alongside a network of innovation spaces for businesses of all sizes – from major corporations, high-tech and high-growth companies to SMEs, startups, spinouts and entrepreneurs – to work alongside Imperial at every stage of their development and growth.

As well as accommodation for postgraduate students and a residential building, the site also already houses, or it set to house, a number of centres focussed on working with and involving both the local community and the widest possible range of would-be inventors and entrepreneurs. Important aspects of this are The Advanced Hasckspace, The Invention Rooms, and the School of Public Health.

All are exciting and important ways that the College is aiming to make use its internationally recognised research capabilities to make a real impact on innovation, growth and society, that is not only felt locally, but also across West London and the Capital. More generally, the approach can also be a model for development and regeneration right across the UK and, indeed, internationally.

Major steps have already been taken. For example, in November 2018, Novartis announced that it would be moving its UK headquarters to the WestWorks building at White City Place. This is a significant development; Novartis were one of the first major businesses to locate at the world-renowned innovation district at Kendall Square. The similarities and potential here are clear, and the announcement of its relocation made it clear that significant drivers of this choice were both the emerging cluster centred around White City Place and the presence of Imperial's White City campus.^{vii}

These economic developments are clearly important. But this report is not just about economics. It highlights the importance of thinking about place and ensuring that economic success is not something that is brought to an area, but something that grows out of it. In this respect, examples from around the world demonstrate that, as well as attracting businesses, innovators and investors, successful innovation districts leverage the existing resources and capabilities of the communities that are already resident in the area. Importantly, it shows that, when done well, this sort of development should both play a major role in the economic success of the area, region and country in which it is located and provide opportunities for improved wellbeing and better living standards for those who already live in and around the area.

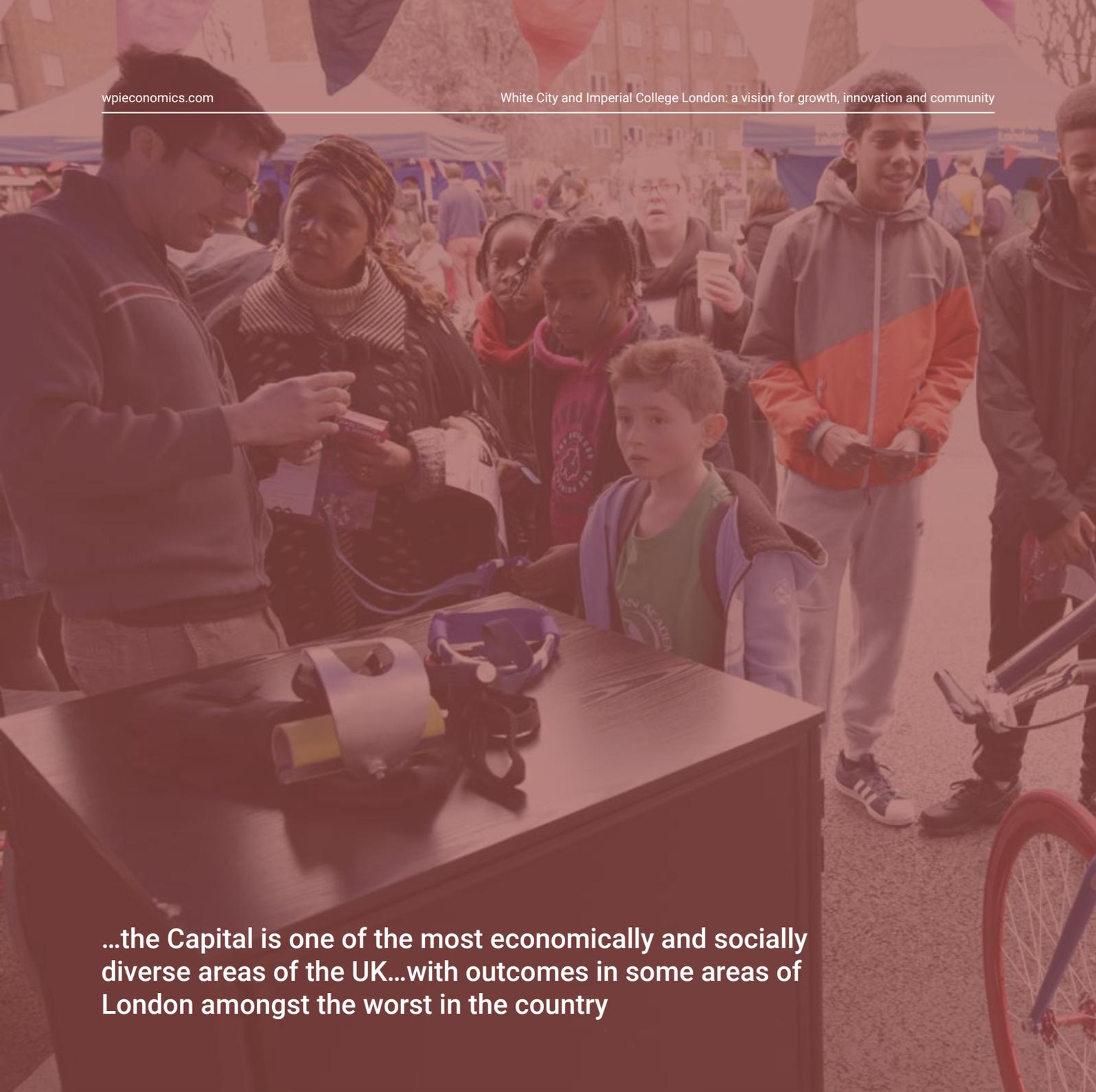
Why this matters

The next sections demonstrate the existing strengths of White City and its surrounding areas, but also the challenges that they face. Many of these have been driven by large scale exits of major employers and a historic lack of a clear plan for regeneration, which needs to be tackled in future. However, this is not just a story of regeneration and improved outcomes in one part of West London; instead the approaches being adopted, and impact of the action taken, provide lessons to local and national policymakers and businesses right across the UK.

This is particularly relevant as Governments over the last 20 years have become more and more focussed on the 'economics of place'; whether it be economic regeneration, spreading the proceeds of growth or a new industrial strategy, whilst the focus is different, the idea that places are central to determining the UK's success in delivering growth, living standards and wellbeing is understood.

The reasons are clear; it is well known that economic and social outcomes vary significantly across the UK and, in response, a range of national and local strategies, often in collaboration with the private sector, have been developed to tackle this. A key example is the focus that has been placed on the North-South divide in England, with calls for increased investment and targeted support to rebalance, or most recently "level up", growth across the country.

However, economic and social outcomes often vary as much within regions, cities and localities as they do between them. A key example is the Capital. London is one of the most economically and socially diverse areas of the UK, with outcomes in some areas of London amongst the worst in the country. For example, while GVA (a measure used to understand the contributions of areas or sectors to the economy) per head is around £50,000 or above in many central and western London boroughs, it is as low as £16,000 per head in others. For these areas, broad economic outcomes are worse than many parts of areas typically regarded as being more deprived, for instance the Midlands and North of England and, when considered alongside the very high living costs in the Capital, it is no surprise that recent research shows that the rate of poverty in London is the highest of any region of the UK.^{viii}



...the Capital is one of the most economically and socially diverse areas of the UK...with outcomes in some areas of London amongst the worst in the country

In many respects, this is already well known; across the UK, a range of regeneration zones and areas are already in place and regeneration programmes are already underway. Local Industrial Strategies are also being developed. However, the progress and insights from these important schemes are rarely heard in public discourse. This means that important lessons are not shared with either local or national policymakers, or the organisations and agencies in the private and third sector who are involved.

This report begins to address this. It provides detailed insights into the work Imperial College London is undertaking to develop a thriving innovation district in White City.

Section 2: Imperial College, White City and surrounding areas

To understand the significance of what the College is doing in and around White City, the impact that this is already having and the potential for the future, it is important to first understand the existing economic and social make up the area.

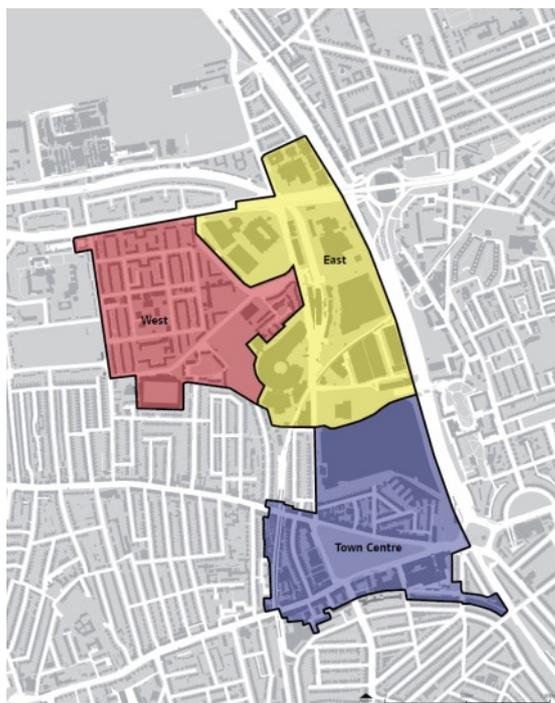
The first thing to note is that, as highlighted above, when considering social and economic outcomes, there are a number of geographic levels at which the College's presence could be viewed. The College's new campus itself sits within the Shepherds Bush Green and College Park and Old Oak wards of Hammersmith and Fulham, so it is clearly important to understand the situation in these communities.

However, the Campus also borders other wards in Hammersmith and Fulham and, indeed, Kensington and Chelsea. The College's development is also a core part of activity taking place across the wider White City Opportunity Area (see figure 2). The Campus is also intrinsically linked to activity underway at the College's Hammersmith and South Kensington campuses.

More broadly, it is also important to consider other significant developments being undertaken in West London. Most obvious is the work being undertaken by the Old Oak and Park Royal Development Corporation (OPDC). Old Oak Common is the one place where HS2 and Crossrail will meet and the ambition of OPDC is to use this opportunity to generate significant benefits including 65,000 new jobs and 25,500 new homes.

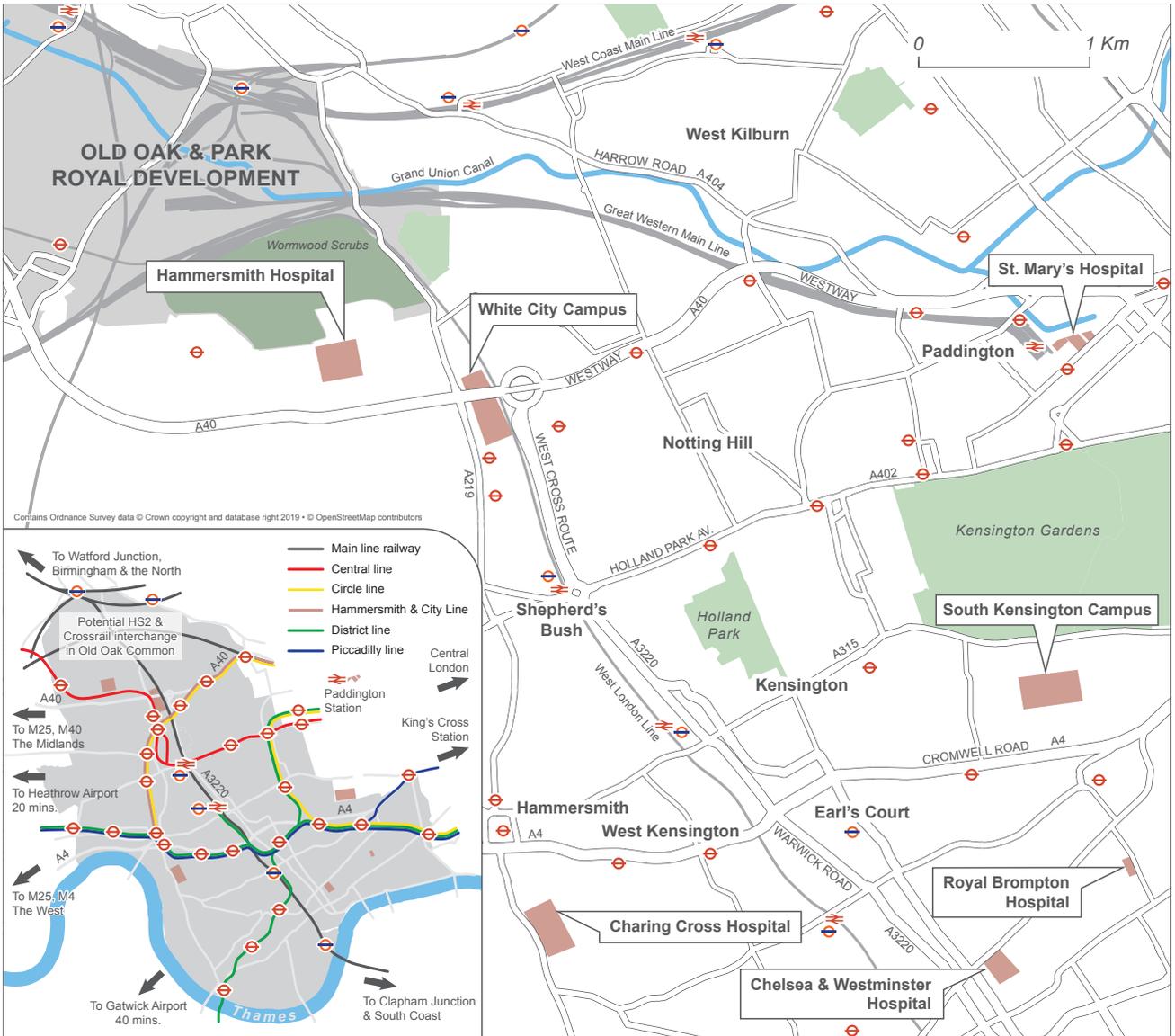
The potential importance for White City is clear: the westerly boundary of the OPDC opportunity area meets Imperial's Hammersmith Hospital Campus and is only separated from the heart of White City by the Westway (figure 3). Together this activity across West London, combined with the emergence of innovation hubs across the UK (see below) provide a real opportunity for collaboration and mutual success, in turn this could be transformational both for the communities in and around White City and, the whole of West London. As such, the following sections provide the key insights that can be drawn from analysis of the communities and business environment around Imperial's new campus and, more broadly, West London. More detail is provided in the annex.

Figure 2: White City Opportunity Area



Source: Hammersmith & Fulham

Figure 3: The White City Campus is situated within the White City area, a 270 acre strategic regeneration zone in Central West London.

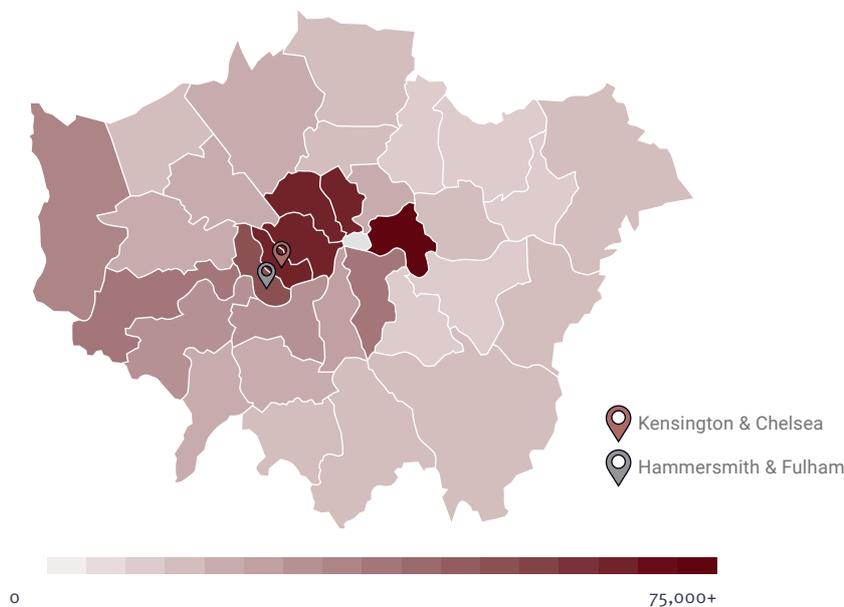


People, communities and socioeconomic outcomes

White City, Hammersmith and Fulham, Kensington and Chelsea and, in fact, the whole of West London are areas of significant diversity; both in terms of their populations and the socioeconomic outcomes they experience. For example, we see that more than three in ten (31.9%) of people in Hammersmith and Fulham identify as belonging to an ethnic minority. In a number of wards, including Wormholt and White City, more than half identify as being from an ethnic minority. This compares to just 14% of people identifying as being from an ethnic minority across England as a whole.

This diversity is also clearly seen in a range of socioeconomic outcomes experienced across West London. Figure 3 shows that Hammersmith and Fulham, Kensington and Chelsea and other parts of West London have some of the highest levels of GVA per capita in the Capital. In fact, on this measure some would be judged as among the most affluent local authorities in the UK.

Figure 3: GVA per head, by London Borough

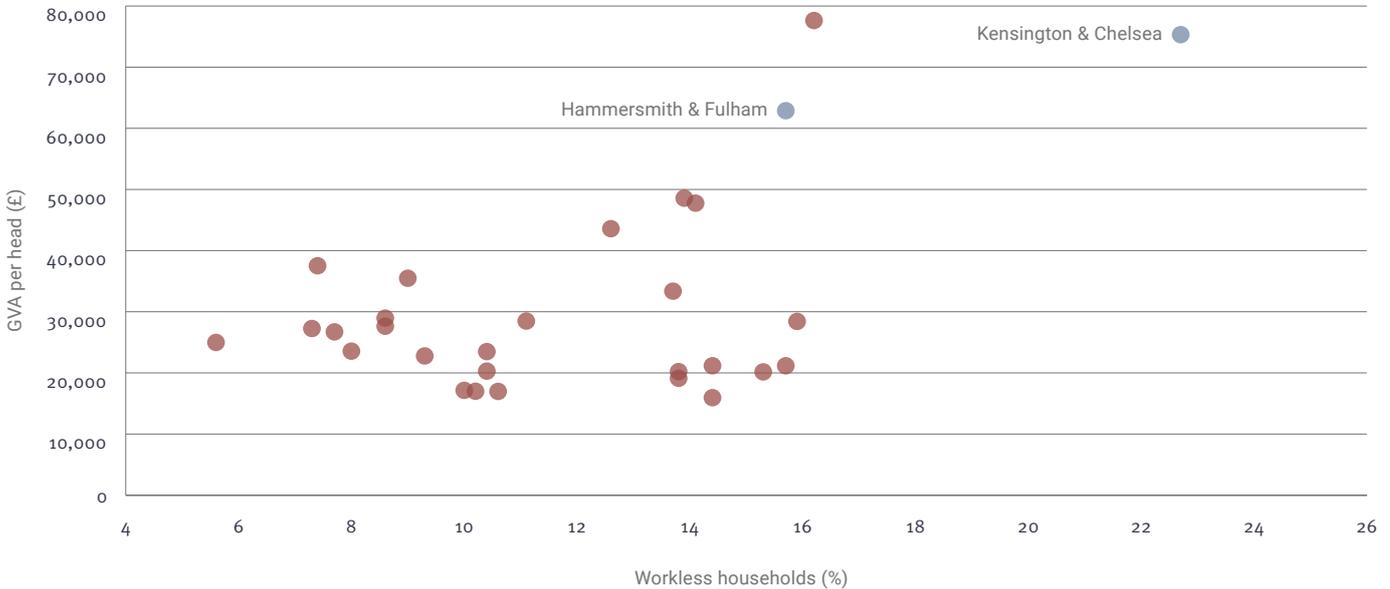


Source: ONS

However, figure 4 provides one indication of the diversity of outcomes experienced within this. It shows that while Hammersmith and Fulham and Kensington and Chelsea (shown by grey dots) perform well on measures of economic output, they have some of the highest rates of worklessness in the capital (Kensington and Chelsea - 22.7% of all working-age households and Hammersmith and Fulham - 15.7%). There is a similar story with unemployment; Hammersmith and Fulham (and London overall) have consistently had an unemployment rate that has been above that in the rest of the UK (although the gap has been closing).^{ix}

Of course, as with other indicators, unemployment and wider labour market outcomes vary significantly within each of the boroughs. One way of exploring outcomes at a local level is to look at results from the Indices of Multiple Deprivation (IMD). These provide a detailed insight into the experiences of people at Lower Super Output Level,^x across a range of dimensions, including income, health, disability, crime and education. The combination of all of these dimensions provides the Index of Multiple Deprivation. Again, this demonstrates the diversity in outcomes in West London.

Figure 4: GVA per head and proportion of workless households, by London Borough



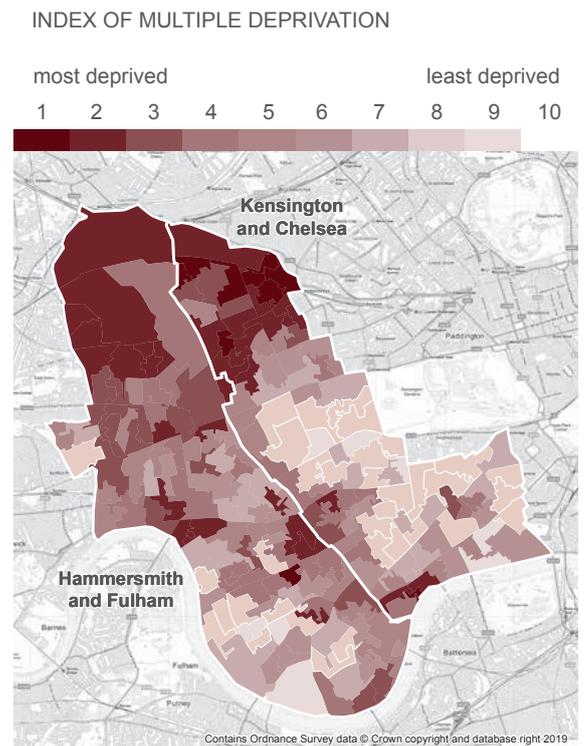
Source: ONS, GLA

Figure 5, shows this for Hammersmith and Fulham and Kensington and Chelsea. For Hammersmith and Fulham, there is a stark difference between the North and South of the borough; with areas in the North amongst the worst ranking areas in England in terms of multiple deprivation, and areas in the South amongst the best ranking.

The conditions affecting residents’ lives vary dramatically across Hammersmith and Fulham and Kensington and Chelsea, illustrating the extent to which the campus is situated in a part of the country characterised by extremes. For example, we see that:

- **Crime:** Almost half of areas in Hammersmith and Fulham and over 35% of areas in Kensington and Chelsea are amongst the worst performing areas on the crime dimension of the Indices of Multiple Deprivation.
- **Living environment:** Thanks mostly to the poor-quality outdoors environment resulting from their central location, the vast majority of areas in Hammersmith and Fulham (83%) and Kensington and Chelsea (98%) rank amongst the worst in the country for the deprivation of their living environment.

Figure 5: Indices of Multiple Deprivation, Lower Super Output Level – Hammersmith and Fulham



Source: WPI Economics, MHCLG

- **Education, skills and training:** Both Hammersmith and Fulham and Kensington and Chelsea have very low rates of education, skills and training deprivation, with 66% and 80% respectively of areas in the boroughs amongst the best performing in the country and none in the bottom fifth.^{xi} All of the neighbourhoods with the lowest-ranked education, skills and training scores (those in the third decile nationally) are in the north of their respective boroughs, again showing the diversity of outcomes seen across the boroughs.
- **Income:** More than four in ten neighbourhoods in Hammersmith and Fulham are amongst the worst performing in country on this dimension of the IMD. While 40% of neighbourhoods in Kensington and Chelsea are amongst the best performing in the country, 30% are amongst the worst performing.

Business environment

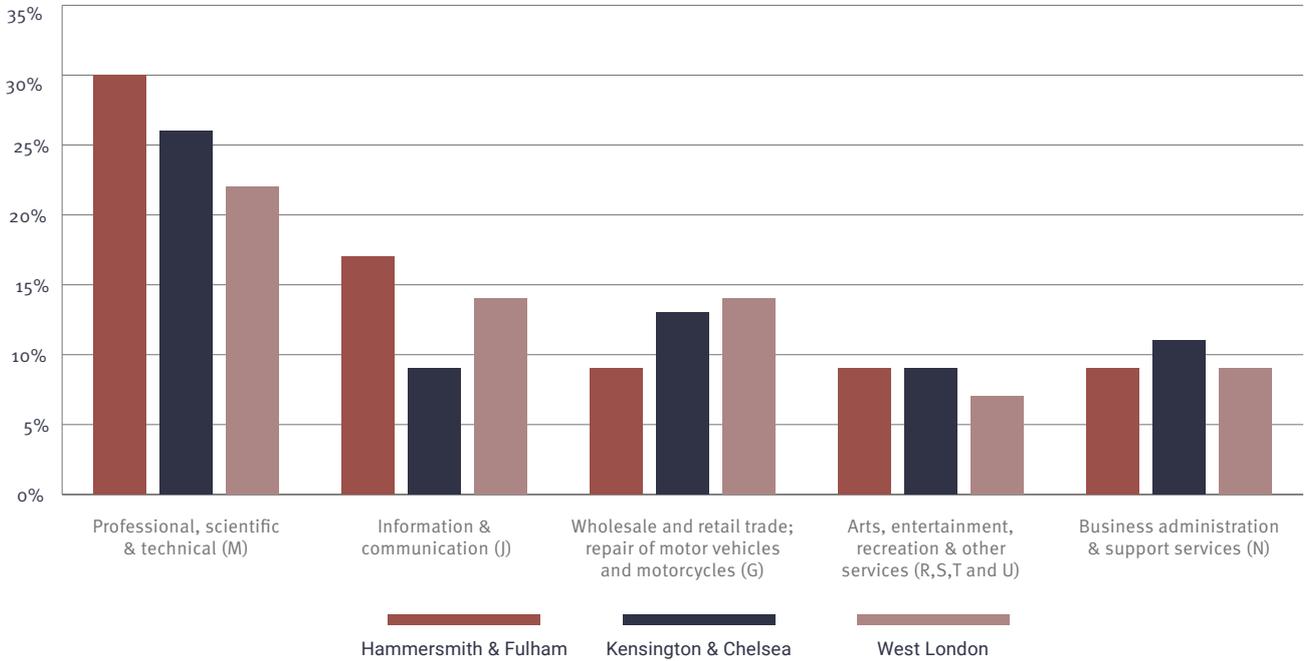
It is impossible to assess economic and social outcomes across West London without understanding the make up of the businesses that are resident there. These businesses are the foundation for the innovation and commercialisation that the College is looking to drive in White City; provide jobs for local residents; attract new workers and investment; and, along with their owners and employees, are the lifeblood of the local community.

There were close to 113,000 businesses based in West London in 2018. This represents over a 30% growth since 2010, much higher than the growth in businesses in England overall (22%). Of these businesses, figure 7 demonstrates that more than nine in ten (91.7%) were micro businesses, with less than 10 people.

This distribution of the size of businesses is relatively similar to the rest of England. Figure 6 breaks down these businesses by industrial sector, showing that the two biggest categories of businesses in West London (and in Hammersmith & Fulham and Kensington & Chelsea) are *professional, scientific and technical* and *information and communication*.

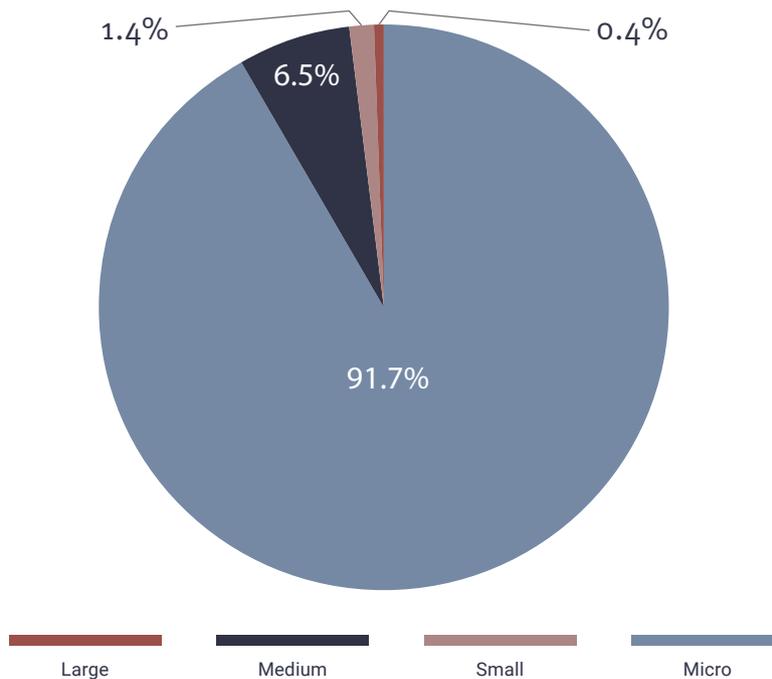


Figure 6: Composition of businesses in West London, by industrial sector size (top five sectors - 2018)



Source: NOMIS, WPI Economics

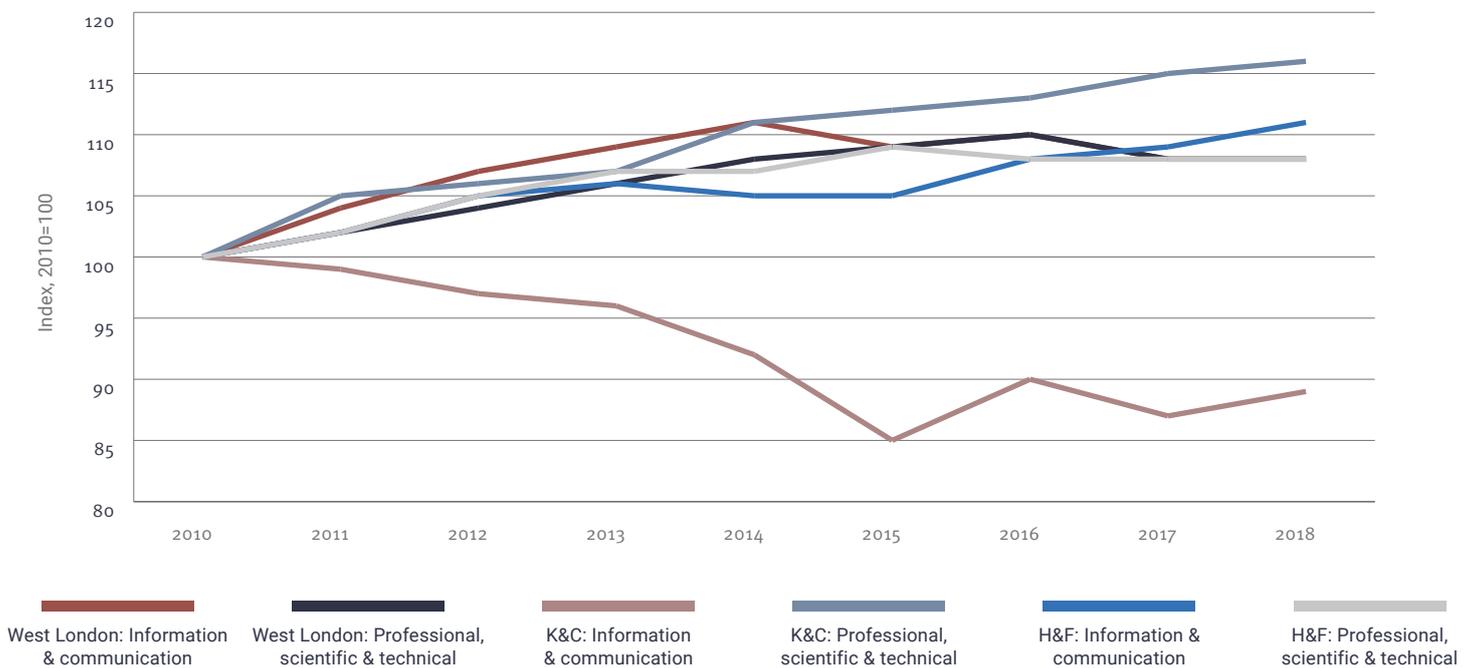
Figure 7: Composition of businesses in West London, by firm size (2018)



Source: NOMIS, WPI Economics

Figure 8 shows how this has changed over time. It shows that, across West London, Hammersmith and Fulham and Kensington and Chelsea, the period 2010 to 2018 saw an increase in the share of businesses taken by those in the information and communication and professional, scientific and technical sectors. This is true, of course, apart a significant share of businesses taken by the information and communication sector in Kensington and Chelsea.

Figure 8: Index of change in sectoral share of businesses, selected industrial sectors, 2010 = 100



Source: ONS, WPI Economics



Table 2 breaks this down in more detail, showing that the majority of the reduction in firms in this sector came from *motion picture, video and television programme production, sound recording and music publishing activities*. This hints at the important role that the BBC had previously played in supporting businesses in the area. It also clearly demonstrates the importance of considering the potential impact of Imperial, and the other businesses in the White City opportunity area, in neighbouring boroughs, rather just in the immediate surrounding areas.

Table 2: Breakdown of firms in “information and communication” sector, by Borough (% of all firms in sector)

	HAMMERSMITH & FULHAM			KENSINGTON & CHELSEA		
	2010	2018	CHANGE 2010-2018	2010	2018	CHANGE 2010-2018
Publishing activities	9%	7%	-1.7	12%	11%	-1.3
Motion picture, video and television programme production, sound recording and music publishing activities	33%	32%	-1.0	40%	33%	-7.4
Programming and broadcasting activities	3%	2%	-0.8	2%	1%	-1.0
Telecommunications	2%	2%	-0.5	3%	2%	-0.7
Computer programming, consultancy and related activities	49%	54%	4.2	39%	49%	10.4
Information service activities	4%	3%	-0.1	4%	4%	-0.1

Source: NOMIS, WPI Economics

Of course, the exit of a significant employer and driver of wider business growth is likely to represent a challenge to the business and economic environment in the area. However, table [2] also demonstrates a strong increase in *computer programming, consultancy and related activities* in both Hammersmith & Fulham and Kensington & Chelsea. It was also demonstrated above that West London has a strong position in *professional, scientific and technical* sector. This is clearly demonstrated in table [2], which shows that businesses in the professional, scientific and technical sector in Hammersmith and Fulham account for a twelve-percentage point larger proportion of businesses in the borough than is the case in the rest of England. In contrast, compared to the rest of the rest of England both of the boroughs have a lower proportion of businesses in sectors including construction and accommodation and food services, and Hammersmith and Fulham has a lower proportion of businesses in the retail sector.

Table 3: Comparison of business sectors (percentage point difference in proportion of total businesses)

SECTOR	DIFFERENCE TO ENGLAND				DIFFERENCE TO LONDON AVERAGE		
	HAMMERSMITH & FULHAM	KENSINGTON & CHELSEA	WEST LONDON	LONDON	HAMMERSMITH & FULHAM	KENSINGTON & CHELSEA	WEST LONDON
Agriculture, forestry & fishing (A)	-4.1%	-4.0%	-4.2%	-4.2%	0.0%	0.2%	0.0%
Mining, quarrying & utilities (B,D and E)	-0.3%	-0.2%	-0.2%	0.0%	-0.3%	-0.2%	-0.2%
Manufacturing (C)	-2.7%	-2.7%	-2.2%	-2.3%	-0.4%	-0.4%	0.2%
Construction (F)	-6.0%	-7.1%	-1.4%	-2.2%	-3.8%	-4.9%	0.7%
Motor trades (Part G)	-1.9%	-2.3%	-1.0%	-1.5%	-0.4%	-0.8%	0.5%
Wholesale (Part G)	-1.5%	-0.1%	0.7%	-0.2%	-1.3%	0.0%	0.8%
Retail (Part G)	-1.7%	1.5%	0.3%	-0.5%	-1.2%	1.9%	0.8%
Transport & storage (inc postal) (H)	-3.0%	-3.0%	-0.7%	-1.7%	-1.3%	-1.2%	1.0%
Accommodation & food services (I)	-1.8%	0.0%	-1.0%	-0.9%	-0.8%	0.9%	-0.1%
Information & communication (J)	8.4%	0.7%	5.5%	4.9%	3.5%	-4.2%	0.6%
Financial & insurance (K)	-0.7%	1.4%	-0.5%	0.7%	-1.4%	0.7%	-1.1%
Property (L)	-0.3%	3.4%	0.7%	1.0%	-1.2%	2.4%	-0.3%
Professional, scientific & technical (M)	12.4%	8.3%	3.8%	5.4%	6.9%	2.8%	-1.7%
Business administration & support services (N)	0.6%	1.9%	0.2%	1.4%	-0.8%	0.5%	-1.2%
Public administration & defence (O)	-0.3%	-0.3%	-0.3%	-0.3%	0.0%	0.0%	0.0%
Education (P)	0.4%	0.0%	0.0%	-0.1%	0.5%	0.1%	0.1%
Health (Q)	-0.1%	-0.3%	-0.1%	-0.1%	0.0%	-0.1%	0.0%
Arts, entertainment, recreation & other services (R - U)	2.6%	2.8%	0.4%	0.5%	2.0%	2.2%	-0.1%

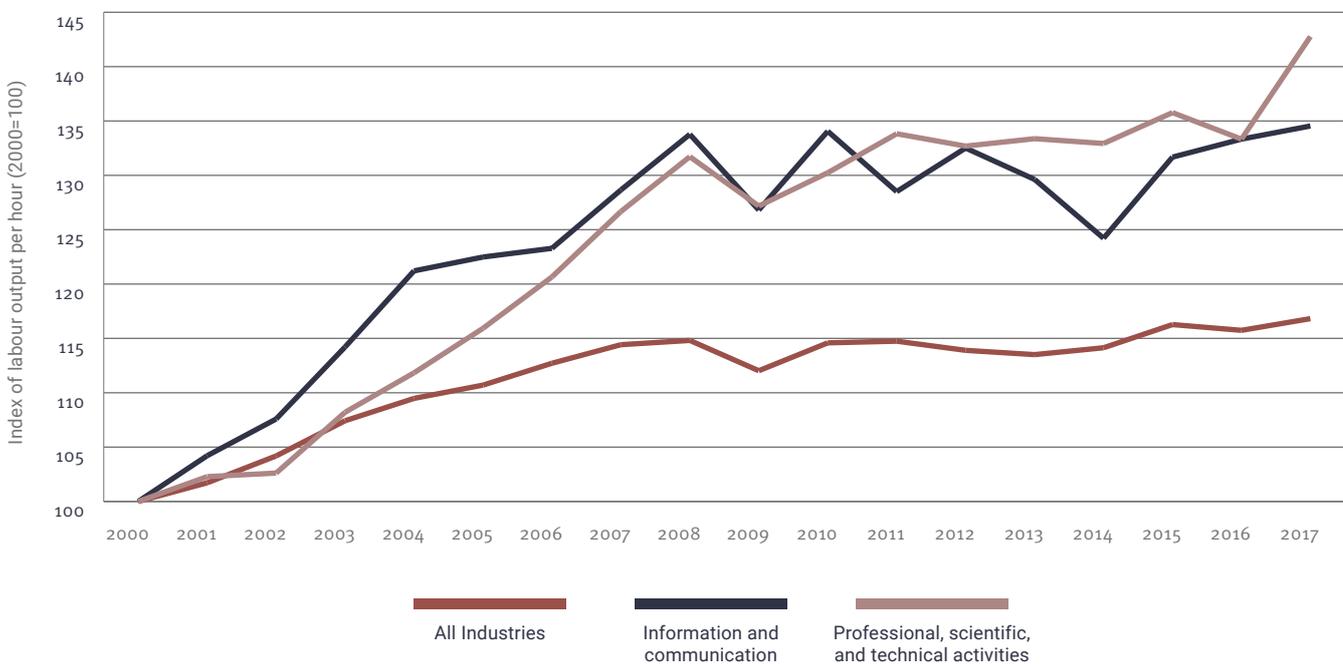
Source: NOMIS, WPI Economics

What does this mean?

Overall, this demonstrates that there are both challenges and real opportunities in West London. We have already seen that there are real strengths; for example, standard measures of economic output show that Hammersmith and Fulham is one of the strongest performing Local Authorities in the UK. The area is also host to significant numbers of highly qualified workers, and businesses that are focussed in sectors where productivity is high and has been growing faster than overall productivity for many years (figure 9). However, it is also clear that this overall economic success has not fed fully through into all parts of West London. There are significant areas of economic disadvantage and deprivation, poor labour market outcomes and large portions of the population who lack the qualifications and skills they may need to engage meaningfully in these high productivity sectors. Whilst, in the context of the exit of a major anchor institution (the BBC) this might be viewed as a significant challenge, in fact, it is a real opportunity; new anchor institutions moving into the area with a better approach to regeneration and the desire to build an inclusive and collaborative business community and society could really make an impact in terms of both economic and social outcomes. However, it is clear from many failed regeneration programmes and attempts to share growth, both across the UK and internationally, that this will not happen by accident. What is needed is a clear vision and strategy to make it happen. The creation of an innovation district could do just that.

Figure 9: Index of Labour productivity per hour, selected industries, UK, 2000=100

Source: ONS, WPI Economics



Section 3: A blueprint for sustainable and inclusive growth in White City

Section 2 outlined the clear challenges and opportunities that the current economic and social make up of White City and West London provide. It also raised the challenge that to make the most of the opportunities that significant development in the White City Opportunity Area could bring, a clear vision and strategy would be required.

This is obviously a significant task, and as a major landowner (purchases in 2009 and 2013 mean that the College now owns a 23-acre site in White City), Imperial College London will play a central role in driving this. Its aim for its new development is to create a distinct innovation ecosystem; giving academics and students a place to collaborate with the entrepreneurs, investors, tech-experts and creatives who are driving London's future growth. At the same time, it will give researchers who have previously been unable to work together the space to collectively tackle major interdisciplinary experiments that could change lives. But the College's approach is based on more than this. It wants its success to build on and support the local community; providing them with the opportunities and resources to ensure that everyone can share in the growth of White City.

This approach builds on emerging research on how to drive sustainable and inclusive regeneration and follows the precedent set by other top global universities, in developing a world class innovation district. This section outlines the theoretical basis for why the development of an innovation district might provide the answer, and examples from other countries that give an indication of how they might be successfully developed.

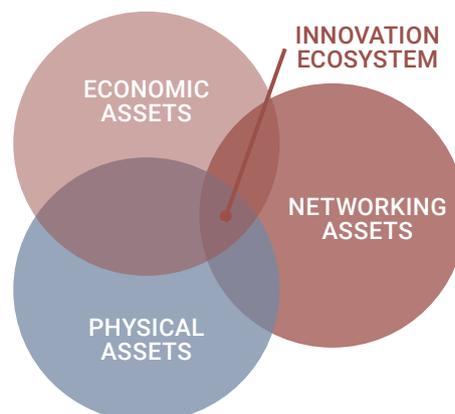
Creating an innovation district

Devised and developed by Bruce Katz and Julie Wagner of the Brookings' research institution, innovation districts are regarded as '...geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators and accelerators'.^{xii}

The approach that the College has taken has been built on evidence from other successful projects around the world. Notably, existing research has shown that a successful innovation district relies on supporting the perfect blend of economic, physical, and networking assets (figure 10).^{xiii}

- **Economic Assets** consist of innovation drivers, innovation cultivators and neighbourhood amenities - they are the firms, institutions and organisations that catalyse and support growth in an innovation-rich environment.
- **Physical assets** refer to the public and privately-owned space, buildings, streets and other infrastructure which are arranged to stimulate connectivity, collaboration, and innovation.

Figure 10: Venn diagram that demonstrates the interaction between economic, physical and networking assets in an innovation district, creating an innovation ecosystem



Source: Brookings Institute

- **Networking assets** are the relationships between individuals, firms, and institutions that have the potential to generate, sharpen, and/or accelerate the advancement of ideas.

When these three assets combine with a supportive, risk-taking culture they create an innovation ecosystem. More detail on the three types of assets within an *innovation ecosystem* are summarised in figure 11.

Figure 11: Economic, physical and networking assets within an innovation ecosystem^{xiv}

ECONOMIC ASSETS	PHYSICAL ASSETS	NETWORKING ASSETS
<ul style="list-style-type: none"> • Innovation drivers: research and education institutions, start-ups and entrepreneurs. • Innovation cultivators: Companies, organisations and groups that support growth, e.g. accelerators, tech transfer office, shared working spaces, training organisations. • Neighbourhood amenities: Local support services, e.g. GPs, local shops, cafes, bars, hotels. 	<ul style="list-style-type: none"> • Public Physical assets: Parks, squares and high energy streets designed to encourage collaboration and connectivity. • Private physical assets: Private buildings that stimulate innovation, e.g. offices, shared work / lab spaces. • Connected enhancing assets: major infrastructure, e.g. transport, broadband. 	<ul style="list-style-type: none"> • Strong tie networking assets: Strengthen existing ties, e.g. workshops, training, conferences. • Weak tie networking: Build new or weak ties, e.g. networking breakfasts, town hall events, hack-a-thons, planned and curated open spaces. • Spontaneous chance connections.

Source: Adapted from Urban Growth NSW

There are clearly many ways in which these economic, physical and networking assets can be brought together, though the literature highlights three main types of innovation districts (box 2). The College has clearly taken a role in developing the first of these; the “anchor plus” model. Until now, “anchor plus” has most commonly been discussed in the context of Kendall Square in Cambridge (and the growth around MIT).

Box Two

Typical models of innovation districts

1. **The “anchor plus” model:** where large scale mixed-use development is centred around major anchor institutions and a rich base of related firms, entrepreneurs and spinout companies involved in the commercialization of innovation.
2. **The “re-imagined urban areas” model:** often found near or along historic waterfronts, is where industrial or warehouse districts are undergoing a physical and economic transformation. This change is powered, in part, by transit access, a historic building stock, and their proximity to downtowns in high rent cities, which is then supplemented with advanced research institutions and anchor companies. This model is best exemplified by the remarkable regeneration underway in Boston’s South Boston waterfront and Seattle’s South Lake Union area.
3. **The “Urbanised science park” model:** where traditionally isolated, sprawling areas of innovation are urbanizing through increased density and an infusion of new activities (including retail and restaurants) that are mixed as opposed to separated.

Source: Brookings^{xiv}

Why an innovation district?

Much of the framework outlined above could sound similar to traditional approaches already taken across the UK. For example, in looking to regenerate and revitalise local areas and whole towns and regions across the UK, numerous governments and sector organisations have worked together to develop, amongst a wide range of other initiatives, Enterprise Zones, Business Improvement Districts and various forms of clusters and research parks.^{xv}

Overall, these have had mixed success. For example, some, including the development of Canary Wharf through the London Docklands Development Corporation have proven successful in driving growth in the local area and providing a major economic boon to the whole of the UK. However, others, including the use of Enterprise Zones in general have been criticised as only providing short-term benefit to businesses taking up the available incentives, whilst having little overall positive impact on the local community and / or simply displacing activity in other local areas.^{xvi}

With this in mind, it is reassuring that the development of innovation districts is, in fact, distinctly different from what has come before. There are three ways in particular that innovation districts navigate the failures of previous approach to deliver transformational, inclusive and sustainable growth and opportunities.

1. *Opening up ideas*

Importantly, the creation of innovation districts is not just about bringing together a set of abstract “assets” and developing a closed community which focuses on fostering expertise in a particular field or sector. Instead, they intentionally focus on bringing together disparate sectors and specialisations (e.g. information technology and bioscience, energy, or education) and cross-fertilising ideas or approaches in order to create new products, technologies and market solutions.^{xvii} In this sense, they are distinct from more traditional approaches to developing clusters and research parks, that tend to focus on developing spillovers between entrepreneurs and firms within a particular sector or specialism.

2. *Growth without boundaries*

Another clear focus of innovation districts is the idea that success is not about developing a closed community of entrepreneurs and businesses that delivers benefits only for members of the community. Instead, innovation districts are about bringing benefits and opportunities to existing residents, businesses and leaders of the local area and creating a community without boundaries so that growth can spread much more widely.

Evidence from other countries has begun to demonstrate the positive impacts that are possible for low-income neighbourhoods proximate to innovation districts.^{xviii} The reasons for this are clear; employment and educational opportunities are typically offered by those leading the development of the innovation district (through STEM programmes, and opportunities to work in retail and leisure) and the development comes hand-in-hand with investment in affordable housing, education, physical and social infrastructure. For instance, both through improvements in “traditional” infrastructure like transport and through improvements in newer forms of critical infrastructure, like internet connectivity.

3. Sustainable and inclusive regeneration

Creating an open community is one aspect of the approach of innovation districts that contributes to a greater likelihood of sustainable and inclusive regeneration. Another is the focus on placemaking. This ensures that the introduction of modern and aesthetically pleasing architecture, shared spaces, green spaces and areas to socialise, all encourage people to utilise the area.

Ultimately, this means that innovation districts are as much about working with the existing resources and talents within the incumbent community, as they are about bringing new ideas and approaches in. They are also very much about focussing on delivering sustainable and inclusive growth to new and existing residents and businesses alike. With this in mind, it is no surprise that innovation districts are becoming a popular approach for urban planners and local policymakers. However, as with all approaches to regeneration, innovation and development, the following examples show delivering all of these things is not always straightforward.

Examples of University-led innovation districts

Kendall Square – MIT

The best-known example of a thriving innovation district is the Kendall Square area that is often regarded as ‘the most innovative square mile on Earth’. Now home to some of the world’s largest technology and biotech companies and over 55,000 jobs,^{xix} like White City, this has not always been the case. In fact, the area has transformed many times over the last century and the development of a world-leading innovation district has not been without difficulties.^{xx}

Starting as an industrial centre in the early 20th Century, MIT took a first real stake in the area in the 1960s when, following large-scale deindustrialisation, the Institute bought land to develop space in which it could collaborate with industry. Businesses including IBM and Polaroid moved in and a major NASA site was due to be located there. However, following budget cuts, that plan was shelved and much of the area remained unused, leading locals to regard the area as “Nowhere Square”.

Over the following decades, the area evolved slowly, with the MIT Centre for Cancer Research starting in 1974 and eventually leading to the creation of biotechnology hub that would expand through the 1990s. Then came the revolution of the internet, and with Tim Berners-Lee taking up residence at MIT, a wave of businesses, entrepreneurs and investors were attracted to the area.

The launch of the Cambridge Innovation Centre in 1999 was central to this development as it provided an affordable space in which tech entrepreneurs could collaborate and inspire each other. In turn this attracted venture capital firms and then major tech companies including Amazon and Google. At the same time, the model of innovation attracted major life sciences companies including Novartis, Pfizer and AstraZeneca.

However, until this point, development had advanced as many other (significant) clusters would have. The success of the area had begun to lead to affordability challenges, leading to questions of where the new entrepreneurs and innovators could set up. There was also a realisation that, despite being the home of global businesses, once employees had gone home, the area was left ‘...a largely uninviting stretch of big brick office buildings and wide [deserted] streets’; the consequence being that it was a community separated from residents of local neighbourhoods, which remained some of the poorest in Cambridge, with little thought dedicated to the retail, leisure and housing development that would be needed to create a thriving neighbourhood.

That changed from 2008 when an MIT-led initiative set about ensuring that Kendall Square became a sustainable area where ‘...diverse people work, live, study, and play’. In short, that a sustainable and inclusive innovation district was created. In practical terms this meant bringing together cohesive plans to ensure that areas already home to thriving businesses could also grow to include guaranteed innovation space, affordable and market housing, childcare, retail, commercial, and space for the MIT Museum.^{xxi} The process included extensive consultation with local communities, businesses, academics, staff and students and has led to a plan that will be delivered over the coming years.

Philadelphia: University City - Centre City

The emerging innovation district is one of Philadelphia’s most significant innovation hubs. The University of Pennsylvania, Penn Medicine, the Children’s Hospital of Philadelphia, Drexel University and large firms such as Comcast, PECO, Independence Blue Cross (IBX), FMC and Aramark are all located within a 1.5 square mile area. It is also home to a number of innovation organisations such as the University City Science Centre (the oldest and largest urban research park in the US), Drexel Ventures, Benjamin’s Desk, and the Pennovation Centre.^{xxii}

There are many positive aspects to the innovation district. As with other innovation districts, it has strong transport infrastructure and social assets, and is a significant draw for talent from across the surrounding areas (44% of workers in the area commute from more than 10 miles away). With 104,000 jobs, it is also a major part of the overall economy of Philadelphia. Growth of the district has also been rapid, both in terms of its economy and residents; growth in the resident population outstripped the rest of Philadelphia eight-fold in the fifteen-year period between 2000 and 2015, and the number of jobs in the district increased by 20% in the 10 years to 2013. Prospects for the district also look strong, with major investments and expansions already underway.^{xxiii}

However, as with the early development around Kendall Square, the district demonstrates some of the challenges that face the growth of innovation districts. In particular, while the district has seen strong growth itself, surrounding neighbourhoods have not benefited as much from this growth; poverty rates are consistently above 40%, and unemployment rates above 15%. This has led to calls for a renewed focus on ensuring that local communities fully benefit from the district, including through anchor-based skills programmes, education and local procurement approaches.

What does this tell us?

All of this demonstrates that innovation districts can be transformational in terms of their impact. However, it also shows both that success is not always guaranteed and that it can take time. The examples above, and others, have been used by a number of authors to suggest a number of principles that, alongside the presence of the “assets” required, can underpin the successful creation of an innovation district.

Figure 12: Example of planned development of mixed-use East Campus/Kendall Square Gateway



Source: MIT

Box Three

Principles of success for innovation districts

1. **Do not try to pick winners:** it's about providing the space and infrastructure for organic growth and the creation of innovative clusters. The focus of innovation districts will depend on the specific strengths of the particular city or region in which they are based.
2. **Diversity is key to success:**
 - a. **Think horizontally, not vertically:** rather than focusing on a particular sector or specialism, innovation districts succeed by bringing together seemingly unrelated sectors and industries to collaborate and innovate.
 - b. **Big and small are both beautiful:** innovation districts rely on providing areas where anchor institutions, global business and investors can connect with start-ups, business incubators and accelerators.
3. **It's good to be together:**
 - a. **Focus on interaction, not linkages:** it is clear that connectivity and proximity are key, but it is not enough to simply link places. Instead, the physical concentration of business, employees and activities is important and providing space for social interactions and chance meetings is key.
 - b. **It's not all bricks and mortar:** as well as physical infrastructure, successful innovation districts provide a range of activities to grow skills, strengthen firms, and build networks that drive the connectedness of the district.
4. **Embed inclusion:**
 - a. **Sharing opportunity:** typically located in economically deprived areas, sustainable innovation districts can provide routes to opportunity for local residents. Not only does this deliver more sustainable regeneration, but also opens up new talent pools and brings new ideas and innovators into the mix. The key here is that this is not a given; it needs significant planning and commitment.
 - b. **Bring innovation to life:** in short, don't innovate within a closed room. Involve the innovation district community, surrounding neighbourhoods and others who use the area. Doing so will attract and inspire talent and bring investment as well as involving the local community.
5. **Planning for success:**
 - a. **Preparing together:** the economic success of innovation districts depends on collaboration, sharing of ideas and co-creation. This same principle also needs to apply to development of the district itself; anchor institutions, businesses, residents, employees and local government all need to share in the vision for the district and how to achieve it.
 - b. **Preparing for change:** it is not enough to invest in creating the initial infrastructure and "place". As with the businesses and people within them, innovation districts need a range of short and long-term strategies to ensure constant evolution and improvement of the space.
 - c. **Plan for (continued) success:** it is apparent that, without careful planning, successful districts will see rising prices and barriers to entry for new challenger firms. This undermines the very nature of what made the district successful in the first place. As such, it is also vital to plan for success; ensuring that new entrepreneurs and innovators are still attracted to and can afford to locate in the district.

Section 4: Creating an innovation district in practice

There are many similarities between White City and other areas where innovation districts have been created. As with other areas, White City has a long and mixed economic history and has recently gone through significant change following the departure of what was once a major anchor institution (the BBC). Box 4 provides a short overview of the history of White City. Section 2 of this report also demonstrated the diverse nature of the neighbourhoods that make up White City, and the fact that a number of local areas are amongst the most deprived in West London, and indeed, the whole of the UK.

However, when visiting the area now there is clearly a real opportunity to continue to drive sustainable and inclusive regeneration in the area by building on the shared vision for regeneration which began with White City Opportunity Area. This would benefit both White City and West London and, indeed, the rest of the UK. Only a decade ago, before Westfield White City was opened in 2008, this sort of opportunity would have been hard to imagine. Since then, the College's significant land purchases and other developments at neighbouring sites including White City Place and a large residential development near Westfield demonstrate the scale of the opportunities that lie ahead.

However, whilst there are clearly others involved in the development of White City (and more broadly the wider West London area), given the scale of both the College's White City footprint and its ambitions for its White City Campus, its success in developing this new campus is central to the long-term prospects of the area.

Box Four

History of White City

Most commonly known as the site of the BBC, White City and the immediate surrounding areas have a long history of innovation and change. White City was originally transformed by its hosting of the 1908 Great Exhibition and Olympic Games. This turned the previously quiet countryside outside of Shepherd's Bush into "the Great White City" of white palaces, pavilions and gardens, lagoons and canals, thrilling rides and a stadium. This was one of the largest events of its time, attracting eight million visits on a site that was seven times the size of the Great Exhibition of 1851.

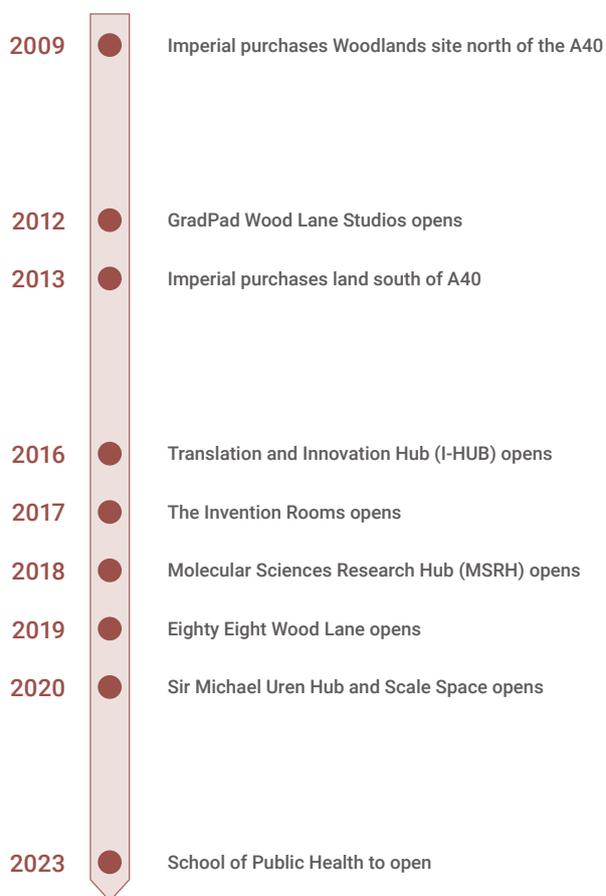
After the exhibitions, White City became home to some of the most ambitious social housing developments in Britain, from cottage housing in the 1920s to balcony blocks in the 1930s. Then, in the late 1950s, the area changed rapidly again, with the construction of the BBC Television Centre and for next fifty years was a centre for worldwide broadcasting, film and television production. The next stage in the White City story began in 2007 with the BBC's announcement that it would move from its home of 50 years and, in 2008 as Westfield White City, one of the most visited shopping malls in Europe, was opened.

What has the College been doing?

It is clear that the College has taken this responsibility seriously and it is already delivering many of the steps needed to create and sustain a successful innovation district. In many areas, these steps have built on evidence from the experience of other universities, outlined above, and the principles outlined in section 3.

Figure 13 demonstrates key developments since 2008, and table 1 (in the Executive Summary) provides more details of the specific locations on Imperial's White City Campus.

Figure 13: Imperial College London - White City campus milestones^{xxvi}



Viewed like this, it is perhaps difficult to understand how this all fits together. However, there is a clear strategy behind the College's development. This is best demonstrated with reference to the principles outlined above.

Do not try to pick winners

The College has invested to develop cutting-edge facilities at its White City Campus. By the end of 2020, 3,000 scientists, clinicians, engineers and entrepreneurs will be on campus, with state-of-the-art facilities offering businesses the opportunity to work alongside world-leading academics and researchers at every stage of growth and development.

As shown below, the College has worked hard to attract a wide range of businesses from a range of sectors and specialisms. However, while it has not been picking winners, it has been focussing on the areas where collaboration and synergies can be built on the existing expertise available across London and, indeed, within the College's own staff and research areas. In short, rather than picking winners, the College has provided the infrastructure for entrepreneurs and innovative businesses to come together, collaborate and grow.

It is clear that it is not just about creating spaces for businesses and entrepreneurs. By bringing a significant residential presence to the campus and providing communal and shared spaces for activities both during the day and in the evening, the College has also been focussed on creating a real community and neighbourhood that works. As shown above, this has been the area where many other innovation districts have had least success, so a focus on this is essential.

Diversity is key to success

There are two aspects of diversity that are important to creating a successful innovation district: ensuring that the innovation district focusses across sectors and specialisms; and attracting and supporting organisations and businesses of different sizes, stages and types.

On the former, whether it be through development of multi-disciplinary research centres or the principle of creating co-location and co-working opportunities, it is clear that the idea of bringing together innovators, researchers and entrepreneurs from a range of sectors and specialisms is at the core of the approach taken by the College. Box 5 provides an example of this in practice

For example, the College's expertise has contributed to a number of emerging clusters at White City, most notably biotechnology (BioTech), medical technology (MedTech), defence and security (Critical Infrastructure); and financial technology (FinTech).

The work being undertaken in each of these areas is significant. However, more important is the fact that they are all being undertaken in close proximity to each other and with the ambition of creating ideas, approaches and technologies that can be transferred and used across a range of applications. This is at the heart of what innovation districts are about; bringing about collaboration between a range of different sectors and specialisms, that could deliver truly transformational impacts on challenges being faced across the world. Box 6 provides a number of examples.

There are also a wide range of businesses of all sizes involved. For example, the College's White City Incubator is now at capacity, providing space and support to a range of small and emerging businesses. White City Incubator raised over £97 million between 2016 and 2019 and has directly created over 100 jobs. The College is also working with others to maximise the impact of the Incubator. For example, In January 2018 the Incubator began a successful partnership with RebelBio, the world's first dedicated life sciences accelerator, which provides dedicated three-month support programmes for emerging biotech start-ups in a shared laboratory space. RebelBio has assisted more than 60 ground-breaking startups via its business support scheme.

Box Five

Innovation and research across specialisms

J-IDEA, the Abdul Latif Jameel Institute for Disease and Emergency Analytics: Located within the School of Public Health, J-IDEA will rapidly respond to emergencies such as epidemics, extreme climate events, and natural and humanitarian disasters. J-IDEA will tackle crises, such as Ebola and MERS, alongside longer-term global priorities, including the impact of climate change on health, using cutting-edge data science and public health research to deliver policy insights.

The new institute brings together the world's foremost epidemiologists, biostatisticians, medics and data scientists as they break down barriers between academic expertise and on-the-ground impact.

Researchers in public health, data modelling and analytics will use real-time analyses and intervention modelling to contain outbreaks, protect vulnerable communities, strengthen on-the-ground data collection and analytical capability, and understand the drivers of resilience in health emergencies

Box Six

Innovation and research with many applications

The Centre for Rapid Online Analysis of Reactions (ROAR). Based within The Molecular Sciences Research Hub, ROAR is the first national centre for the study of reactions, focusing on data-centric chemistry. Finding the right way to synthesise new molecules with desired properties, such as potential medical drugs or novel materials, can take a long time, sometimes years. With the aim of making the synthesis of any desired molecule 'as easy as dialling a number, ROAR will tackle this by automating chemical process and creating a wealth of data about the synthesis steps involved in creating a new molecule.

Using state-of-the-art equipment, including robots that automatically set up chemicals for experiments and machines that take samples throughout the duration of the experiment, the Centre will be able to precisely measure at which conditions each reaction step is working optimally. The availability of high-quality and reproducible data will also enable future developments in machine-learning and AI in the chemical sciences; providing benefits far beyond the Centre's own field of work.

Care Research & Technology Centre: The Centre joins six national discovery science centres that collectively make up the UK Dementia Research Institute (UK DRI), which was launched in 2016 to find scientific solutions to one of society's biggest health challenges: over 1 million people are expected to have dementia in the UK by 2025.

The centre will be based at the Sir Michael Uren Hub. It will bring together scientists, engineers and doctors to build on existing, early-stage technologies that can be integrated into a person's home - from artificial intelligence and robotics to sleep monitoring. The idea is this technology continuously tracks and assesses physical and mental wellbeing, alerting a person's medical team of any potential problems at an early stage. The ultimate goal is to enable people with dementia to live safely and independently for longer in their own homes.

Box Seven

Business stories from Imperial's Incubator

Puraffinity (formerly Customem), a student start-up whose founder, Henrik Hagemann, was involved with synthetic biology at Imperial when he started the company. Puraffinity is developing bio-based adsorbent granules that can target and remove specific micropollutants from wastewater. Henrik talks about the value of the facility at White City to the company as a young start-up, and especially the flexibility of the shared lab space which allowed them time and space to do the research they needed to get a major Horizon 2020 grant. They also benefited from the facilities and support that exist to take an idea from the lab and towards commercial success. Puraffinity is now VC funded, has a full lab and office at the Imperial White City Incubator, and has made its 11th hire.

MediSieve, who are developing a platform technology for the treatment of blood-borne diseases by physically removing disease relevant targets directly from a patient's bloodstream, joined the Incubator in 2018. Their vision is to revolutionise the treatment of diseases like malaria, sepsis, leukaemia and others, improving patient outcomes, and ultimately saving lives. MediSieve's rapid growth in recent years comes on the back of a string of success, having secured two grants from Innovate UK, alongside backing from private investors. Founder and CEO Dr George Frodsham was recognised in MIT Technology Review's Innovators Under 35 Europe 2019 and won Innovator of the Year at the Biotechnology and Biological Sciences Research Council Awards 2019. As well as a purpose-built R&D facility in the Incubator, the company have membership at Central Working White City, where startups, scale ups and established businesses work side by side in modern and flexible office space.

More broadly, a vast range of different types and sizes of organisations, from different sectors and specialisms are involved across the innovation and enterprise facilities at Imperial's White City Campus. Figure 14 shows some of those involved.

Figure 14: Examples of businesses and organisations utilising space across Imperial's White City Campus



It's good to be together

From the start of the development, the College has been focussed on ensuring that community and shared spaces were created as part of its campus. An obvious way in which this is demonstrated is through the principle of co-working and co-location across many of the College's buildings including the I-HUB and its multi-disciplinary research centres. This underpins the College's desire to ensure that researchers, businesses and entrepreneurs interact, collaborate and share ideas. A similar approach is being taken with the development of Scale Space on the South of the campus.

The College also has a range of support programmes and structures in place to boost skills, create links and encourage collaboration. For example, the Advanced Hackspace at White City provides members from inside and outside the College with access to prototyping technologies, training classes, networking opportunities, booster funding, mentoring and technology showcases. The sites at White City join a network of Hackspaces already in action at Imperial's South Kensington Campus, to provide access to a unique network of workshops, laboratories and co-location spaces across the Imperial estate. The ambition is for Imperial staff, students, alumni and commercial partners from different disciplines to work together to rapidly convert research ideas into breakthrough prototype products and solutions. This environment is supported by a regular series of Hackathons; events during which technologists, innovators and scientists work together to develop solutions for defined challenges from industry in a 'scale fast, fail fast' framework.

More broadly, in July 2017, Imperial and Hammersmith and Fulham launched a unique Partnership for Growth and Innovation (or "Upstream") to drive forward the development of a world-class innovation ecosystem in White City. The initial focus of the relationship has been on supporting the development and survival of scale up businesses, especially those graduating from incubators and accelerators nearby. The aim is to attract new science, tech and creative organisations into the existing clusters at White City and connect them with academia, entrepreneurs and corporates to kick-start new collaborations.

Of course, whilst an important part of the mix, support for business growth, financing and skills development is not the only thing needed to drive the co-location and collaboration that the College is focussed on. As already highlighted, social spaces are also a key part of the framework. In this respect, the College has been clear about its commitment; the masterplan for the south site introduced two key relevant principles:

- **Creating connections through the site**, including new pedestrian and cycle routes to link the site to both existing communities and new developments; and
- **Open public spaces to support collaboration and community**, with a series of high-quality common spaces to provide attractive focal points for the campus, open to everyone, where people meet and take part in events and activities.

However, while the College has committed to playing an important role in developing shared spaces around its campus, it is clear from international experience that doing so in practice will take an ongoing commitment and continued investment. It is also clear that that developing an open, shared community is not something that Imperial can do on its own. Instead, landowners across the White City area need to work in collaboration to develop a place where people want to be. This is already an area of focus, with the White City Opportunity Area delivering a shared twenty-year vision for plans of 4,000 new homes, 30 acres of public open space, 450 retail stores, cafes and restaurants and two million square feet of office space. Again, this will not be a one-off approach; this collaboration and investment will need to continue in years to come. By doing so, they will be creating a real community for existing and new residents, businesses and employees alike.

Embed inclusion

Imperial's campus at White City is not an out-of-town industrial or research park, separated from local communities and simply set up to house businesses and research. Instead, it is being developed in an area with a rich history and vibrant local communities with a wide range of backgrounds and experiences. Examples from around the world show that innovation districts (and more broadly any attempt at regeneration) are most successful when local communities are involved, brought into the development and share in the vision of those who are taking it forward. As well as ensuring that local communities are supportive, this has much more important impacts; it can be a tool to ensuring that the strengths and talents of the local community are leveraged; and it goes some way to ensuring that success for the organisations and businesses at the heart of the innovation district are translated into economic and social success for the neighbourhoods around them.

Learning from the experience of other anchor-plus models of innovation districts, Imperial has focussed significant resources in driving this agenda forward. This is most clearly seen in The Invention Rooms, which are focussed on bringing the local community into the heart of the Imperial Campus and opening up the opportunity to innovate, design and create working prototypes to people who never before have had the opportunity. Action can also be seen right across the campus, including at the White City Incubator and through the College's procurement strategy:

- **Maker Challenge Programme:** allows 14 to 18 year-old students from schools local to White City to develop their own prototypes and gadgets at the Invention Rooms. As part of the Maker Challenge programme, students take part in weekly sessions where they gain a range of skills from hands-on use of 3D printers and laser cutters, to product development, team-building, and presentation and communication skills to help turn their innovative ideas into reality. These skills are then put to the test as each project group assembles a prototype ahead of the final showcase event. Innovative ideas to come from the programme so far include a drone that delivers emergency supplies, trainers that play music and generate energy, and adaptations for hearing aids to make them look more attractive for young children.
- **White City Innovators Programme:** run in partnership with NatWest, the programme runs twice a year and is aimed at tech businesses from the local area, alongside Imperial students and alumni. It is a four-week programme that is designed to give entrepreneurs and start-up technology companies free space to work at the Imperial White City Incubator and access to change makers through Imperial Innovations.
- **CodeLab:** an after-school club targeted at people living in White City, with priority places given to children who would be the first in their family to attend University. This aims at breaking down barriers to entering the tech / STEM industries, by providing the children with the opportunity to develop practical skills in problem solving, creativity and computational thinking.
- **What The Tech?:** tech drop-in sessions where elderly members of the local community can bring along their electronic devices – such as smartphones, tablets and laptops - to get help and support from Imperial's student volunteers.
- **Agents of Change:** a pioneering place-based community leadership network for women who have an active interest in driving social change in the north of Hammersmith and Fulham. The aim of the network is to support, empower and connect female community leaders of all ages, sectors and backgrounds to drive positive social change. It has more than 120 members, and brings together grassroots community leaders, local businesses and organisations who want to make a difference.

- **Harnessing the anchor role:** there are a wide range of other approaches that can be used to engage, include and support the local community. These include through the supply chain of the College. An example of this in practice is Jollof Mama, a family business specialising in showcasing Nigeria's finest dishes. Their popular stall on Wood Lane was created by David Miller from Imperial's Advanced Hackspace and Jollof Mama are now an official College supplier.

The opportunity that each of these provides is significant. box 8 shows five specific examples of the success that participants have had.

Box Eight

Success at the Invention Rooms

Monitored nightlight: a previous winner of the Maker Challenge was Maddena Hadafmand from Phoenix Academy who designed the Lumi Lamp, a nightlight which could monitor breathing and movement to sense when a person falls asleep, and automatically switch off when a state of deep sleep has been achieved. She said: "The Maker Challenge has been fantastic. As it runs after school you might expect to find it tiring, but it's so fun that I always arrived enthusiastic and excited to get going...I love engineering, and the way it makes you look at things in different ways to solve problems. This is just the first step for me."

Tech drop-in: a regular at What the Tech!? is local resident Michael Woof who has lived just round the corner in Shepherd's Bush for the last 40 years. He said: "Staff at the library showed me the flyer for What the Tech!? which looked really inviting, so I got up the courage to come down to the Invention Rooms. The help has been fantastic because it's given me hope now that I can start using my phone, which I didn't have before. I am still nervous about it – it will take a while for me to learn something strange that's all new to me – but I am learning which I am really pleased about."

An organic journey: a founding member of Agents of Change programme is Carol Fraser, a vegan nutritionist and recently appointed Head Chef who enjoys growing organic food and running workshops around London. Speaking about the programme, Carol said. "The self-development, and thinking about myself differently, gave me more confidence, vigour and self-esteem. This programme provides opportunities for personal growth, business development, and gaining new insights. It is the ideal programme to go on to do better for yourself and better for others."

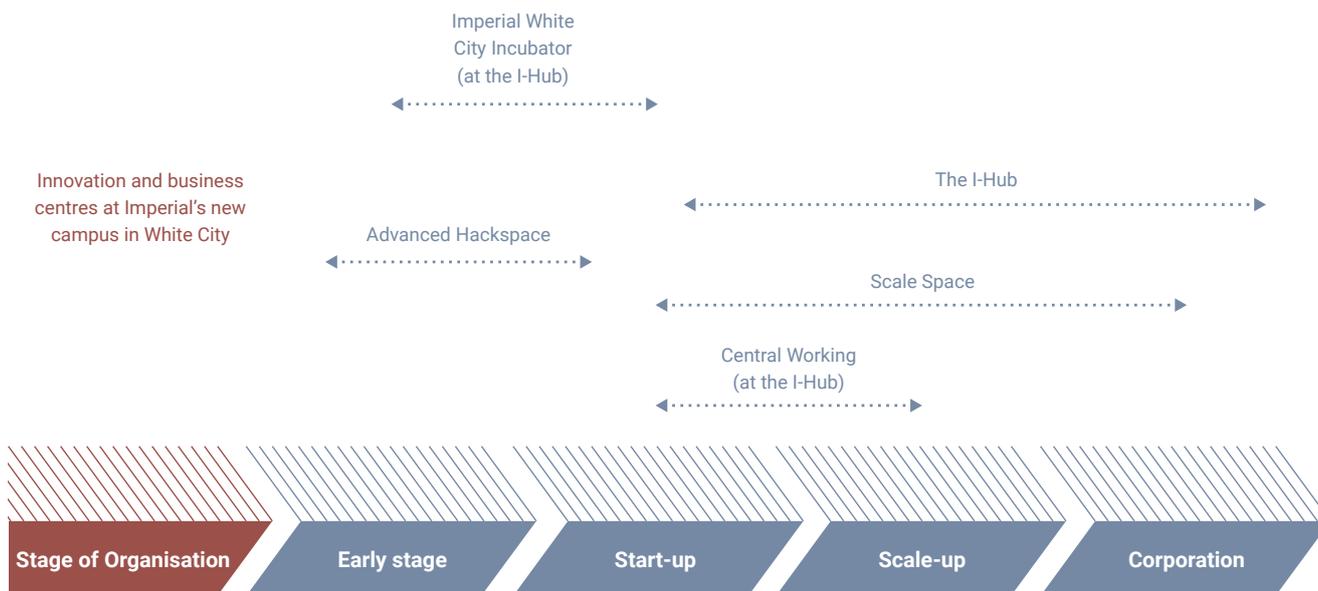
Food for thought: Jollof Mama is a family business based in West London which provides a mobile catering service with a unique brand of Nigerian street cuisine, borrowing from the wider West African food tradition. Owner Tieyan Ewaka established a pop-up food stall in White City in 2018 and has since catered for numerous events on campus. The Advanced Hackspace team at The Invention Rooms supported the original design and development of Tieyan's stall.

Hearing birdsong: A novel project explores the use of bird songs to increase engagement with hearing tests. The venture was born out of a two-day Imperial workshop at The Invention Rooms, designed to stimulate innovative ideas that could help improve communication for adults with mild or moderate hearing loss. It brings together researchers, medical practitioners and industry partners to open dialogue and raise awareness on the subject.

Planning for success

As outlined above, there are many elements to planning for success that lasts. One is to tackle affordability and longevity issues head-on and ensure that there is always space for new innovators and entrepreneurs to access and join the innovation district. This has been a challenge in other innovation districts and tackling this issue is central to the College’s plans at White City. Its approach is centred around the fact that the White City Campus is designed to accommodate and work with businesses at a range of stages. There is also a core principle that the College will seek to work with partners whose objectives and vision align with the principles of the innovation district that is being created. Figure 15 demonstrates how the range of centres at the campus can accommodate organisations at different stages of their development.

Figure 15: Innovation and growth journey for businesses working with Imperial College London in White City



Source: WPI Economics, Imperial College London

What this means in practice is that a business might begin life as an idea in the Advanced Hackspace at The Invention Rooms, where a prototype is then made. Once the prototype has been made and a business plan developed, the start-up might move to the Incubator and, with more progress, attract capital to be able to grow the idea. Once it becomes more successful, it will need more space and more staff, meaning that a move to Scale Space or the I-HUB might be appropriate.

As well as supporting businesses to grow at each stage of their development, this ecosystem stimulates a steady flow of businesses through the various stages, meaning that as one business grows, they open up space for the next entrepreneur looking to develop a new idea. This is key to the concept of the innovation district at White City; it makes it more likely that businesses born in White City, stay in White City and acts as a real draw for entrepreneurs, investors and businesses. For example – box 9 demonstrates the case of Pureaffinity.^{xxvii}

Box Nine

Growing a business at the White City Campus

Arborea, founded by Imperial alumnus Julian Melchiorri, are developing pioneering 'BioSolar Leaf' technology to improve air quality in White City. The technology, which is the first of its kind in the world, purifies the air through the photosynthesis of microscopic plants, removing greenhouse gases from the environment whilst generating breathable oxygen. Julian is quick to highlight that cooperation between start-ups, academic institutions and governmental bodies, like that being witnessed at White City, is critical to enabling and accelerating sustainable innovation. Arborea are currently based in grow on space at the I-HUB and have partnered with Imperial to roll out an outdoor pilot project on campus.

Fresh Check are developing products which are revolutionising the way the world thinks about cleanliness. The team have developed the first affordable test for surface contamination with a simple colour changing spray. Founded in 2015 by Alex Bond, John Simpson and Robert Peach, who were all colleagues on the same Imperial PhD course, Fresh Check has benefitted from a range of entrepreneurial support from across College and won multiple awards, including Forbes 30 under 30 Europe. At White City, the team were able to develop and iterate their prototypes at the Advanced Hackspace, which was pivotal in helping to secure investment and take their product to market. Fresh Check currently occupy bespoke lab space at the White City Incubator.

MiNA Therapeutics: was the first business to "graduate" from Imperial's Incubator when, in 2018, it moved from the Incubator to new, bigger facilities at the I-HUB. The story of the business is typical of a successful innovation district. It was co-founded by Imperial professor, Nagy Habib, and is pioneering a new class of medicines called 'small activating RNA'. These restore normal function to cells of patients with diseases including cancer and ischaemia, and have the potential to transform treatment. One of its drug candidates is currently in clinical trials for the treatment of advanced liver cancer, and last year the company received £35m investment from Sosei Group Corporation.

Polymateria: was one of the first companies to take up space in the Incubator. It is an innovative plastic waste reduction company with a mission is to develop biodegradable, recyclable, customizable and cost-effective plastic products and beat global plastic pollution. Again, showing the close links between Imperial research and innovation and enterprise, the company has received more than £1 million in grants from Innovate UK to further research and scale up, and have since emulated the success of MiNA Therapeutics by moving into larger grow on space in the I-HUB.

Section 5: What needs to happen now?

Maximising the potential of an innovation district in White City

It is clear that the College has already taken great steps to developing the foundations of a thriving innovation district in White City. The benefits of this to local residents and businesses and the West London economy should be significant.

There could also be significant benefits to the national economy. The obvious benefits include attracting world class talent and international investment to the UK. However, there could also be significant spillovers from the work that is being undertaken in White City and the chance to build the principles of successful innovation districts out across the UK. A key example of this is the real opportunity to think more broadly about the role that Imperial and its partners could play in the wider network of clusters, hubs and innovation centres that are developing across London and the rest of the UK.

With significant transport infrastructure assets already in place, and more coming, the White City innovation district is ideally placed to link into and collaborate with these other areas. For example, there are already three underground stations providing access to the West End and the City of London. Once developed, Old Oak Common will provide Crossrail services, High Speed 2 and rapid connections to Heathrow Airport. By making the most of these connections, collaborating and bringing together more entrepreneurs, innovators and businesses, Imperial and the White City innovation district could contribute to a much larger innovation ecosystem across London and the UK.

Much more broadly, the products, approaches and services developed and delivered by researchers and businesses in White City could have transformational impacts on the whole of society. Whether this is through contributing to the development of new medicines or treatments, or through collaborations that create breakthrough discoveries and techniques that can be applied across many different fields, the opportunities are significant.

The challenge now is to ensure that the emerging innovation district centred on White City fulfils its potential. This will require a consistent focus on each of the five principles that drive successful innovation districts.

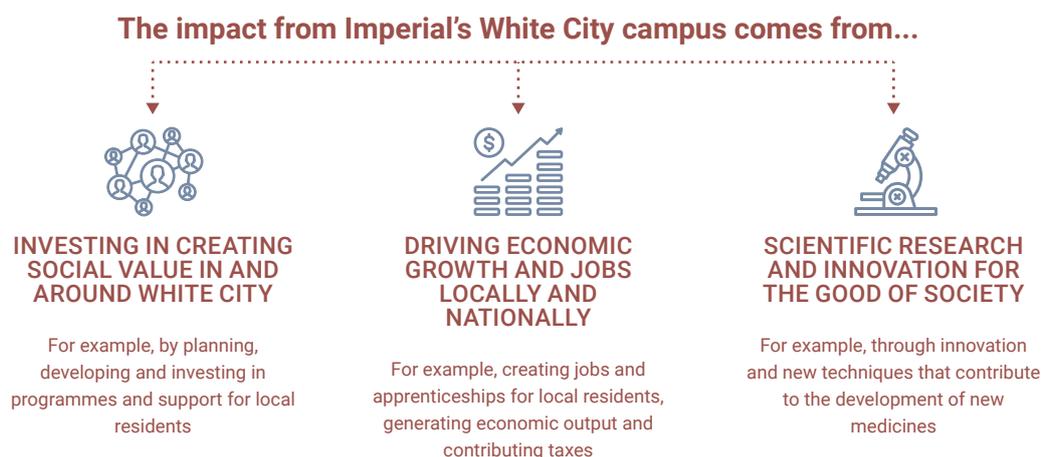
International experience has demonstrated that this is easier for some of the principles than others. For example, this report has demonstrated that many innovation districts have struggled to fulfil their potential to embed inclusion. This has meant that the opportunity to deliver meaningful programmes and support for local residents has been missed and the district has become separated from the community in which it is located. Elsewhere this has been bad for local residents, as well being as a waste of significant local potential. In some cases, these failings have been spotted and investment undertaken to try to turn things around, but this has also proven challenging.

Ensuring that this does not happen in White City, and that Imperial's commitment to its role as an anchor institution at the centre of the innovation district are realised, will need continued planning and investment. In this respect, it is positive that the College has already developed a business plan to guide its social investment programmes in the future.

Securing continued success will also require a focus on understanding what works and what needs to change. To do this effectively, the College will need to understand the impact it is having now, what

it wants to achieve in the future and how it is progressing towards those goals. Given the scale of the College's operation and diversity of its actions, this will require a range of factors to be considered.

In particular, there are three key areas where the College's impact from its investment in White City could be measured.



Understanding the College's impact in each of these areas will be fundamental to ensuring that the College's future investments and activities maximise the impact of the innovation district emerging in and around White City. A separate report from WPI Economics considers the first of these, building on the College's business plan for its social investment to develop a framework for measuring the social value created by Imperial in White City and providing estimates of the value created to date and the potential for the future. Future work will be needed to develop this and also to understand and quantify the impact across the other two areas.

Doing so will not just be of benefit to the College and its White City campus. This understanding can also support other organisations, for example:

- Local and national policymakers with a role in supporting economic growth and living standards in West London, who can draw on this evidence to better target and tailor their actions to support the College's work;
- Policymakers looking to regenerate and drive economic growth and living standards in other parts of the country, who can use the experience of the College as an exemplar for how to undertake place-making and local economic development; and
- Other universities looking to maximise their economic and civic impact, who can draw on the experience of Imperial to develop their own similar approaches.

This means that, as well as Imperial playing a role in directly delivering significant economic and social value, its actions could also have an indirect effect by supporting others to learn from the work it has done. This underlines the importance of the work currently being undertaken by the College in White City. By taking this forward, continuing to invest in social value, as well as economic value, the creation of an innovation district could be transformational both for the area and for economic policy and practice right across the UK.

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