

BY RESEARCHERS FROM
IMPERIAL COLLEGE LONDON
IN COLLABORATION WITH
WHITE CITY PLACE

CREATING
OPPORTUNITIES
IN A WORLD-CLASS
ECOSYSTEM

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INTRODUCTION

As recently as a decade ago, the ‘Death of Distance’ was a widely coined phrase. The future of innovation was portrayed as a world where ideas would spark, and innovations arise from a globally interconnected world where people could contribute to innovation from wherever they were. An ultrafast internet connection would suffice for tapping into global communities of scientific, creative and engineering talent. Global connectedness has been valuable for innovation, but the Death of Distance has not materialised. Location, in addition to connection, is as important as ever for business competitiveness. In the new era of innovation, it is the location in and connectedness to cluster ecosystems of science, creative industries and technology that matter most.

Global research universities such as Imperial College London have a central role in building the ecosystems of tomorrow, by making discoveries, educating leaders and developing innovations that benefit society. Imperial’s excellence in Science, Technology, Engineering, Mathematics and Building (“STEMB”) subjects has produced global leaders and innovations that place it in the top 10 of global universities (8th according to QS World University Ranking 2016). Located in London’s South Kensington, with five hospital sites in north west London and a new campus in White City, Imperial is in prime position to execute an ambitious strategy to continue leading the data revolution, engineering novel solutions, discovering the natural world and producing life-changing innovations relating to health and wellbeing.

Throughout history, White City has hosted some of the world’s most enduring institutions. This includes the 1908 Olympics and a series of International Exhibitions showcasing innovations

in science and technology. Its name the ‘Great White City’ was derived from the white marble cladding used on the exhibition pavilions. As a former industrial district, and most notably home to the British Broadcasting Corporation, Imperial’s White City Campus has the foundations of a world-class innovation hub and the potential to inform, influence and inspire the next wave of technological innovations.

This White Paper offers an outlook on how White City is becoming London’s new innovation district. The emerging new campus of Imperial College London in conjunction with renewed energy of entrepreneurs and corporations to locate in the area create opportunities for a world-class ecosystem to develop. This report offers an insight into the emergence of ecosystems and illustrates how businesses can tap into the potential of such ecosystems in a bid to gain competitive advantage at a time when innovation is fast-paced and collaborative.

November 2016

KEY POINTS

- 1 Global connectedness has been valuable for innovation, but the ‘Death of Distance’ has not materialised: Location is as important as ever for business competitiveness
- 2 Now, the location in and connectedness to ecosystems of science, creative industries and technology matters most
- 3 Ecosystems are spatial concentrations of scientific, entrepreneurial and corporate activities across a variety of sectors, whereby spatial proximity between these parties promotes networks of knowledge sharing and joint idea development
- 4 Businesses can tap into the potential of such ecosystems in a bid to gain competitive advantage at a time when innovation is fast-paced and collaborative
- 5 Creativity and innovation originate not from within single disciplines or domain areas, but from the spaces between them
- 6 Ultimately, clusters form ecosystems by connecting a variety of players, and building communities through shared space and shared goals
- 7 Serendipity needs to be designed-in: People from different backgrounds can be brought together through initiatives that unite actors around a specific challenge, as well as through the design of flexible space geared at fostering communication and collaboration
- 8 Open building and site designs that facilitate communication and form an integrated part of the ecosystem site are paramount for realising the potential for creativity and ideation
- 9 This is why White City is fast becoming London’s new innovation district, where major advances in healthcare, science and technology are being engineered and a new approach to innovation is being created.

WHAT IS AN ECOSYSTEM AND WHY IS IT IMPORTANT?

Creativity and innovation typically originate not from within single disciplines or domain areas, but from the spaces between them. New opportunities emerge from creative abrasion, where experimentation happens and ideas and problems rub against each other. Although, with today's belief in multidisciplinary science, that observation may seem relatively recent, this perspective goes back to the work of Joseph Schumpeter, the founding father of the academic study of innovation. His work in the early 20th century promoted the idea that innovations typically arise from new combinations of existing ideas and technologies. Automobile production emerged in those locations (such as Detroit in the US and Coventry in the UK) where the original presence of the bicycle, combustion engine, and horse carriage industries formed the right building blocks for the development of the automobile.

The idea of recombination being the source of creativity and innovation is as relevant today as it was a century ago. In fact, it lies at the very fundament of the recent importance of cluster ecosystems for innovation.

‘The idea of recombination being the source of creativity is as relevant today as it was a century ago.’

Ecosystems may be a recent buzzword when it comes to creativity and innovation. Sceptics may say it is little different from industrial policy to promote clusters, prevalent in the study of innovation as well as in governmental industrial policy since the 1980s. Just like clusters, ecosystems are spatial concentrations of scientific, entrepreneurial and corporate activities whereby proximity between those parties ought to promote networks of knowledge sharing and joint idea development. As a result, ecosystems are expected to thrive as innovation districts. Just like clusters, ecosystems may capitalize on their reputation for science and technology excellence, attracting future talent to the area and building global connectedness.

So are ecosystems just old wine in new bottles? No. The fundamental difference lies in the nature of activities that are spatially concentrated. Clusters are usually concentrations of related activities; ecosystems concentrate activities that may, at first glance, be unrelated. Clusters bear a defined sector-specific signature, bringing together universities, research institutes, entrepreneurial firms, and large corporations that broadly work in the same domain. Although clusters offer great conditions for parties to collaborate and jointly innovate within the confines of a sector, they may not be best placed to spur the development of radically new ideas, building on prior knowledge from across industrial boundaries.

‘Ecosystems form a breeding ground for the cross-fertilization of ideas and create a space for serendipitous discoveries.’

Ecosystems are seen as key in the new era of innovation because of an eclectic spatial concentration of activities that form the breeding ground for cross-fertilization of ideas and space for serendipitous discoveries that may be beyond the imagination of those deeply embedded in environments dominated by a single sector.

Silicon Valley in the San Francisco Bay area and Boston’s Kendall Square are internationally leading examples of successful multi-sector ecosystems. Both Kendall Square and Silicon Valley are more than mere business parks or university campuses. The key impetus lies in the mix of academic, entrepreneurial and corporate actors, including facilities such as mixed-use research labs, incubation spaces and other amenities that blur the boundaries between academia, business and entrepreneurship.

It is no surprise that many recent disruptive innovations have their origins in urban clusters: places that combine a spatial concentration of a variety of sectors with a critical mass of creative, scientific and engineering talent. London is leading the way in becoming a global centre of disruptive digital and ‘fintech’ innovations. Companies such as TransferWise, which revolutionised international bank transfers, originate from London’s Tech City. Similarly, Magic Pony, founded by former Imperial College London students and acquired by Twitter, is the latest in a series of machine learning start-ups in Britain to bring cutting-edge technology to the creative sector and attract the attention of Silicon Valley giants. Microsoft’s \$250m acquisition of smart keyboard start-up Swiftkey and Google’s £400m acquisition of DeepMind suggest there is a strong appetite for innovations that go beyond technological excellence, blending design with a focus on performance in unexpected ways. For instance, the potential for Artificial Intelligence across multiple application areas was demonstrated when DeepMind became famous for designing a computer algorithm that could beat a human champion at the Chinese board game ‘Go’ for the first time.

‘It is no surprise that recent disruptive innovations have their origin in entrepreneurial ecosystems.’

In many ways London’s ecosystem is unique in blending cutting-edge digital technologies with multiple applications across ‘fintech’, ‘cleantech’, ‘medtech’ and digital or creative industries. These successful examples, originating from London, raise the question of what makes ecosystems work as innovation districts. The next section will discuss what the central ingredients are to thriving entrepreneurial and innovative ecosystems and provide insights into how Imperial College London’s White City Campus will play a leading role in the ecosystem-led era of innovation.

WHAT DRIVES INNOVATION IN CLUSTER ECOSYSTEMS?

White City, once a thriving media and communications hub and home to the BBC, is being transformed into an innovation ecosystem where academic, creative, and entrepreneurial talent comes together to form a ‘co-located community’ involved in translating and commercialising cutting-edge research for the benefit of the global economy and society.

The value of an ecosystem that underpins its ‘innovation premium’ resides in the co-location, connection and community of individuals and organizations across a range of activities. Imperial’s White City Campus brings together world-class academics, businesses, entrepreneurs and research partners in one Innovation District. It has already grown rapidly in the last five years, with many new organisations investing in the area, focusing on new applications in health and wellbeing.

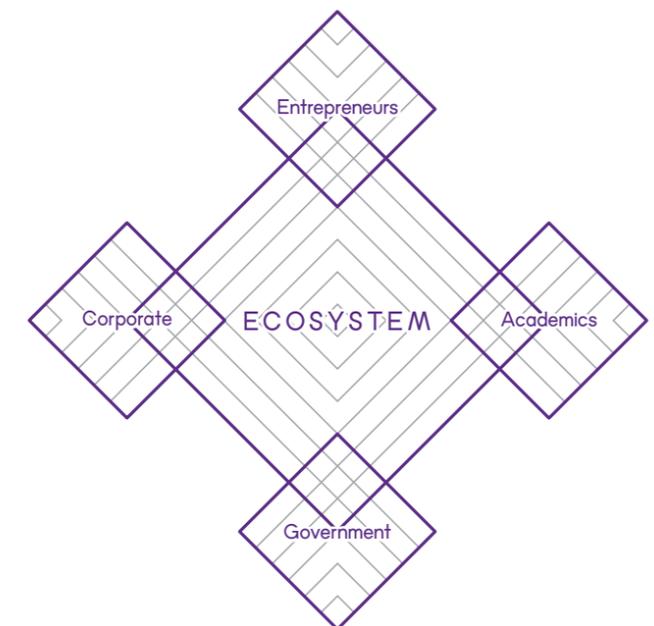
CO-LOCATION

Co-location of individuals and organizations spanning a range of activities is necessary for an ecosystem to function well. Despite advances in the speed of travel and in communication technology, co-location remains an important enabler for successful innovation. But what kind of activities need to be co-located for clustering to breed innovation? We have defined four main building blocks of an effective ecosystem and key participants that are fundamental to the development of the innovation district at Imperial’s White City Campus.

‘The co-location of research, business and healthcare will be a first in London, reinforcing its position as a catalyst for scientific development and economic growth.’

Academics, at universities or research institutes, form the first building block. They offer access to the frontier of science where the seeds for innovation and technological change take root. They experiment, seeking new solutions to old problems, or finding new opportunities at the frontiers of science. The first phase of flagship buildings opening at Imperial’s White City Campus include the iHub (Innovation Hub), the Molecular Sciences Research Hub and the Michael Uren Biomedical Engineering Research Hub. State-of-the-art facilities essential for scientific research will house research from Imperial’s Department of Chemistry to seed a new molecular sciences community, connecting with work in synthetic biology, data sciences, digital technology and health. The key to successful translation activities involves bringing talent from multiple disciplines together, such as engineers, scientists and clinicians, pursuing life-changing research into new and affordable medical technology.

CO-LOCATION



Entrepreneurs and small and medium sized enterprises are the second building block. Entrepreneurs catalyse innovation. They often see opportunities before others and they are prepared to take risks. Relative to larger established firms, entrepreneurs typically have an outsider mindset, a greater appetite for risk and the energy and passion for trying and persisting with something new and different. Entrepreneurs and fast-growing small businesses are a key component of Imperial's White City Campus, where to the south of the site there is a set of buildings occupied by young technology companies. Imperial College London's ThinkSpace offers high-spec labs and workspaces to companies at various stages of development, including over 70 start-ups that have newly moved into the area. Another entrepreneurial tenant in the area is the European Innovation Technology (EIT) ICT labs. It has established its UK hub in White City, as well as its FireTech Camp: a leading incubator programme founded on the premise that young people are the early adopters and innovators of digital technologies, and hence providing them with the tools and facilities may spur innovation.

Imperial College London has pioneered the application of design engineering across disciplines through collaborations with the Royal College of Art. It recently launched the Dyson School of Design Engineering to develop talented graduates and young innovators with the capability to revolutionize sectors as diverse as healthcare, sport and renewable energy. Following the same philosophy, White City Campus participants work closely with their co-tenants to breed creativity and design. Jill Hodges, Founder of FireTech Camp explained "[creativity] is evident not only through collaboration in terms of shared business needs such as office space and meeting rooms, but [also] in the way [local businesses] help to grow each other's businesses by building relationships". Advanced HackSpace is an organisation that works within the broader London ecosystem and has been a key input into the many businesses emerging around the White City Campus.

Corporations form the third building block. Whereas start-ups may take the lead in the inception of novel commercial ideas, they may lack the capabilities and resources to make these ideas materialize. Corporates, when receptive to entrepreneurial initiative and scientific advancement, may offer the scale and market power – and potentially the financial infrastructure – to drive momentum behind new ideas and provide the resources and ambition to sustain innovation. For example, Imperial's Data Science Institute has already attracted large corporates looking to make the most of the data revolution. It brings together scientists at the leading edge of computing and data analytics who work alongside global industry partners such as IBM, Thomson Reuters, GSK, Elsevier and Huawei to make it a reality. In an interview, Vice President for Enterprise UK at Huawei discussed how important it is that business and academia work collaboratively to create future value for society:

"This is an opportunity for Huawei to work with great entrepreneurs, and combine leading research and teaching principles with our own internal Research and Development to foster both spin-offs and future businesses."

Finally, local **government** is a key player in building the White City ecosystem. They hold the key to granting planning permission and safeguarding space for co-location. They can also provide support to raise the profile of emerging industries and ecosystems. For instance, White City Campus's medtech hub fits into other translational activities currently taking place across Imperial College London, many in collaboration with the NHS – in the nearby Hammersmith campus, where local government and NHS Trust support has fuelled the potential to transform this space.

'A cluster ecosystem provides space for residents to engage with and learn from new ideas, helping to shape successful outcomes.'

Urban planning also plays a crucial role for the integration of an ecosystem in the wider urban environment, which may set the starting conditions for 'connection' and 'community' components of effective ecosystems. An ecosystem should not be an island within a city, but an integral part of its social fabric; a place where urban residents want to spend time before, during and after work time to maximize chance encounters and serendipitous events that may spur innovation. Imperial's White City Campus is ideally positioned within one of the capital's most connected transport hubs. A short walk from White City, Wood Lane and Shepherd's Bush undergrounds stations, Crossrail to the north, as well as easy access to the M4 and Heathrow airport, offering excellent transportation across London and beyond.

CONNECTION

Mere co-location of academics, entrepreneurs and larger corporations will not magically turn cluster ecosystems into centres of innovation excellence. Network connections between those parties within the ecosystem, and connectedness of these parties to relevant stakeholders around the globe, are closer to being the secret recipe to innovation success.

Ecosystems offer great opportunities for accidental encounters and spontaneous conversations between people of different backgrounds and working for different types of organizations, which in turn may enable the exchange of ideas and collaboration initiatives. Some network connections are planned, others often come about serendipitously. Collaborations between individuals working for different types of organizations more easily develop and flourish in close proximity. Organizations in ecosystems may also benefit from better opportunities for global connections. A reputation of international allure may make it more appealing for stakeholders outside the cluster to collaborate. Having an 'antenna' in a vibrant ecosystem in the form of network connections may help firms outside the ecosystem to stay in the loop of recent development in the ecosystem.

'Ecosystems offer great opportunities for spontaneous conversations between people of different backgrounds.'

COMMUNITY

Co-location is a necessary but insufficient condition for network connections to develop. Academics, entrepreneurs, and corporate engineers and managers may share the same location, but if there is nothing that ties them together, networks of exchange and collaboration will not materialize. It requires individuals from different backgrounds and working for different organizations to buy into a shared vision or a shared goal. Feeling part of a community, united around shared goals and values, makes it easier to establish connections with people who are unfamiliar and unknown, but simply happen to be nearby. Stanhope, Westfield and Imperial College London are providing the cafes, bars and spaces for people to enjoy meeting in, to extend time spent on the campus into an area catering to Londoners' most popular leisure activities.

'Co-location is a necessary but insufficient condition for network connections to develop. It requires individuals to feel part of a community with a shared vision or shared goal.'

Ecosystems may be home to different types of organizations that span a range of activities and knowledge domains. White City Campus exemplifies an ecosystem where academics working across a broad range of application areas are united by a shared focus on the disruptive role of digital, technology and design engineering for healthcare and wellbeing. Such focus is evident in Imperial's continuing leadership in research on challenging Anti-Microbial Resistance, or the new developments in Nutrition Science with Nestlé, focussed on tackling diabetes and obesity. The world's grand challenges such as climate change or future general-purpose technologies also offer useful anchors that help unite diverse parties around such shared visions or goals.

A sense of community is also paramount for attracting talent to the ecosystem. An ecosystem thrives with people coming and going, and thus it is essential that there is some stability in what defines the ecosystem, so that it remains a continuous draw for new talent of creative, engineering, scientific ability, for example from across London and Oxford and Cambridge.

Taken together, ecosystems may be best placed to drive innovation when co-located academics, entrepreneurs, and large corporations connect and exchange in an environment with a sense of community and shared higher-order goals. A relevant question in this regard is how such community-based, connected ecosystems develop (page 15) and what firms can do to contribute to and gain from such ecosystems (page 25).

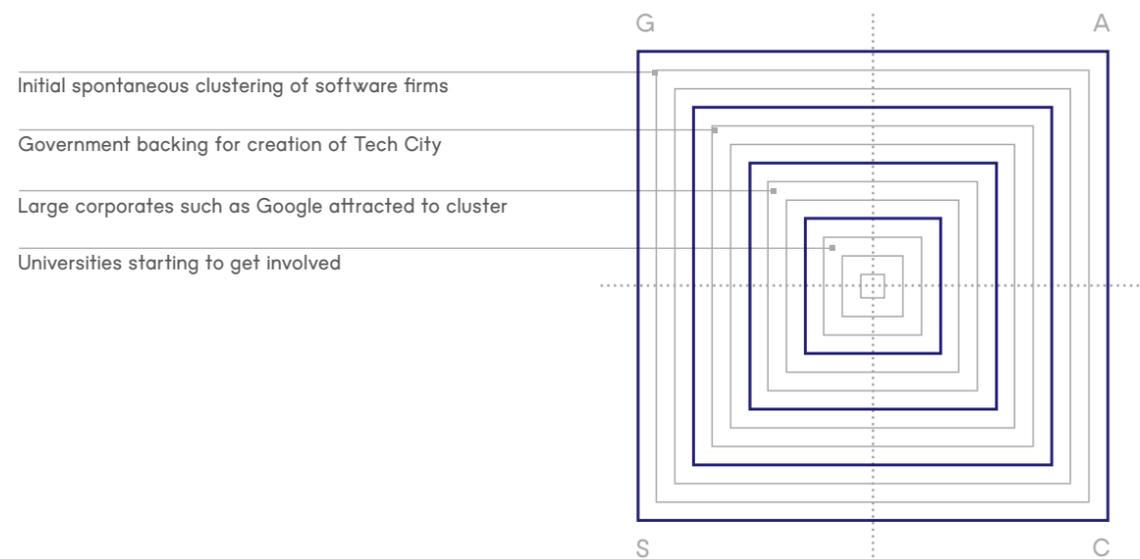
HOW DO ENTREPRENEURIAL ECOSYSTEMS GROW AND DEVELOP?

In the same way that cities have their own founding story, ecosystems have diverse origins that influence their sense of community, culture and purpose. Tracking the emergence and development of leading UK and international technology clusters, we found evidence that their origins can lie with start-ups, universities, large corporations or government. After the early inception, ecosystems tend to develop and grow as other parties are attracted to the cluster.

Looking east, London's Tech City for example, developed from an initial, spontaneous and unplanned clustering of software firms working on web-based applications, making it a 'start-up led ecosystem development' (S). It gained traction, and started to provide substantial evidence of success through innovation when the government (G) first backed the region as part of its Tech City investment programme. Subsequently, large corporations (C) such as Google, Intel and Cisco were attracted to the area, an effort catalysed by two of London's leading universities (Imperial and UCL) through the founding of collaborative research initiatives and talent programmes, which spurred the involvement of top academics (A).

Shared objectives and support between the different types of organizations centred within the ecosystem, and strong government endorsement allowed a sense of community and interconnectedness between parties to develop. In this section, we will assess the complementarities between these different types of cluster participants (i.e. start-ups, large corporations, and academic institutions) on the basis of case studies that illustrate the advantages of building communities and connections between them that foster exchange, collaboration and joint innovation.

TECH CITY LONDON



START-UP-LED ECOSYSTEMS

The role of start-ups is considered a keystone in the emergence and development of ecosystems. An existing concentration of small and medium-sized businesses characterised by agility, forward thinking and growth ambitions is a powerful beacon to attract further entrepreneurial talent from all over the world. It can also trigger universities and large corporation to seek proximity to, and engage with these small businesses. London's Tech City is a good example.

The Tech City case illustrates the allure of a dynamic community of start-ups and young businesses in the area and the desire of large

corporations and universities to tap into and benefit from their dynamism. It is of critical importance for well-functioning ecosystems that small businesses keep their place in growing ecosystems and are not crowded out by increasing property prices that may be the unintended consequence of a burgeoning presence of corporate or academic parties in the ecosystem. In Tech City the original community of creative entrepreneurs has started to look to move out of the area, as soaring commercial property prices have become untenable for many young, growing companies.

London Tech City

Since the late 1990s and the lead-up to the dotcom bubble, a high-tech cluster has developed around inner East London. Developing organically due to affordable rents and proximity to central London, the area attracted a number of software and internet start-ups basing themselves around the Shoreditch and Clerkenwell area, gradually spreading throughout much of East London.

During the early stages of its development, there was little evidence of knowledge transfer between its varied participants, as one firm based in Old Street, described how "little interaction was taking place at the time between resident companies". The same company eventually began offering networking opportunities and office space to East London start-ups, becoming an important interface between SMEs and larger companies in the East London tech scene, which up until that point had been poorly networked. It provided a place "where different elements of the tech start-up ecosystem could come together in one place". By engaging corporate partners, resident start-ups, as well as local government and universities, it demonstrated the possibility of building an ecosystem with 'everything under one roof', a model soon adopted by the coalition government.

Strong government interest was based on the recognition that the future of advanced economies like Britain relies on the growth of an innovative, knowledge-based technology sector, as well as the existing importance of the digital economy to the UK, which today employs over 1.56bn people nationwide and contributes £161bn to the economy. The original labelling of the area as 'Tech City' in 2010 was a government initiative set up to propagate digital technology and attract global talent and investment via its flourishing start-up sector. As the ecosystem grew and developed, investment from large multinational corporations also began to flow into the area. Large corporates such as Cisco, Google, Microsoft, Facebook, Intel and Vodafone were attracted by the local entrepreneurial community and opened up offices, contributing to the area's innovative climate and reputation as well as benefitting from the innovative services offered by similarly technology-driven, local SMEs.

While the presence of large corporates within the epicentre has controversially pushed out some well-known start-up residents, since 2010, the clustering of small and medium sized enterprises in inner East London has in fact grown from 3,200 to 11,000 firms in 2016, servicing the needs of many corporate clients in the City of London.

INDUSTRY-LED ECOSYSTEMS

A second type of ecosystem development is led by larger corporations seeking to create ‘innovation districts’ attached to corporate headquarters or R&D facilities. The intention of these developments is to attract both small businesses and universities or research institutes to their proximity. While the concentration of multinational corporations is typically driven by corporate desire to co-locate R&D with other large businesses, close to fast-growing markets, several UK-based multinational corporations have taken the initiative to foster their own ecosystems. Such initiatives go beyond corporate venture capital investments and aim to attract innovative small businesses – to learn from – to their vicinity. By utilising their own small-scale incubators and accelerators, corporations seek to keep up with fast-paced technology change that may arise outside their company borders. The GSK BioCatalyst is a leading example of the development of an industry-led ecosystem.

GSK Catalyst

Located amid a cluster of academic centres and other pharmaceutical companies in Stevenage, UK, the GSK Bioscience Catalyst is a £38 million joint venture between the Wellcome Trust, the UK government and GlaxoSmithKline (GSK). Developed with a ‘campus’ in mind, it was originally intended as a hub for early-stage biotechnology companies, a vision which has grown to provide small to medium-sized biotech and life sciences companies access to the expertise, networks and scientific facilities of a multinational pharmaceutical company.

So what’s in it for start-ups? Since it was established in 2012, the initiative has been led by GSK, which has so far provided land, facilities and investment of over £11m to help build and launch the campus. With long-term plans to expand the campus fivefold, it offers a range of equipment, expertise and commercial opportunities that would be impossible for small or medium-sized enterprises (SME) to develop alone. Facilities include office and lab space within an incubator for start-up biotech companies, an accelerator for late stage start-ups to grow and a networking space in the form of ‘The Hub’. Tenants retain full independence and the freedom to interact with any commercial partners.

And what’s in it for the large corporate? As one GSK representative described, the ambition for the incubator and accelerator space was to initially attract university start-ups, on the basis that their cutting-edge knowledge and deep science would play a pivotal role in future:

“The University of Cambridge has a spot there, UCL is going to have a spot there..., as well as many individual biotech start-ups coming out of Cambridge, Oxford and London Colleges.”

The BioCatalyst is a combination of space for incubating start-ups hosted by the universities, from which GSK gains synergies and biotech companies that have spun out of academic labs, providing investment opportunities and new product development.

The GSK BioCatalyst illustrates the pivotal role large corporations can play in providing the operational as well as financial infrastructure for fostering ecosystems where complementarities between corporate scientists, entrepreneurs, and academic scientists form the breeding ground for major innovations to take shape.

‘Large corporations have a leading role to play in providing the financial and operational infrastructure for fostering ecosystems where complementarities between corporate and academic scientists and entrepreneurs form the breeding ground for major innovations to take shape.’

ACADEMIA-LED ECOSYSTEMS

Universities have begun to take a central role in cluster emergence and development, combatting the traditional view of their laissez faire attitude towards entrepreneurial initiative and lack of central coordination in university-industry interactions. Alongside their supporting role, providing key inputs in the form of scientific knowledge and academic talent, some UK universities have become the driving force of their own cluster developments. Most notably Cambridge University, where the Colleges led the development of Science Parks, using their own resources to invest in land and cultivate companies to grow in proximity to the city’s historic university. In recent years, university initiatives have become even more inclusive, exemplified by collaborations such as London’s Crick Institute near King’s Cross, a space where Imperial College London, UCL and King’s College London work together with Cancer Research UK, the Wellcome Trust and the National Institute for Healthcare Research. Because of financial pressures and a growing mandate from the government to improve the translation of scientific output into valuable commercial outputs, UK universities have become increasingly involved across an entire spectrum of research valorisation activities, often with a local orientation. In this light, several globally leading universities both in the UK and internationally have led initiatives to nurture ecosystems around their campuses. We see these initiatives as ‘academia-led’ ecosystems.

‘Access to the talent pool of entrepreneurial students is a prime incentive for entrepreneurs and large corporations to seek a presence in a university-led ecosystem.’

Universities seek to attract entrepreneurs and larger corporations to the proximity of their campuses by setting up new teaching programmes focused on entrepreneurship and industry relevance, fostering improved links with industry in research, and establishing technology transfer offices, incubators and accelerator programmes that offer funding and facilities to ‘spin-outs’ from staff or students. Top UK universities have led the way in recent academia-led initiatives and have offered a template for the role of universities in many other parts of the world in local ecosystem developments and the future of academia-industry relations.

Imperial College London

Imperial College London has a long tradition of nurturing university-industry relations and entrepreneurial initiatives in a bid to translate advances in science, technology and medicine into valuable commercial outputs. Corporate partnerships with some of the world's largest multinationals have crowded in commercial expertise, contract funding and bolstered the universities real-world relevance. Similarly, Imperial Innovations, partly owned by the College itself, is Europe's largest, publically listed Technology Transfer Office dedicated to the commercialisation of university spinouts, academic ventures and the commercialisation of cutting-edge intellectual property. The emerging Enterprise Lab located across South Kensington and White City Campus plays an important role in nurturing student-led start-ups and harnessing entrepreneurial talent from STEMB programmes into real-world applications.

Cambridge ICT and life sciences cluster

Over the past 30 years, Cambridge and the surrounding area has become one of the UK's leading high-technology business clusters. In 1978, there were 20 high-technology companies within a 25-mile radius of Cambridge. By 2010 there were over 1,400 firms employing 43,000 people with combined revenues of £11.8bn according to their annual Technopole Report. Cambridge has since become renowned for expertise spanning technology areas vital to the UK economy, including ICT and life sciences, both of which share an important foundation in basic research.

The University of Cambridge has had a major input in the growth and development of the regional cluster around Cambridgeshire. It provided the impetus to transform itself from a medieval seat of learning to a knowledge-based business centre. Early on, an important supporting role was also played by technology consultancies such as Cambridge Consultants, which helped to incubate a family of start-ups connected to the university. Similarly, the establishment of institutional R&D which followed close research links with multinationals has been important in attracting corporate investors. Large companies were important in injecting capital as well as applied knowledge into the university, especially during the 1990s when the cluster started to receive more systematic forms of private equity and venture capital funding.

Initially, the university took a laissez faire attitude to the valorisation of university knowledge, which led to the characterization of the cluster as a grassroots development, where new entrants such as Cambridge Consultants were acting in the face of a hostile university which frowned on commerce. While this may have been the case early on in the cluster's development, attitudes have since changed. An effective cluster ecosystem has helped to create an enduring sense of community as well as a powerful networking and support structure, which provides start-ups with access to laboratories, technology, skills, office facilities, business expertise, venture capital and financial advice.

As both the Imperial and Cambridge example illustrates, universities may play a leading role in setting "single goals" within ecosystems as well as attracting additional participants. Access to the talent pool of entrepreneurial students and the scientific excellence of its academic staff are prime incentives for both entrepreneurs and corporations to seek a presence in this emerging ecosystem.

GOVERNMENT-LED ECOSYSTEMS

One of the primary concerns of government-led efforts to build ecosystems is the role of the built environment, specifically how to design-in serendipity through meeting spaces, open planning and fluid transport. Governments worldwide are asking questions in relation to their major cities and transport hubs, such as: How to design for international collaboration? How to build attractive spaces where people want to stay after work? What factors ensure integration of business parks or university campuses in the urban social fabric? The A*STAR development in Singapore may provide some guidance, which is akin to Imperial's role in similar UK government-led developments, such as its collaboration in the Diamond Light Source in Harwell and research on particle physics in Daresbury Labs in the North of England.

‘Government has a leading role to play in spatial planning that allows sufficient flexibility for ecosystem parties to grow without needing to relocate outside the area.’

As the A*STAR case (page 22) illustrates, government has a leading role to play not only in directly investing in science and innovation, but also in spatial planning. Planning should allow for sufficient flexibility for research institutes, small businesses and large corporations to grow (or contract) without needing to relocate outside the area, and encouraging the design of public space that promotes interaction and integrates the ecosystem into the wider urban built environment.

In summary, academic, entrepreneurial, corporate, and governmental stakeholders all have a crucial role to play in delivering on the potential that ecosystems provide for generating innovation through co-location, connection and community.

Despite the differences in origin between start-up-led, industry-led, academia-led, and government-led clusters, there is striking similarity in the recognition that a well-functioning cluster ecosystem combines entrepreneurial, corporate, academic, and governmental initiatives.

‘Clusters may originate from an entrepreneurial, academic, or corporate basis, but will ultimately only rise as ecosystems if that basis is broadened up while being kept together as a community through shared space and shared goals.’

A*STAR (Agency for science, technology & research)

Over the course of around twenty years, Singapore has transformed itself from an ‘entrepôt economy’, based on commercial trading to one driven by knowledge and innovation. This transition is largely the result of strategic investment by the government in science, technology and medicine, enabling it to improve its position in the global value chain and overcome its size limitations to become Asia’s ‘innovation capital’ and global R&D hub.

At the heart of this transformation is the Agency for Science, Technology and Research (A*STAR), which represents a major conduit for financing the country’s cutting-edge research facilities, as well as coordinating collaborative R&D with global business partners. Key to its success has been the development of ‘fringe’ space: flexible land allocation that allows growing activities such as successfully scaled-up small businesses to grow within the ecosystem rather than being driven out. Its 14 biomedical, physical sciences and engineering research institutes are located in One-North, a wooded 200-hectare innovation hub where research facilities, business parks and educational institutions can ‘meet, share and discover’. Impressive breakthroughs in cancer drug discovery, nanotechnology and smart systems are the result of an excellent innovation ecosystem in which front-line research is carried out alongside global research partners, including multinational corporations and some of the world’s top universities.

With the intention of ‘designing-in serendipity’, A*STAR promotes an open innovation model which offers incentives to private companies in order to reach a critical mass of multinational companies. Relocating corporate R&D facilities is a risky and expensive business, based on long-term strategic objectives. To overcome this, the government supports corporate laboratories through policy incentives and generous government grants directed at translational research, as well as Singapore’s proximity to a vast Asian market. GlaxoSmithKline and Novartis are two high-profile pharmaceutical companies with R&D labs in its Biomed research centre Biopolis, which have established a number of collaborations with research institutes and universities in Singapore. A*STAR is also home to initiatives such as HP Research Labs and the Experimental Power Grid Centre (EPGC) which leverages Singapore’s superior telecommunications and energy infrastructure and its research strengths in computer science and ‘intelligent grids’ to test and deploy front-line technologies in distributed energy resources. Such companies are attracted by a sophisticated market of early adopters and unique opportunities for innovative public-private partnerships.

Innovation is likely to arise from the spaces between these different types of organizations, rather than within them. In all successful ecosystems we studied, serendipity played a key role in forging communication and collaboration. Yet, serendipity was almost always designed-in: people from different backgrounds were brought together through the corporate or government initiatives that united actors around a specific challenge, as well as through the design of flexible space geared at fostering communication and collaboration. That is, clusters may originate from an entrepreneurial, corporate, or academic basis, but ultimately they will only rise as ecosystems if that basis is broadened up to include a variety of players, while being kept together as a community through shared space and shared goals.

The concluding section of this report will provide perspective on what approaches large corporations can take in contributing to and benefitting from such ecosystems.

‘Academic, entrepreneurial, corporate, and government stakeholders all have a crucial role to play in delivering on the potential that ecosystems provide for generating innovation through co-location, connection, and community.’

HOW FIRMS CAN HELP FOSTER A VIBRANT COMMUNITY AT WHITE CITY

Cluster ecosystems flourish with academic, entrepreneurial and corporate participants operating in close proximity of each other. Each actor plays a part in contributing to a dense network of connections of exchange and collaboration and sense of community around shared goals. Corporations, be they large or small, may consider various approaches to being part of an ecosystem. This concluding section discusses a range of approaches small and large firms can consider in a bid to contribute to and benefit from ecosystem development.

CO-LOCATION

The frontier of science and technology development that academics and local entrepreneurs are working at forms a major basin of attraction for technology corporations and firms in the creative industries alike. Both types of firms are often motivated by the proximity of the academic and entrepreneurial talent. As a first step, 'being there' allows them to stay in the loop as to what is happening at the science and technology frontier, and – provided they have a culture open to external engagement – liaise with these firms and with each other to contribute to advancing that frontier further. Corporate co-location with small businesses, entrepreneurs and universities or research institutes comes in two main forms.

'A satellite approach allows corporations to place an antenna in multiple innovation hotspots and stay up-to-date with the latest science and innovation.'

Some firms choose a 'satellite approach', building a small, but critical presence in multiple ecosystems. Rather than putting 'all eggs in one basket' by seeking a larger presence in a single cluster, they seek to place an antenna in a range of 'innovation hotspots' to stay up-to-date with the latest developments in science and innovation in a range of fields. This approach allows firms to place multiple bets and enable technology scouting. For example, Johnson & Johnson and GE, amongst many others, have satellite offices in multiple ecosystems, looking for new opportunities by being in close proximity to multiple pools of connected creative talent. However, there is also a risk of a too small presence, which may undermine the corporate visibility in the cluster and may place a strong burden on those of their staff present in a particular ecosystem to foster a too broad range of network connections.

Other firms seek a larger presence in one or a limited number of ecosystems. They believe that to integrate in the ecosystem and take maximum benefit of opportunities to connect to start-ups and academia, it is required to build a critical mass of own staff in the ecosystem. This approach, although arguably a big-bet location decision, may allow corporations to build multiple channels of communication and exchange with entrepreneurs and academic scientists, and become an integral part of the ecosystem's web of planned and serendipitous connections among scientists, artists, engineers and other highly skilled creative workers.

CONNECTION

Corporations may not simply benefit from co-location in a cluster ecosystem. For corporations to play a leading role in the formulation of new big ideas and the formulation of creative solutions jointly with co-located partners, an open approach to university-industry collaboration and active approach to entrepreneurship and intrapreneurship are vital. Firms with a history of corporate venturing, sympathetic to entrepreneurial initiative from their own staff, or actively engaging with external entrepreneurs through incubators or accelerators may be best placed to play an active role in cluster ecosystems and take maximum benefit.

‘A big-bet location decision in one or a few ecosystems may allow corporations to become an integral part of the ecosystem’s web of planned and serendipitous connections among scientists, artists, and other creative workers.’

For some large corporations in particular a shift in culture and mindset may be required to take maximum benefit from being located in cluster ecosystems. They may be used to organizing their operations in top-secure, inaccessible sites, whereas an open attitude to ecosystem residents to come and visit their premises and a tolerance of their own staff working off-site are required for a fluid exchange with other ecosystem residents. Open building and site designs that facilitate communication and form an integrated part of the ecosystem site are paramount for realizing the potential for creativity and ideation their location in the ecosystem offers.

‘An open attitude of corporations to freely allow visitors on their premises is required for a fluid exchange with other ecosystem residents.’

Yet, also for smaller, more agile companies connectedness to the ecosystem cannot be taken for granted. Participation in local entrepreneurial initiatives such as hackathons, or academic events is crucial to lay the foundations for network relations to form. Networking is not a science but an art: everyone has their own style, there are no hard rules, but it is without a doubt that effort, commitment and courage are required to succeed at it. Members of small and large companies alike have to commit to taking the courage to step outside their comfort zone of day-to-day activities and actively seek out new platforms where new connections may emerge.

‘The key to networking is for people to commit to taking the courage to step outside their comfort zone and actively seek out new platforms where new connections may emerge.’

COMMUNITY

Ecosystems may appear somewhat of a paradox to some. On the one hand, a relatively broad range of activities should co-locate and connect to allow for recombination: the formation of new, ground-breaking concepts through the cross-fertilization of ideas across domain boundaries. After all, recombinatorial novelty is difficult if not possible to predict beforehand. On the other hand, networks between ecosystems may not come off the ground if there is no shared vision that brings them together.

‘Shared visions between ecosystem residents – for example around future general purpose technologies or the world’s grand challenges – lay the basis for the bond between the residents to develop.’

The answer lies in ecosystems built around shared goals. Shared visions that lay the basis for the bond between academic scientists, corporate scientists, creative workers, engineers, and entrepreneurs may either be technology-push or demand-pull. Technology- or science-push visions may be formulated around likely future general purpose technologies, such as nanotechnology. Demand-pull visions may take shape around the desire to find solutions to the world’s grand challenges such as reducing poverty or battling climate change. Corporations that buy into such a shared vision and are willing to shape it together with other ecosystem residents form a natural companion for the academic and entrepreneurial partners in a thriving cluster ecosystem.

Local amenities in the ecosystem are of crucial importance as the conduits where such communities can take shape. Shopping centres, coffee bars, gyms and entertainment facilities offer opportunities for a 24/7 lifestyle where personal and work-related networking are blended. In addition to spontaneous, unplanned interactions, established firms, start-ups, universities and government each have a leading role to play in dedicated activities targeted at forming a sense of community. Organizing events that bring parties together around a united goal or vision is not only a platform where connections between attendees can emerge, they first and foremost also help signal the common denominator of what brings local parties together. That denominator may evolve into the ‘ecosystem’s DNA’, the unequivocal unexpected ‘new big idea’ that defines the ecosystem and works as a further attractor of global talent.

KEY TAKEAWAYS

White City, once the home to the British Broadcasting Corporation (BBC) and a thriving media and communications hub, is being transformed into an innovation ecosystem. Academic, creative, and entrepreneurial talent will come together in and around Imperial College London's new White City Campus to achieve innovation through co-location, connection and community. This report sheds light on how ecosystems develop and how corporations can take advantage of locating in them and connecting to them.

What are ecosystems and what drives innovation in ecosystems?

- Creativity and innovation typically originate not from within single disciplines or domain areas, but from the spaces between them.
- Ecosystems are spatial concentrations of scientific, entrepreneurial and corporate activities across a variety of sectors whereby spatial proximity between those parties ought to promote networks of knowledge sharing and joint idea development.
- The spatial concentration of an eclectic variety of activities in ecosystems forms the breeding ground for the cross-fertilization of ideas and creates a space for serendipitous discoveries that may be beyond the imagination of those deeply embedded in environments dominated by a single sector.

How do entrepreneurial ecosystems grow and develop?

- Entrepreneurs and small businesses, large corporations, academia, and government form the core building blocks of ecosystems that flourishes based on the interdependencies between them. High quality players attract other high quality organizations, whereby the recognized brand and scientific leadership of academic players such as Imperial College London are fundamental to setting in motion this self-reinforcing cycle.
- Clusters may originate from an entrepreneurial, corporate, or academic basis, but ultimately they will only rise as ecosystems if that basis is broadened up to include a variety of players, while being kept together as a community through shared space and shared goals.
- Access to the talent pool of entrepreneurs and entrepreneurial students is a prime incentive for other firms to seek a presence in an ecosystem.
- Corporations have a leading role to play in providing the financial and operational infrastructure for fostering ecosystems where complementarities between corporate and academic scientists and entrepreneurs form the breeding ground for major innovations to take shape.
- Government has a leading role to play in spatial planning that allows sufficient flexibility for ecosystem parties to grow without needing to relocate outside the area.
- It is of critical importance for well-functioning ecosystems that small businesses keep their place in growing ecosystems and are not crowded out by increasing property prices that may be the unintended consequence of a burgeoning presence of corporate or academic parties in the ecosystem.

How can ecosystems be designed?

- An ecosystem should not be an island within a city, but an integral part of its social fabric; a place where urban residents want to spend time before, during and after work time to maximize chance encounters and serendipitous events that may spur innovation.
- Co-location is a necessary but insufficient condition for network connections to develop. It requires individuals from different backgrounds and working for different organizations to buy into a shared vision or a shared goal.

- Serendipity needs to be designed-in: people from different backgrounds can be brought together through initiatives that unite actors around a specific challenge as well as through the design of flexible space geared at fostering communication and collaboration.
- Open building and site designs that facilitate communication and form an integrated part of the ecosystem site are paramount for realizing the potential for creativity and ideation their location in the ecosystem offers.

How can firms benefit from ecosystems?

- Some firms choose a ‘satellite approach’, building a small, but critical presence in multiple ecosystems, placing an antenna in a range of ‘innovation hotspots’ to stay up-to-date with the latest developments in science and innovation in a range of fields.
- A big-bet location decision in one or a few ecosystems may allow corporations to become an integral part of the ecosystem’s web of planned and serendipitous connections among scientists, artists, and other creative workers.
- The key to networking is for people to commit to taking the courage to step outside their comfort zone and actively seek out new platforms where new connections may emerge.
- Shared visions between ecosystem residents – for example around future general-purpose technologies or the world’s grand challenges – lay the basis for the bond between the residents to develop.
- Organizing events that bring parties together around a united goal or vision not only creates a platform where connections between attendees can emerge, they first and foremost also help signal the common denominator of what brings local parties together. This denominator may evolve into the ecosystem DNA that defines it and helps attract future talent.

White City London contains all the key building blocks of a thriving innovation ecosystem in the making. The new campus of Imperial College London arising in the area not only offers a critical pool of academic talent working at the frontier of science and medicine, it also offers a range of entrepreneurial initiatives and renowned industry partnerships. In collaboration with entrepreneurs, existing businesses and large corporations that cut across traditional sector boundaries – and through clever property development and spatial design – White City London offers great opportunities for a world-class ecosystem to flourish.

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