

Oxford-Cambridge
SUPERCLUSTER



**East West Rail
as a Catalyst for
Turbocharged
Economic Growth**

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Introduction – EWR’s Role in Connecting the Oxford-Cambridge Supercluster

The Chancellor’s commitment to East West Rail (EWR) in the Autumn Statement was welcomed by the private-sector, LEP and university leaders that form the signatories to the Oxford-Cambridge Supercluster Board. Indeed, Government’s commitment to EWR was the key recommendation in our letters to Rishi Sunak and Jeremy Hunt, dated 14th November last year.

The Oxford-Cambridge Supercluster Board believes that EWR can be a catalyst for turbocharged economic growth across the Oxford-Cambridge Arc region, unlocking the critical mass needed to accelerate the region’s innovation economy and demonstrating Government’s firm commitment to the region as part of its scientific superpower ambition.

By capitalising on EWR’s stations and joining up the knowledge intensive clusters across the Arc, it is clear that EWR can contribute to the country’s ability to capitalise on the Supercluster’s innovation ecosystem and drive significant economic benefit across the UK. EWR provides the backbone for the Oxford-Cambridge Supercluster and if supported with the policy enablers detailed in this paper alongside focused activity around each of its stations the Oxford-Cambridge Supercluster Board believes EWR can become a catalyst for turbocharged economic growth.

With EWR and a policy landscape that enables growth the private sector, universities and LEPs that form the Oxford-Cambridge Supercluster Board are committed to

collaborating with EWR, Government and the Arc Pan-Regional Partnership to create a UK ‘Silicon Valley’ and bring the Science Superpower ambition to fruition.

EWR Unlocking a £50bn Arc Opportunity

The Oxford-Cambridge Arc currently contributes an estimated £125bn to the UK economy. However, a series of constraints on the globally significant clusters of Oxford and Cambridge is curbing not only the direct economic contribution of the clusters, but also the productivity and business investment opportunities for the wider region and more importantly the UK as a whole.

This curbing is a function of a combination of factors. These range from the tension of local planning functions challenged with the responsibility of national economic assets, delivering necessary skills, transport and power shortfalls, and wider policy gaps. The positive signalling from Government following its commitment to deliver EWR alongside increased R&D spending, creates a platform that can deliver transformative economic growth if supported by enabling policies and a collaborative partnership between the public and private sectors and academia.

This paper identifies the opportunity presented by the delivery of EWR to unleash the economic potential of the Oxford – Cambridge Supercluster and the UK as a whole. Specifically, it sets out the current direct contribution of the Ox-Cam Arc, and how the region can turbocharge economic growth and propel global Britain. As reported in the FT in 2022, it is estimated this direct contribution could deliver an additional £50bn by 2030 if its growth potential were unencumbered.

Furthermore, it establishes the opportunity for the EWR to enable the Oxford-Cambridge Supercluster, as a national asset, to drive the economic potential of other regions and cities across the UK. The evidence base for this case is provided in two academic papers and illustrated in a series of case studies.

Enabling EWR to deliver the UK’s first science Supercluster

The Arc accounts for 7.1% of England’s economic output (measured by Gross Value Added, or GVA) and it is home to some of the country’s fastest growing and most innovative places.¹ Cambridge (1), Milton Keynes (3) and Oxford (7) are placed in the top ten cities producing the highest number of new economy firms per head of population².

The Arc’s economy has doubled over the last two decades. In 2000, the Arc (constant prices) delivered £58bn to the UK economy and it is estimated this has risen to around £125bn today³. The emergence of science and tech across the Arc had been a growth accelerator of the

region, but the increase in GVA has been achieved despite a 'passive growth strategy' across much of the region, as higher value businesses displace the less productive. The NIC estimated in 2018, that with the right interventions and investment, economic output could double to over £200 billion by 2050.⁴

Bidwells estimate that, providing sufficiently for the growth potential, in particular science and tech business space, infrastructure (such as EWR) and investment across the region, the Arc's economy has the capacity to deliver £235bn by 2030. This reflects the high growth potential of sectors that are currently curbed by space and infrastructure constraints.

For example, over the last 3 years, the GVA growth of the Arc's R&D sector has grown by an annualised average of close to 10% and 13% across Cambridge and Oxford respectively. Unfortunately, these sectors remain a much smaller proportion of the overall regional and UK economy than could have been the case due to the constraints placed upon them. Highly productive sectors which attract robust business investment have little impact on a local or national economy if they are constrained.

Failing to accommodate the expansion of high value life science and tech in our globally leading clusters, will mean the UK economy will forego an estimated £50bn of economic output by 2030. This is equivalent to over 2% of today's UK economy.

The evidence provided in this document demonstrates that the Supercluster's full economic potential may be achieved by

- **Adding scale.** Clusters strengthen with critical mass allowing greater specialisation and depth. This depth and specialisation is highly attractive to domestic and international investment in high growth R&D sectors, which has national as well as regional benefits.
- **Enhancing regional economic spillover.** The university base in the Oxford-Cambridge Supercluster is highly connected to the ecosystem of innovative firms in the area, and frequently engages in knowledge exchange and innovation collaborations. There is evidence of

strong knowledge spillovers into connected locations. This drives more productive and inventive output in these locations and can provide the catalyst for knowledge industry business formation beyond the cluster itself. However, the reach of this economic spillover is focused on places well connected by road and transit. The benefits of the clusters are therefore highly uneven across the region. EWR would expand economic spillover to a wider regional catchment, with benefits for the Arc and the UK economy as a whole.

- **Leverage the interdependencies within region:** The interdependence of key cities (i.e Oxford, Cambridge and Milton Keynes) and their respective surrounding suburban and rural economic areas can have a further positive effect on productivity growth and income. However, this impact is only potent for those places that are well connected by road and transit. Enhancing connectivity between the interdependent cities will enhance their economic firepower. Perhaps more importantly, connecting other towns across the Arc will create new linkages and interdependencies with positive economic results.
- **Enabling wider employment growth.** With additional critical mass within clusters and through spillover into connected towns, there is the potential to drive wider employment growth to support the growing economies of these 'spillover' towns. This contributes to employment growth across the region. Resolution Foundation research finds every six knowledge industry roles supports ten additional workers.
- **Maintain the appeal of place with growth.** Place matters for clusters as they seek to attract and retain top global talent. The economic success of the Supercluster therefore depends on retaining and supporting the appeal and resilience of the Arc's component cities, in terms of amenity, liveability, connectivity, sustainability and affordability. This means providing a city that still works as it expands, requiring a deliberate plan for growth, including essential infrastructure (such as EWR) to extend city hinterlands, as well as intra connectivity within clusters.

With the existence of the Arc Universities Group, and Pan-Regional Partnership representing local government, the Supercluster Board will create a triple-helix of Academia, Business, and Civic Community groupings that collaborate and coordinate together across the region, enabling Government to interact strategically and quickly with all three groups within the Arc.

The Supercluster as a catalyst in the transformation of the UK economy

The academic evidence provided in this paper states that clusters that coalesce across a city, region or corridor are critical to the competitiveness of nations, delivering strong positive sum advantages for national economies. This is achieved through a series of ways:

- **Boosting international profile.** The Oxford-Cambridge Supercluster science and technology excellence provides the UK with a global presence and are uniquely positioned as a catalyst for growth for the country as a whole.
- **Advance frontier knowledge intensive sectors.** Clusters such as Oxford and Cambridge are globally leading in several R&D areas are important to building frontier knowledge intensive sectors for the UK as a whole, enabling clusters elsewhere in the country to capitalise.
- **Increased productivity and inventiveness.** Productivity, inventiveness and the business investment that is attracted as a result, drives a high level of business formation in the cluster, but has aggregate nationwide macroeconomic benefits, driving complementary growth elsewhere in the country.
- **Deep research infrastructure.** This infrastructure whether in academic expertise or specialist facilities and testing infrastructure across the clusters' parks such as Harwell, makes a significant contribution to the UK economy through its commercialisation activities and attracting and employing researchers from around the globe.
- **Delivering a high skilled workforce.** The Arc's globally leading academic institutions and companies attract the best in the world and in so doing provide a supremely skilled workforce. This clearly contributes to the local and regional economy, but also delivers skilled talent to the UK as a whole. This is the case for all clusters across the UK, but the scale and maturity of the Arc magnifies this impact and is an important driver for the growth of other UK clusters seeking specific high value skills.

- **Achieving a broader geographical impact of research collaboration.** Many frontier technologies are concentrated in the Arc's cities where key institutions, researchers and firms are clustered. While this serves to reinforce the importance of Oxford and Cambridge, and other universities across the Supercluster, these centres of excellence are also super connectors - supporting collaboration and cooperation between researchers and innovative businesses nationally. Analysis of Innovate UK funding data finds a large proportion of Arc collaborative relationships are with partners (firms, universities, public research organisations, third sector) outside of the Supercluster region. This diffusing of impact, expands the potential for the value of innovation to be realised in multiple locations.
- **Capitalising on supply/value chains.** The knowledge intensive nature of the Oxford-Cambridge Supercluster presents an opportunity to leverage its position in and across supply chains both within and beyond the cluster. Significantly, it is the global linkages of the Supercluster that provide an important source of competitive advantage to the wider UK economy through its connections into both global value chains and international markets. In this respect the Oxford-Cambridge Supercluster can serve as a gateway for other UK regions.

While the evidence provided reflects on the multiple ways the Oxford-Cambridge Supercluster may benefit the wider UK economy, realising these indirect benefits will need to be actively managed.

The Oxford-Cambridge Supercluster's Unique Position as a Catalyst for Growth

By Professor Tim Vorley OBE FAcSS

Co-author Dr Jen Nelles PHD

Clusters also have spillover effects on the wider economy⁵. Deepening this insight, Wilson, Wise and Smith stress that clusters are not “isolated entities but activity-specific microsystems that operate within wider regional system dynamics and whose development is mutually dependent with elements of the specific regional systems in which they are embedded”⁶. In this vein, the Oxford-Cambridge Supercluster's strengths have developed in part because of advantages associated with its embeddedness in the UK innovation system, and itself contributes to strengthening the broader economy. The Supercluster's research and innovation assets are the drivers of prosperity and growth in the region, and these strengths also have potentially positive impacts on the development of places elsewhere in the UK. While these indirect effects can be difficult to measure, we can elaborate the mechanisms through which these impacts can be translated. This briefing identifies the ways in which the Oxford-Cambridge Supercluster can contribute to growth beyond the Supercluster itself, and in so doing realising the Government's ambition for a more sustainable, resilient, and higher-skilled UK economy.

Innovation and international profile: The Oxford-Cambridge Supercluster is integral to the UK's vision to assert its position as a Science Superpower and Innovation Nation. At the core of this vision is a need to extend the global impact of UK Science and Technology, and the strengths of the Oxford-Cambridge Supercluster are uniquely positioned as a catalyst for growth. The science and research base of the Supercluster arc is unparalleled. As well as the two world leading research universities of Oxford and Cambridge being located less than 70 miles apart, the Supercluster also includes a further 7 universities who collectively comprise the Oxford-Cambridge Arc Universities Group⁷, and 1 other university. This deep research infrastructure makes a significant contribution to the UK economy through its commercialisation activities and attracting and employing researchers from around the globe. As a result, the Oxford-Cambridge Supercluster hosts and sustains some of the leading R&D intensive enterprises, many of which benefit from working with and accessing crucial testing infrastructure at the area's research parks, institutes, and labs. Previous work identified five areas of competitive advantage with world-leading firms and innovation centres including Life Sciences (AstraZeneca, Alchemab); Space (Harwell Space Cluster, Westcott Venture Park, and Satellite Applications Catapult); Sustainable Aviation (Cranfield Global Research Airport, Zero Carbon Airport and Aviation Centre); Future energy (Culham Science Centre, UK Atomic Energy Authority, Oxford Thermofluids and Energy Institute, National Centre for Propulsion and Power); and Future mobility (Oxbotica, Latent Logic, TWI). These core areas of capability, and others, have driven the growth of



clusters that anchor innovation in the Supercluster. All of these assets continue to make the area, and the UK, one of the most attractive innovation regions in the world and a key asset with national and global reach. Consequently, deepening the research base is key to the long-term success of the places that comprise the Supercluster, and of the Supercluster as a whole.

Skills provision, talent attraction and retention: Further to their role in contributing to research, the universities across the Oxford-Cambridge Supercluster play a crucial role in contributing to a high-skilled workforce by providing students with the knowledge and skills needed. This sees universities contributing to the local and regional, as well as paying a role within the HEI skills ecosystem nationally. The universities across the Supercluster also attract high numbers of international students, serving as both an important source of income and source of human capital. Employment data from the University of Cambridge found that 71% of recent international students who had been attracted to the country to participate in the MBA programme had transitioned to permanent employment in the UK.⁸ The role of universities is critical to maintaining and building the skills pipeline, and our universities are delivering a highly skilled workforce that meets the needs of business across the UK. Through the collaboration of partners across and beyond the Supercluster, the goal is to ensure both current and future skills gaps are met.

Interregional connectivity and the impact of brokerage functions: A growing literature studies cities and regions as brokers of innovation and strategic advantage. This scholarship highlights how brokerage relationships connect cities and regions between scales and systems.⁹ Most of this literature focuses on the advantages that accrue to the broker city or region. However, actors (and places) linked by brokerage networks all have the potential to gain advantages from participation. Places are linked by individual connections - for example, between researchers in collaborative partnership or firms in a supply chain relationship, among others - the sum and nature of which shapes the propensity for reciprocal flows of knowledge and resources. Operti and Kumar have recently suggested that certain configurations of localised and external networks can affect regional innovation performance.¹⁰ This implies that while the absorptive capacity of cities and regions outside of the Supercluster area is at least partly a function of their own internal brokerage networks, that flows from highly connected broker regions (such as the Supercluster) are likely to have notable impacts on their innovation performance. We explore two dimensions of this phenomenon, below:

Broader geographical impact of research collaboration: The OECD recognised that the pursuit of cluster programmes born from industrial and innovation policies pursuing growth of frontier technologies can become concentrated in specific geographic areas where key institutions, researchers and firms are clustered. While this serves to reinforce the importance of Oxford and Cambridge, and other universities across the Supercluster,

they are also super connectors - supporting collaboration and cooperation between researchers and innovative businesses nationally and globally. This is a recurring theme in the Government's 'UK Innovation Strategy'. The university base in the Oxford-Cambridge Supercluster is very plugged into the ecosystem of innovative firms in the area, and frequently engages in knowledge exchange and innovation collaborations. These relationships suggest that there are strong knowledge spillovers to the local economy from this research activity. However, a recent analysis of Innovate UK funding data showed that a large proportion of collaborative relationships are with partners (firms, universities, public research organisations, third sector) outside of the Supercluster region¹¹. Where Supercluster universities and firms engage in external collaborations these create pipelines for knowledge transfer to peers in other parts of the country. These relationships can distribute the benefits of public funding to research assets in the Supercluster literally, through external actors' share of the collaborative project funding total, and more diffusely by expanding the potential for the value of innovation to be realised in multiple locations.

Capitalising on supply/value chains: The knowledge intensive nature of the Oxford-Cambridge Supercluster presents an opportunity to leverage its position in and across supply chains both for and beyond the cluster. Clearly the Supercluster directly benefits from supply-chain clustering where groups of similar and related firms in a defined geographic area, especially where supply chain activities are coordinated. However, it is the global linkages of the Supercluster that provide an important source of competitive advantage to the wider UK economy through its connections into both global value chains and international markets. In this respect the Oxford-Cambridge Supercluster can serve as a gateway for other UK regions.

Interdependencies of regional growth: It is important to also understand and leverage the interdependencies within and beyond the Oxford-Cambridge Supercluster. For example, the importance of interdependence between key cities (i.e Oxford, Cambridge and Milton Keynes) and their respective surrounding suburban and rural economic areas can have a further positive effect on productivity growth and income, particularly for those places that are well connected by road and transit, and are located on transport corridors to London. This phenomenon is most iconically expressed in the symbiotic relationships that underpin central place theory but achieves more nuance in the archipelago metaphor of urban network theory.¹² However, it is important to note that the benefits of being in the umland of a city, or indeed Supercluster, are not automatic and may not be evenly spread - an observation evidenced by the fact that the Supercluster area also contains areas of deprivation that are not experiencing the same growth and prosperity as others. This logic extends to external spatial relationships based on different types of proximity (e.g., through networks). Therefore, while other places will benefit from association with the Oxford-Cambridge Supercluster through collaboration and connection that benefit will be spatially uneven.

The multiplying effect of strategic planning: Multiple attempts over the past three decades to coordinate and strategically plan across the Supercluster area testify to the durability of the idea that bridging the innovation system between the Oxford and Cambridge poles could further increase the areas' impact. A forthcoming paper argues that several well-considered and positive proposals for the improvement of strategic planning arrangements have already been brought forward¹³; the political commitment and institutional foundation required to drive them forward has been lacking. Momentum for change requires acknowledgment of the limitations of localism in resolving strategic planning dilemmas and delivering sustainable development; and demands political leadership and democratic accountability at national, city-regional and sub-regional scales to make the case for strategic planning, to navigate the institutional complexity and to rebuild strategic planning capacities.

Reflection

The cities of Oxford and Cambridge with their respective globally renowned universities are central to the Government's vision to become a science superpower, if the UK is to play a leading global role in research and technology. While the paper reflects on different ways that the Oxford-Cambridge Supercluster may benefit the wider UK economy, realising these indirect benefits will need to be actively managed. Unlocking the research and innovation strengths across the Supercluster, and beyond, is a not trivial task. To realise the indirect benefits of the Supercluster across the pan regional partnership and further field will demand both investment and coordination, as well as sustained engagement with other regions and partners beyond the region.



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AstraZeneca – Driving National Growth from the Heart of the Supercluster

AstraZeneca is one of the largest companies in the UK, with the highest market capitalisation of any business on the FTSE. The company has over 8,000 direct employees, around half of which are based in Cambridge, and its regional and national footprint supports over 42,000 jobs in the supply chain. AstraZeneca is the UK's single largest private sector investor in R&D, spending £2.5bn in 2021 alone, which supports the generation of around £4.1bn in annual gross value add (GVA) for the economy.



The company has a long history in Cambridge, having been attracted by the unique science and technology collaboration that exists in the city and the wider Oxford-Cambridge Supercluster. This collaboration is critical for driving innovation and represents the best opportunity for the UK to develop a science cluster with the critical mass to compete with global centres such as San Francisco and Boston. In Cambridge, the colocation of research institutes, including the Medical Research Council's Laboratory of Molecular Biology (LMB), hospitals such as Addenbrookes and Royal Papworth, the University of Cambridge, and other life science and technology companies is the reason why AstraZeneca invested £1.1bn in its Discovery Centre (DISC) on the Cambridge Biomedical Campus (CBC). As one of AstraZeneca's four global R&D centres, as well as its global headquarters, it will soon be home to over 2,000 scientists and researchers. The site itself will be partly accessible to the public and its glass façade will enable people to witness first-hand the science taking place on the site, helping to inspire the next generation of scientific curiosity from students and the general public.

AstraZeneca's presence in Cambridge has a significant impact on the wider region and across the country. Regionally, the company supports 14,000 jobs and £1.5bn in GVA in the East of England, as well as hiring a number of apprentices, graduates and post-graduates to nurture scientific talent and bring critical skills to the region. Nationally, AstraZeneca's major manufacturing site in Macclesfield conducts late-stage development of scientific breakthroughs made in Cambridge, which - if successful during clinical trials - can be manufactured and distributed to countries across the world from the site, which itself employs 4,000 people. In addition, AstraZeneca's pioneering AI work in Cambridge with Cancer Research UK and others has led to a partnership with Qure.ai and Greater Manchester Cancer Alliance to improve lung cancer screening, with the aim of reading 250,000 chest



x-rays of local people to support radiologists in making faster and more accurate diagnoses of lung cancer. These examples demonstrate the spill over effects for the country of a company like AstraZeneca being present in the heart of Cambridge's vibrant life sciences cluster.

In order to take advantage of the opportunity to grow the Oxford-Cambridge Supercluster into a world-leading centre for science and technology development, AstraZeneca believes that the Government should drive forward policy recommendations from the partners in the region, including on tax and fiscal policy, transport and planning, ensuring senior Cabinet-level leadership of the programme and committing to unlock further funding for vital infrastructure development that supports growth.

The UK's guiding light in high precision research

Diamond Light Source is the UK's premier synchrotron facility, offering scientists the ability to study a wide range of subjects with unprecedented detail and precision.

By accelerating electrons to near light speeds, it creates bright beams of light that are directed into specialised laboratories, or beamlines, giving off light 10 billion times brighter than the sun.

As a not-for-profit venture funded by UKRI and the Wellcome Trust, located at the Harwell Science and Innovation Campus in Oxfordshire, Diamond provides national science infrastructure that is free at the point of use.

Scientists can use this light to analyse everything from fossils and jet engines to viruses and vaccines, making it 10,000 times more powerful than traditional microscopes.

Established in 2002 as a joint venture company, Diamond is an independent non-profit organization with a focus on delivering basic and applied science in collaboration with 14,000 researchers from across UK life and physical sciences, both from academia and industry, using Diamond to conduct experiments, assisted by approximately 700 staff.

There are some impressive examples of how Diamond is being leveraged to make breakthroughs formerly beyond their own financial means. The University of Manchester

joined forces with Diamond to build and run a imaging centre using its imaging and coherence beamline, enabling research into metals not achievable in their own laboratories.

The UK Catalysis Hub located in its the Research Complex at Harwell (RCaH), next to Diamond is the centre of a network of over 35 universities working together. The organisation's purpose is to coordinate, enhance, and advance the UK's catalysis research portfolio.

The Hub is divided into five themes, each led by a lead investigator from one of the five partner universities. This network provides researchers with complimentary access to Diamond's cutting-edge synchrotron and cryo electron microscopy facilities, helping to maintain the UK's status as a leader in scientific exploration.

The software and applications produced using Diamond have been valued at an estimated £51.3 million; plus, with Diamond generating £35.5 million in net economic impact to the UK through its operational expenditure.

Training opportunities for its users were worth £8.8 million over the past five years with 7,668 attendees upskilled, without charge. But perhaps most crucially of all, Diamond played a crucial role in the UK's response to the Covid-19 pandemic; developing new treatments, working on the design of new drugs and repurposing existing drugs, becoming a vital piece of UK infrastructure and making significant contributions to its users and the wider society.



Clusters, Corridors and Competitiveness

By Dr Tim Moonen

For more than 30 years the evolving role of clusters that coalesce across a city, region or corridor has been shown to be critical to the competitiveness of nations. There is an extensive literature on the role that geographic proximity and strong networks of companies, institutions, customers, and specialised workforce can have in raising the overall performance and productivity of a place and a surrounding ecosystem.¹⁴

Ongoing research continues to highlight how clusters are fuelled by the alliances that span public and private knowledge assets, from which arise a variety of shared interests and infrastructures, and localised flows of technical and tacit knowledge.¹⁵ These foster the sharing of resources, the pooling of risks, the opportunities to network, the joint effort to internationalise, the ability to partner closely on projects, and the regular testing of technologies with industry partners.

Clusters thrive on localised proximity, and strengthen when they gain critical mass, diverse physical connections, and wider relationships in the regional and national economy.¹⁶ These features arise from the agglomeration effects. The core advantages of agglomeration are acknowledged to be (1) matching capability of 'thick' diverse labour markets between workers and companies; (2) the accelerated learning and information flow through face-to-face and face-to-place interaction; and (3) the sharing of facilities, supply chains, utilities, infrastructure and investment risks that encourages greater specialisation.¹⁷

The shared advantages of clusters have also been examined in scenarios and examples that correspond to the Oxford-Cambridge Arc. In particular:

- **Clusters are especially important in frontier knowledge-intensive sectors such as those hosted across the Arc.**¹⁸ Across many nations, the advantages have been observed across the full suite of digital and life science-related industries as well as a variety of creative services and advanced production.¹⁹ Increasingly the innovations extend and expand beyond a single industry. Lots of evidence has emerged that for sectors like biotech, clusters that develop around university labs are key drivers of knowledge-intensive growth.²⁰
- **Many clusters of related industries evolve along 'corridors' – neighbouring locations unified by shared attributes and underpinned by infrastructure networks.**²¹ Corridors provide connections between economic activity hubs, and possess a distinct economic fabric for the companies and organisations along it. Corridors also provide opportunities to link knowledge clusters both to each other and to other locations of production, testing and demonstration.

When reliably connected, these corridors foster high levels of interaction and inter-connectivity, especially in places that possess a high knowledge quotient and high potential growth businesses.²²

- **High-performing clusters can deliver strong positive-sum advantages.** Advanced clusters in leading economies are not only magnets for people and businesses. Research suggests they also tend to make incomers and existing workers more productive and inventive, and trigger higher business formation.²³ Studies point to aggregate nationwide macroeconomic benefits of many internationally successful clusters – on income, productivity and innovation.²⁴ These can also drive complementary growth in more distant cities and locations, especially when connectivity is enhanced alongside improvements to skills, soft infrastructure and co-ordination.²⁵

The evolution and enabling of clusters

Recent analysis now observes a distinct geography and character to the frontier economy.²⁶ The technologically advanced sectors – in the UK and globally – are fast-moving and thrive on iterating, improving and integrating technologies, products, processes and services. This amplifies the advantages to clustering, co-location and convergence of related industries and capabilities.²⁷

As such "clusters" are evolving into "platforms" that consist of many related and converging sub-clusters, services, markets and expertise. Their strength lies in their high lateral absorptive capacity – ie. the propensity to introduce and take up innovations from outside established industry networks.

Among the key implications for established clusters in the global economy is that "place matters".²⁸ Clusters rely on strong roots and interdependencies with their regional economy. They depend on place appeal and resilience, in terms of amenities, liveability, land uses, connectivity, sustainability and affordability.²⁹ And they benefit from public and private institutions that behave as willing 'anchors' to their wider ecosystem, as well as from intermediaries who can operate at the interface between industries and disciplines.³⁰

The evidence from the economic development literature therefore suggests that the clusters already extant across the Oxford-Cambridge Arc constitute a significant strategic advantage for UK plc and depend on purposeful place-based interventions to support mobility, agglomeration and sustainable growth management.

The full benefits of world-class clusters, including their propensity to complement other economies in a national ecosystem, are not achieved without investment and co-ordination. In order to be 'deep' rather than 'shallow',³¹ to drive maximum commercialisation and capitalisation, and to accommodate successive cycles of growth, they require careful inputs and timely support.

Many studies have observed the essential importance of coordinated leadership, investment systems, R&D, skills development, market-facing convenors, and connectivity.³² Improving connectivity plays a key role to encourage labour and firm co-location and mobility along a knowledge-intensive growth corridor, and facilitate the organic development of existing neighbouring clusters.³³



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Motorsport Valley driving £10bn UK Formula One industry

The UK dominates global motorsport, with six of the top ten Formula 1 teams basing their headquarters in the UK.

The presence of several Formula One teams, such as Red Bull, Mercedes, and McLaren, and racing circuits, like Silverstone, within close proximity to each other across the Arc, has led to the creation of Motorsport Valley - a hub for the production of high-performance car components.

The UK industry turns over £10 billion in sales each year, with 25-30% of that being spent on research and development in the Arc.

This hub is also supported by a network of specialized legal, financial, and insurance services. With around 4,500 businesses and 40,000 jobs attributed to motorsport, it is a significant contributor to the UK economy.

Silverstone Park is not only the site of a world-renowned F1 race circuit located in the heart of Arc. It's a hub for the UK sector. The companies located in Silverstone Park are a mix of race teams, engineering companies, and global brands like Ducati and Porsche.

Close to major roads and airports, Silverstone has become a convenient destination for teams and suppliers to establish themselves, leading to its growth and importance as a hub of industry. This growing motorsport community located here is contributing to the growth and success of the industry, providing employment and wealth across the UK.



Oxford space centre putting UK clusters into economic orbit

The UK space sector saw a 6.7% increase in employment, totalling 46,995 in 2020. There are now 1,293 space organizations in the UK, with Scotland housing one fifth of the UK space workforce.

The sector's income also increased from £16.4 billion to £16.5 billion in 2020. The Harwell Campus and its business incubation programme played a major role in this stratospheric UK success story. The Harwell Space Cluster forms an integral part of the UK's space sector and has grown into a dynamic, enterprising ecosystem of 105 space organisations employing over 1,400 people.

The ESA Space Solutions BIC UK is a part of the European Space Agency's network of business incubation centres established in 2010 and is based at Harwell but has expanded to other regions in the UK, including the Northwest, Scotland, and the East Midlands. Over its history, the ESA BIC UK has supported around 100 companies in the space sector across the UK.

It supports start-ups and helps them launch their business ideas. The team comprises of individuals from various career backgrounds, all with a passion for space and its applications. The team is spread across different locations in the UK, and they offer support, funding and connect incubatees with what they need during their journey. The ESA BIC UK incubates start-ups that work to solve some of the UK's most pressing challenges, such as sustainability and safety, as well as medical and inspiring companies

Government investment in research and development investment saw a 19% boost to £836 million in 2020, reflecting the UK government's commitment to increasing public and private R&D spending.

With regional space clusters and international investment, along with emerging technologies such as in-space manufacturing and debris removal, expected to create more jobs in the UK, ESA BIC UK aims to be the go-to place for innovative business ideas in the space industry for entrepreneurs across the UK.

The Global Competitive Horizon

By Dr Tim Moonen

10 years ago, the global innovation ecosystem consisted of a relatively small number of 'superstar' regions. The Golden Triangle was recognised as one of 6-8 ecosystems with a deep track record of world-class research, diversified innovation, unicorn production, and access to early-stage business funding.³⁴ In 2023, global competition is much wider and deeper and there are more challengers to the established global frontrunners.

The changing geography of talent, capital, science, technology and founders has seen many more city-regions, clusters and corridors emerge, each with specific industry strengths as well as competitive and lifestyle advantages. The rise of inter-connected regions such as Tel Aviv-Haifa, Shanghai-YRD, Amsterdam-Randstad, China's Greater Bay Area, Bangalore, Toronto-Waterloo and Singapore-Kuala Lumpur into mature and diversified ecosystems has intensified the competition for investment, talent and discovery.³⁵ Many smaller locations such as Eindhoven, Leuven, Basel, Charlottesville, Boulder and Malmö are also succeeding in distinct sectors.³⁶ And meanwhile more nations are investing in nationwide technology infrastructures, regulatory sandboxes, R&D and entrepreneur visas.

Competitor regions and corridors with many comparable attributes and regional dynamics to the Oxford-Cambridge Arc, are continuing to invest and leverage their faster and more frequent rail connectivity. Many have a clear perspective that they can serve growth in the wider region and nationally.

With Hong Kong as the financial capital, Shenzhen is the innovation hub of the Greater Bay Area. It is very soon to complete the infrastructure programme called the Shenzhen 'Metropolitan Circle', which will ensure that travel time between Shenzhen and other core cities in the multi city region is 30 minutes or less. Hong Kong's East Rail Line now connects directly with two metro lines in Shenzhen while one of the key innovation parks (HSITP) is also linked to both locations by rail. By 2025, the total railway network in operation and under construction across the 9 city region will extend to over 4,000 km.³⁷

Sweden's third city, Malmö has successfully used its improved connections to Copenhagen by rail and road to cultivate much larger clusters in life sciences and pharmacology as well as gaming and IT. The Öresund bridge and multi-stop rail line was combined with efforts to coordinate and pool life science assets, have strengthened two-way talent flows and communications, and in effect created a more dynamic and integrated labour market. Medicin Valley has emerged into a combined cluster of leading Biotech, Medtech and Pharma companies, working together to raise visibility and investment. At the same time Malmö has seen wage convergence with the larger and more established hub of Copenhagen.³⁸

Taiwan's leading innovation corridor, Hsinchu to Taoyuan, connects cities and science parks 50-100km from the capital Taipei. The national focus has been to achieve tight clustering by co-locating leading science hubs close to leading national labs (eg. NCSIST) and technical universities, brought together with production and services. Existing connectivity improvements have especially enabled growth when land-use policies also foster compact development closer to stations and effective conversion of land.³⁹ Taiwan is in the middle of 8 year plan acceleration of infrastructure investment, called the Forward-looking Infrastructure Development Program, which is enabling the scale, access and global visibility of the IT, semiconductor and advanced materials clusters to grow. This works closely with its Innovative Industries policy and prioritises funding for inter-city rail, local transport systems and digital infrastructure. A 90 minute connection between the established North of Taiwan with the South also underpins commitment to the development of other regions and spillover benefits.⁴⁰

Toronto-Waterloo is an innovation corridor running between Ontario's capital and Waterloo, a small regional city 2 hours west of Toronto. As a small university city-region Waterloo has already been successful at leveraging its well-regarded university to cultivate a talent-rich pipeline and provide entrepreneurs with outstanding convening and pre-incubation support. Recognising that with better planning and infrastructure more two-way connections could occur, Ontario's provincial government has announced funding for a two-way commuter service between Toronto and Waterloo in an effort to connect the talent with the capital, and generate spillovers in the highest potential locations along the route. This is supported by a renewed federal Global Innovation Clusters initiative focused on connecting SMEs and institutions in five most promising industries to build international advantage and reputation.

Other leading ecosystems are also focused on connecting their corridors by rail, including the Cascadia corridor that connects Vancouver, Seattle and Portland, and in Israel between Tel Aviv and Haifa. The aim in both cases is to reduce commuter times between the existing knowledge and innovation clusters, and expand development and opportunity in the locations and stations between them.

While different global ecosystems and corridors are progressing at different paces, there is a very clear trend that over the next 10-20 years the majority of Oxford-Cambridge Arc's international comparator and competitor locations will enjoy improved internal connections as a foundation for achieving greater scale, more access to opportunity, new and adjacent cluster strengths, and more opportunities for concerted complementarity across their national and regional economies.

Next Steps

In this paper the Oxford-Cambridge Supercluster Board, with the support of leading academics, has identified how the UK can fully benefit from 'East West Rail as a Catalyst for Turbocharged Economic Growth'.

We welcome further discussion on the policy recommendations put forward in this paper and look forward to establishing a collaborative relationship with Government and the locally-led Pan Regional Partnership as an officially endorsed Oxford-Cambridge Supercluster Board.

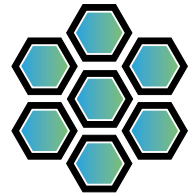
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