Economic Vision: The Oxford – Cambridge Arc

Home of the New Innovation Economy

April 2019

OxLEP driving economic growth

BTVLEP ENTREPRENEURIAL HEART OF BRITAIN

SEMLEP South East Midlands Local Enterprise Partnership

CAMBRIDGESHIRE & PETERBOROUGH COMBINED AUTHORITY

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1 Introduction

1.1 This vision's purpose

The purpose of the Economic Vision is to explain the Oxford - Cambridge Arc's unified proposition as a globally leading innovation and growth catalyst. The Arc offers access to each of the critical ingredients for business and innovation-led growth. This collective offer represents a powerful and coherent expression of the region's current assets and future potential.

This Economic Vision for the Arc sets out an ambition and series of proposals designed to unlock the economic potential of the region and deliver transformative growth for the UK between now and 2050. It provides a vision for how the Arc can better connect its unique and world-leading assets to become truly globally competitive in frontier markets, both for business investment and for top talent. With a bolder brand and stronger international presence the Arc can continue to lead the whole of the UK to the forefront of global innovation excellence in the coming years and decades.

The Opportunity

Global leaders	The Arc is already home to world-leading production clusters in high-skilled sectors, such as Life Sciences, Aerospace, Advanced Manufacturing, Transport, Energy, Creative and Digital.
Cross-fertilisation potential	It is essential that these existing clusters are linked in a way that can greatly improve collaboration and boost economic productivity. To do this the Arc needs new infrastructure and strong economic networks to support a coherent brand.
Knowledge economy	These new networks will draw upon the region's internationally renowned knowledge economy to embed innovation at their core. By supporting production through research & development partnerships, economic cross-fertilisation throughout the Arc will increase.
Innovation test bed	Improved networks and infrastructure will unlock the economic potential of settlements across the wider Arc, especially as a test bed for innovative new industries and emerging technology being developed in more space-constrained Arc locations. This will mark the Arc out as the UK's primary R&D centre.
Commercial critical mass	Innovative sectors are present at a greater scale and density in the Arc than elsewhere in the UK. Many local businesses are at a critical point where they could crystallise into major commercial entities if given a boost to infrastructure and support at this juncture.
Wider UK growth	Aside from considerable and inclusive growth across the Arc, the success of this region would have major spillover benefits for the rest of the UK. Above all, by becoming the UK's R&D centre the Arc will be able to design productivity improvements that can then be implemented across the UK.

This Economic Vision is built upon the foundation of the four local industrial strategies which currently demarcate the Arc's geographic area. These have been prepared by the Oxfordshire (OxLEP), South East Midlands (SEMLEP) and Buckinghamshire Thames Valley (BTVLEP) Local Enterprise Partnerships, as well as the Cambridgeshire & Peterborough Mayoral Combined Authority (CPCA). However, it goes beyond the sum of their individual ambitions; better collaboration between industry clusters across the Arc has the potential to drive innovation and higher productivity, boosting inclusive, sustainable economic growth across the whole region and beyond. The National Infrastructure Commission (NIC) has stated that this growth will occur alongside the creation of up to one million new homes and jobs and improved infrastructure, an ambition this Vision document supports.[1]

The stakeholders associated with the vision are determined that this growth be sustainable, enhancing environmental and cultural assets and ensuring that existing and new communities are healthy, inclusive and all benefit from new economic opportunities. Alongside the benefit of added GVA, this focus on clean growth productivity opportunities will help to drive down the carbon intensity and unwanted environmental side-effects of industries operating within the Arc.

This Vision comes at critical time for the UK. The world is changing rapidly and in ways we cannot predict. Our futures are being shaped by new disruptive technologies and trends that are transforming the twenty-first century and the ways we live and work. Global markets are shifting, and in an uncertain world the UK needs to innovate to address the productivity puzzle it is facing, and respond to new challenges and opportunities to remain globally competitive.

This Vision is also crucially timed for the Arc. The region already has some highly successful technology businesses that have been successfully spun out from commercial-academic partnerships, and some of the fastest growing manufacturing and service sector scale-ups in the country. In order to push these success stories over the threshold into larger, higher margin and internationally competitive offerings, improvements to business network infrastructure and business support networks will be necessary. This will move the Arc into competition beyond the high new business attrition rate and relatively low-GVA start-ups that have typified its economic growth in recent decades.

This Economic Vision has been developed in partnership with the three LEPs and the Combined Authority, who have been given a mandate by Central Government to drive forwards the Economic Vision for the Arc:

> "Our vision is for the Arc to be the world leading place for high-value growth, innovation and productivity. A global hub where ideas and companies are generated and thrive, home to exemplary models of 21st century development, with a high-quality environment and outstanding quality of life, and with a strong economic focus that drives inclusive clean growth."

It is designed to set out our vision of the Arc clearly for HM Government, who can then work in collaboration with Arc leadership to deliver it. It is also designed to help partners and other stakeholders understand and respond to this Economic Vision for the future, in particular Local Authorities, investors, businesses and communities. It will also align to emerging proposals for housing and economic growth, including for both expanded and new settlements.

This document should be read in conjunction with a number of associated documents. These include the local industrial strategies for the three LEP areas and Combined Authority area within the Arc, as these set out the local priorities and opportunities for economic development in greater detail. They also contain the wider economic evidence base for the opportunities proposed in this joint vision.

This document sets out:

- Our vision and ambition for the Arc;
- Sectors which can help to form the basis for the Arc's New Innovation Economy;
- The importance of an innovation network being developed across the Arc;
- Some key strategies to consider in delivering this vision; and
- Next steps to take towards implementation and realisation of economic opportunities identified here.

[1] Cambridge Econometrics and SQW (2016) Cambridge, Milton Keynes, Northampton, Oxford Growth Corridor: Final report for the NIC'.

1.2 The Arc today

The Arc is the uppermost part of the geographical area also known as the 'Golden Triangle', which connects Oxford, Cambridge and London. The Arc brings together three Local Enterprise Partnerships, for Oxfordshire, Buckinghamshire Thames Valley and South East Midlands, and the Cambridgeshire and Peterborough Mayoral Combined Authority. Within the boundaries of these areas are further partner organisations, such as Local Authorities, universities and businesses.

The Arc is home to 3.3 million people, and in 2016 contributed £107 billion Gross Value Added (GVA) to the UK economy.[2] It has the highest concentration of world-class research and innovation assets in the world. These include the two highest ranking universities in the world in Oxford and Cambridge,[3] which have been at the heart of the growth of the Arc's knowledge-intensive economy, along with eight further universities and a network of science parks, research institutions, businesses and incubators. Together, these innovation assets form a wider innovation economy that drives growth across the region and generates additional growth for the UK.

Although other areas of the UK are home to pockets of innovation, research and development, such activities are widespread across the Arc, making its density of R&D institutions far higher than other UK regions. The Arc is home to world-leading R&D and is already renowned as a place of global firsts – pioneering cures for disease, forging breakthroughs in engine technology, innovating in future energy and transport systems, and developing world-leading strengths in technologies that are shaping the twenty-first century. Our knowledge and innovation assets enable us to be world-leading in industries that have global and rapidly growing markets.

Areas across the Arc are also home to the most highly skilled workforces in the UK, and some of the most productive and fast-growing cities. In particular, it has high levels of entrepreneurship, where firms are created and scaled to take advantage of new business models, new forms of business and customer value and some of the fastest growing global markets. Our cities and towns are some of the most desirable places to live in the UK; we are home to two of the top four ranking cities in PwC's 2018 Good Growth for Cities report, namely Oxford and Milton Keynes, based on

[2] ONS Statistics, 2016.

[3] Times Higher Education World University Rankings 2019.

economic and wellbeing indicators, such as employment, health, income and skills.[4]

1.3 Policy context

The National Industrial Strategy

The Government published the UK Industrial Strategy in November 2017. The National Industrial Strategy seeks to boost the productivity and earning power of people across the UK and to create a Britain that is fit for the future. It seeks to do this by strengthening the foundations of productivity, agreeing sector deals between industry and government, and inviting business, academia and civil society to tackle the Grand Challenges: ageing society, data & artificial intelligence, clean growth and mobility.

It initiates a regional-led approach to growth focussing on 'place', asking each area across the UK to develop a Local Industrial Strategy to take forward the UK's ambitions. The three LEPs and the Combined Authority have been developing individual local industrial strategies in response to this.

The National Infrastructure Commission and Government's response

HM Government has specifically been looking to the Arc to deliver economic growth, commissioning the NIC to review the growth potential of the region. In 2017, the NIC concluded that the Arc has the potential to become the UK's Silicon Valley, provided the right planning for homes, jobs and infrastructure.

To secure the area's success, the NIC recommended delivering up to one million new homes and jobs in the area by 2050 in new and expanded settlements. This should be supported by investments in transport infrastructure including an Expressway between Oxford and Cambridge and an East West Rail line, and as part of a 50-year vision for the Arc as a whole.

Government's response in October 2018 designated that Arc as a key economic priority and a significant opportunity for transformational growth, supporting the ambition to deliver up to one million homes by 2050 to maximise the Arc's economic potential.

With the right interventions and investment, the Arc can be positioned as a world-leading place and can support the National Industrial Strategy aim to boost productivity and prosperity across the country.

Government has already taken action to deliver the Arc, committing funding for transport infrastructure including the Expressway and East-West Rail, and agreeing an ambitious Housing & Growth Deal for Oxfordshire to support the delivery of 100,000 homes by 2031.

However, Government has not made specific provisions around supporting medium-term growth and the associated risk mitigation mechanisms should productivity begin to fall behind targets. Risk provisioning should be addressed as a specific measure to support productivity.

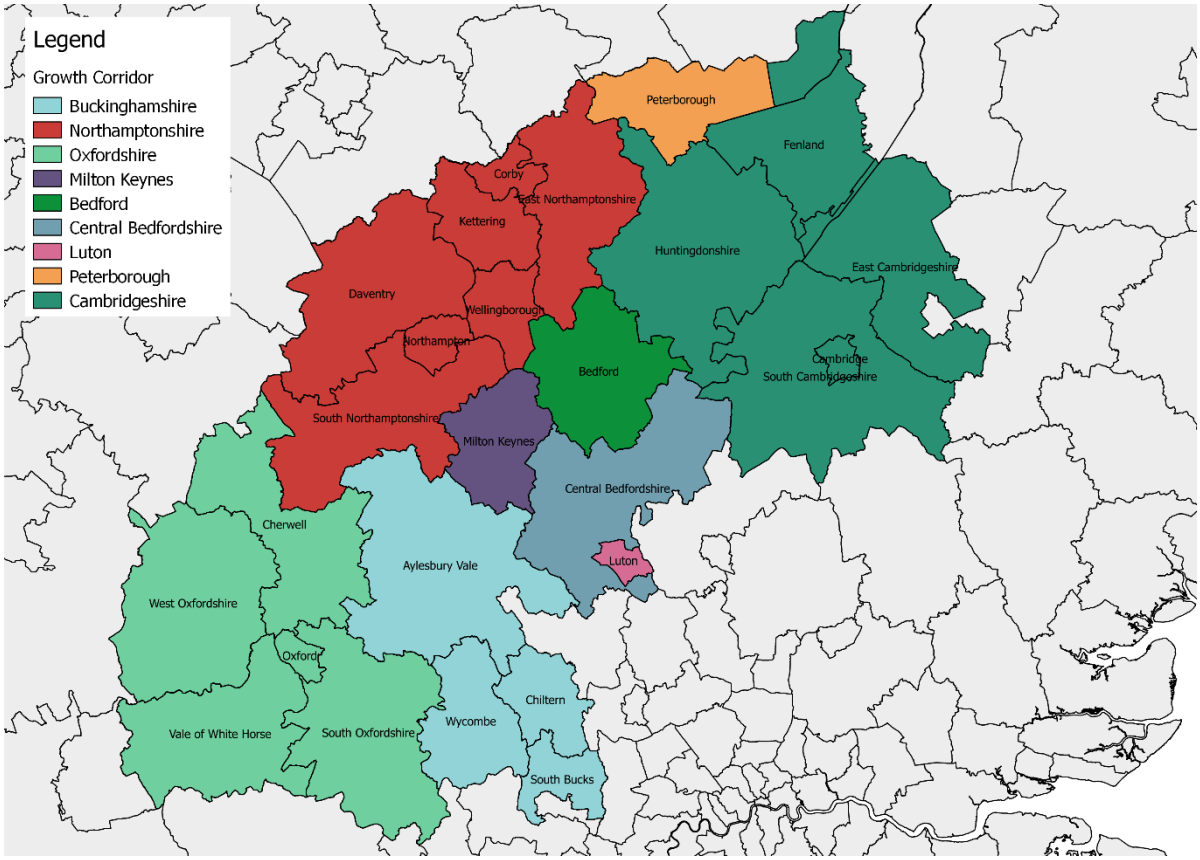


Figure 1 – Location of the Arc, as per county boundaries

[4] PwC and Demos, 'Good Growth for Cities 2018', 2018.

1.4 Limitation of scope

This document represents an Economic Vision for the Arc as a coherent whole, and demonstrates its immediate potential to become a major international brand. It is based on practical opportunities within the local industrial strategies of the three LEPs and the Cambridgeshire and Peterborough Mayoral Combined Authority, and on additional cross-fertilisation opportunities that emerge as a result of their collaboration. This document has not attempted to quantify the scale of economic effects arising from economic interventions, such as through economic modelling.

This document does not represent a comprehensive list of economic opportunities across the Arc, aiming instead to provide a representative cross-section of approaches for each sector based on its unique strengths. More detail on sector and opportunity specifics will be available within the local industrial strategies of the four partner LEPs and Combined Authority.

This document does not represent a delivery plan for specific projects or policy interventions, nor does it lay out the specifics of funding mechanisms needed to deliver the vision.

It is intended that this document will be followed by a separate investment and delivery programme, building on the Key Priorities of Chapter 6. It will tackle the practicalities of realising the joint ambition of partners, namely to achieve collaborative economic transformation that is greater than the sum of its parts.

2 The Economic Vision

2.1 Introduction

This section sets out our combined Economic Vision and ambitions for the Arc. As many infrastructure projects across the next ten years are already being planned for, this vision primarily focusses on the next phase of development from 2030 to 2050.

Planning for and designing such development projects will, however, occur over the next ten years. This Vision considers how plans made during the next decade can be focussed around inclusive growth in areas of the Arc that have the potential to develop rapidly. This will help to ensure that proposals for the long term are not focussed around urban areas that are already severely restricted through environmental geography, regulation or other constraints such as inadequate infrastructure capacity.

Although the economy touches all aspects of our lives, our Vision detailed here is not a geographic or societal one but an economic one, exploring how the Arc's economic and business clusters can be connected in new ways and under an ambitious vision that generates growth for the region and for the UK.

2.2 Our Vision: Home of the new innovation economy

The Arc will be a breakthrough region for the new innovation economy. It will build on the distinctive assets and strengths from across the Arc to create a cohesive innovation ecosystem that is more than the sum of its parts. Through its unique manufacturing specialisms and knowledge-intensive economy, the Arc will drive growth across the UK by harnessing technological change. This will drive improvements in productivity in our businesses and prosperity in our communities, doing so in an inclusive way that leaves no group behind. It will provide the critical mass necessary to transform the Arc into the innovation powerhouse that will push the UK to the forefront of global competition in key markets and industries of the future.

The Arc will be:

1) A place where specialist commercial knowledge and skills collide with world-leading research and development assets to shape existing and new industries.

The Arc is home to a wealth of unique assets, from world-class universities to globally-renowned industry clusters operating in knowledge-intensive sectors at the cutting edge of global research. When combined, our innovation assets are second to none and will push the UK to the forefront of global innovation in industries of the future.

2) A testbed for innovation that will shape the twenty-first century.

The Arc houses some of the most innovative places in the UK, and will become globally-renowned as a living laboratory for testing innovation and shaping places that harness and embrace new technologies. Together, we will build sustainable, technology-enabled communities based on an Arc with improved infrastructure connectivity. This will allow for greater cohesion and consistency in testbed access across the region, and will deliver breakthroughs in new and emerging industries that are shaping our futures.

3) A business growth-enabled environment where our ideas and inventions are rapidly commercialised and spun-out, whilst our most exciting entrepreneurs are supported to scale-up new services, products and markets.

The Arc is already home to a high concentration of high-growth firms, a highly skilled and entrepreneurial workforce and a dynamic business base. Crucially, there is potential to scale up the operations of such firms given the right investment. Working across the Arc, we will become a world-leading ecosystem for high-growth start-ups, but also a business environment that enables businesses to commercialise technologies and business ideas, draw on academic research, grow to scale, and export internationally.

2.3 Our ambition: Sustainable and Balanced Growth

The Arc has the potential to generate transformative growth for the region, and additional growth for the UK. It is important that it does so in a way that is environmentally sustainable. As part of our vision, we have set out the following ambitions:

Significantly increasing the GVA of the Arc economy by 2050 to build on the Local Industrial Strategy targets of the member authorities.

The Arc's current £107 billion annual GVA figure could be bolstered significantly though a coherent and collaborative economic strategy.[5] This could include capital investment in improved commercial buildings, generating additional employment in areas with labour market surpluses; improved commercialisation of intellectual property and patents; or knowledge networks and support for industry clusters, helping local business scale up and compete internationally.

For instance, between 2016 and 2050 we estimate that if GVA was doubled this would require a growth rate of around 2% per annum, a similar figure to the 1.9% previously estimated by the National Infrastructure Commission.[6]

From 2030 onwards longer-term transport and housing infrastructure projects could also reach completion and begin to contribute GVA. Details of sector-level opportunities for GVA growth are set out below in *Section 3*.

Deliver green growth across the Arc that is sustainable and enhances environmental and cultural assets, including a carbon neutral footprint by 2050.

Boosting the GVA of the region must not be at the expense of environmental sustainability. Our ambition is to ensure growth embraces, protects and enhances the environmental, cultural and heritage assets of the Arc, and builds on its natural capital assets to achieve these results. To reduce our environmental impact and ensure the success of the Arc for future generations, we plan for the Arc to lead the UK in progress towards carbon neutrality by 2050.

To do this, growth will be innovation-led, creating and embracing new technologies that support the creation of sustainable communities and that harness advances in industries such as transport and energy, such as carbon neutral technologies.

Solutions invented, tested and commercialised here will also be implemented here, with greater investment made possible by the expected rise in average household incomes. This will put the Arc at the forefront of environmentally-conscious global generations, economic opportunity and twenty-first century development.

Ensure growth is inclusive, delivering the benefits of economic growth to everyone across the Arc.

Areas of the Arc currently have high levels of disparity, with pockets of both urban and rural deprivation. The Economic Vision and its delivery is an opportunity to address the inequalities that are undermining economic growth. We will ensure that growth in the Arc promotes an inclusive and diverse economy, with good jobs and greater earning power for all. We will ensure that all communities are able to benefit from the opportunities of economic growth and greater collaboration across the Arc. All communities will be able to raise their aspirations and see improved prosperity following on from their increasing opportunities and engagement.

Therefore, we need to change the growth dynamic. At the moment, the innovation growth hotspots that are Cambridge & Oxford, are global in their intellectual and market reach but extremely localised in their economic and societal impact. Businesses elsewhere in the Arc lead the world in bringing cutting edge research and business ideas to market but tend to do so in relative isolation. Outside these hotspots, we have some of the fastest growing cities in the UK but have not fully translated their industrial heritage and recent growth into universal prosperity. Hence, it is important that we increase the sustainability and broaden the base of our economic growth, by identifying opportunities for high-growth companies to accelerate business growth where there is greater capacity in suitable locations across the region. This will go beyond the current hotspots, where there are increasing bottlenecks to growth.

In addition, we recognise the potential risks that automation and future ways of working pose to the goals of high employment and economic equality. Hence, we will ensure a key element of our inclusive approach will be a commitment to life-long learning, skills development and retraining. An inclusive growth strategy which improves absolute standards of living is also vital for the long-term economic sustainability of the Arc; as such it represents a risk mitigation strategy as well as an opportunity.

[5] ONS Statistics, 2016.

[6] Cambridge Econometrics and SQW (2016) Cambridge, Milton Keynes, Northampton, Oxford Growth Corridor: Final report for the NIC'.

2.4 In practice: A network of economic clusters

Central to our vision is building a network of sector-focused clusters across the Arc which, when connected through innovation and growth support, become more than the sum of their parts. Together, this network of clusters will foster a breakthrough region for growth through innovation that will become a driver for the UK economy.

The Arc will become a network of well-connected economic and business clusters centred on key industries, connecting across boundaries and accessing world-class growth support. Clustering businesses in the same geographical area, or increasing connectivity between them, can lead to direct increases in productivity through economies of agglomeration.

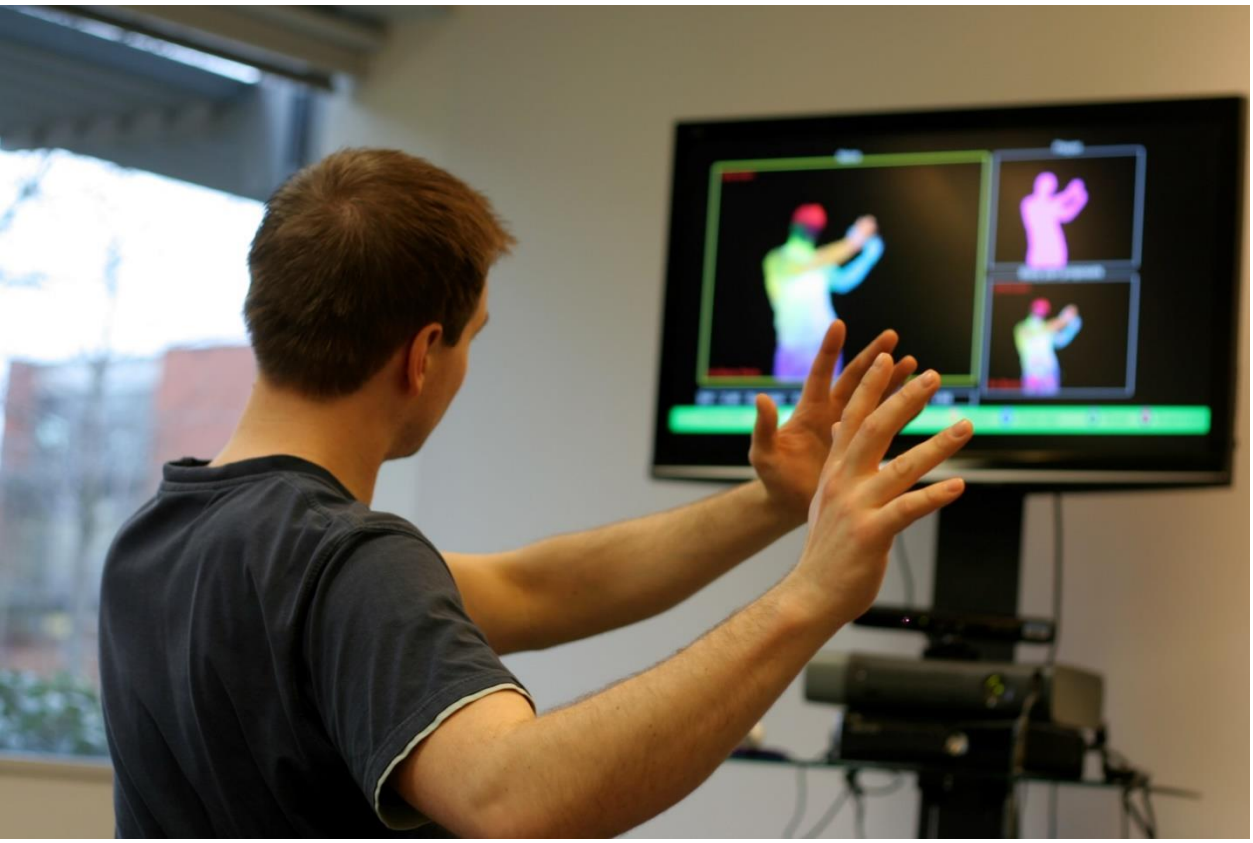
This is the case both between businesses within the same industry, and between businesses across different industries. In the midst of an era of unprecedented disruption, characterised by the blurring of boundaries between traditional industries as new technologies underpin innovations across sectors, agglomeration can have a dynamic effect on growth and productivity by stimulating innovation.

The benefits of agglomeration for the economy include productivity growth, higher net business start-ups, faster growing and more sustainable scale-ups as well as increased overseas trade, high quality jobs, and positive spillovers to the rest of the UK. Agglomeration also has the potential to support inclusive growth in the region, such as through enabling businesses in disadvantaged areas to access new supply chains, skilled labour and business support more easily.

These networks will require the Arc to make better collective use of its growing pool of skilled workers, ensuring that business requirements are shared between networks and with sources of future employees, such as the secondary and tertiary education sectors. This will help to ensure that businesses have access to the appropriate skilled labour force necessary for them to scale up, a transition which has been challenging historically for some businesses across the Arc.

These networks will also have to adapt to competitive clusters nearby, such as the large scale aerospace cluster in the Midlands. However, proximity to competitive clusters presents opportunities too, both through collaboration (such as Northamptonshire members of the Midlands Aerospace Alliance) and through opportunities to differentiate. In the case of aerospace, the Arc can use its focus on innovation to differentiate its industry as highly technical and specialist rather than aiming to compete on scale with the rest of the Midlands.

We provide more detail on this concept and how it will work in practice across the Arc in Chapter 4. The next chapter sets out the Arc's key industries, on which the network of clusters will be based.



3 The New Innovation Economy: Sectors

3.1 The foundations of growth

The Arc already has strong foundations for growth on which we can build:

- Its existing £107 billion annual GVA contribution to the UK economy.[7]
- Top two ranked universities in the world in Oxford and Cambridge.[8]
- Over 60% of residents in Oxford and Cambridge hold a NVQ4 (degree-level) qualification compared with 38% nationally.[9]
- The most patent applications per 100,000 residents in the UK.[10]
- Nine times more patents in Cambridge than the national average.[11]
- Milton Keynes has almost 25% higher productivity per worker than the UK average.[12]
- Two of the top twenty European cities for innovation (Oxford and Cambridge).[13]
- Two of the top five UK cities for business start-ups per capita (Milton Keynes and Northampton).[14]

This section sets out a high-level view of why the Arc has such strong foundations for growth. It then considers where there are opportunities for networks of clusters to emerge, networks which will help to realise the Economic Vision.

These sectors are those identified within the four local industrial strategies of the Arc area as most crucial to the future development of the region. They are sectors that are receptive to technological improvements and therefore have high potential for growth when looking forwards to 2050. They rely on similar technologies, skills and strengths, and have a high level of overlap and convergence that will encourage cross-fertilisation and productivity growth between now and 2050.

These sectors do however represent broad varieties of businesses; sufficiently diverse that they may have strikingly different approaches to problem solving. Evidence already exists within each industry of inter-regional Arc collaboration, as well as collaboration across different industry clusters to spark innovation and productivity growth. Through collaboration they may learn to share the best of these practices.

3.2 Life Sciences

The Arc is home to two globally renowned life sciences clusters in Oxford and Cambridge. They are the most productive life sciences clusters in Europe and already compete internationally with the global leaders in San Francisco and Boston, Massachusetts. Together, the Arc's concentration of assets could rival these clusters and become known as a place where pioneering discoveries and inventions are transformed into treatments and cures for disease.

The diverse expertise across the Arc is second to none, and is pushing the boundaries of innovation by applying new technologies such as machine learning and artificial intelligence to deliver world firsts and life-changing innovations.

The Cambridge life sciences cluster alone is home to over 400 companies, with 15,500 people and contributing around £2.9bn annually to the UK economy.[15] The Cambridge cluster is underpinned by the presence of world-leading R&D at the University of Cambridge and the specialist research institutes, hospitals and businesses in the city, clustered in a number of science parks and with particular strengths in bioscience and pharmaceuticals.

[7] ONS Statistics, 2016.

[8] Times Higher Education World University Rankings 2019.

[9] Centre for Cities (2018), Cities Outlook 2018.

[10] Centre for Cities (2018), Cities Outlook 2018.

[11] Centre for Cities (2016), Cities Outlook 2016.

[12] Cambridge Econometrics and SQW (2016) Cambridge, Milton Keynes, Northampton, Oxford Growth Corridor: Final report for the NIC'.

[13] Centre for Cities (2016), Competing with the Continent.

[14] Centre for Cities (2018), Cities Outlook 2018.

[15] AztraZeneca and MedImmune (2018), Cambridge: driving growth in life sciences: Exploring the value of knowledge-clusters on the UK economy and life sciences sector.

The **Cambridge Biomedical Campus** combines world-class biomedical research, patient care and education on a single site with the University of Cambridge teaching hospitals. It is home to national research assets including the Wellcome Trust Stem Cell Institute, the MRC Laboratory of Molecular Biology, and Cancer Research UK, along with global companies such as AstraZeneca. The **Babraham Research Campus** in Cambridge is another leading campus with over 60 organisations on site including the Babraham Institute, and a number of leading bioscience facilities. **Cambridge Science Park** is home to over 100 businesses working on life-enhancing technologies, with planned further developments including the Bio Innovation Centre.

Discovery, the Big Data Institute and three NHS Foundation Trusts. Harwell Science and Innovation Campus in Didcot has a rapidly growing HealthTec cluster, with research assets such as the Diamond Light Source and the UK's most powerful supercomputer, Emerald, both of which have life sciences applications.

Buckinghamshire is also home to a growing medtech sector, with the **Buckinghamshire Life Science Partnership** leading the development of the Buckinghamshire Life Sciences Innovation Centre. The county is also home to number of global industry leaders in healthcare such as GE Healthcare, as well as national facilities such as the spinal centre in Stoke Mandeville.

Figure 2 – Oxford BioMedica manufacturing suite

Oxfordshire is also home to a leading bioscience cluster, with an estimated 180 companies in R&D and over 150 companies in associated industries. Across the Thames Valley there are an estimated 500 biotech, medtech and diagnostic companies.[16] Oxfordshire is home to several global players in the industry as well as a wealth of innovative companies that have been spun out of the universities and have received valuations of over US$1bn, including **Oxford Nanopore and Adaptimmune**.

Oxfordshire's life sciences clusters include leading R&D facilities, with four new innovation centres including the Oxford BioEscalator and the Begbroke Accelerator, and one each at Harwell and Culham. Oxford Science Park is home to the life sciences facilities of the University of Oxford, and the Biomedical Research Campus in Headington is home to a number of national research assets including the Li Ka Shing Centre for Health Information and

Opportunities

Together, the Arc's life sciences cluster have the critical mass of assets necessary to rival the world's biggest life sciences ecosystems. Looking forward to 2050, its life science industry has high potential for development.

- Expanded clusters in the middle of the Arc: New east-west links provide an opportunity to extend the benefits of clustering across the Arc. This includes opening up a new wave of science parks and incubation centres in other parts of the Arc between the two existing clusters in Oxford and Cambridge, and connecting south into London. In particular, this will enable growth of the emerging cluster in Buckinghamshire, where comparatively affordable business and residential space will be attractive to businesses and talent.

- Arc Life Sciences Network: We will seek to establish a cross-Arc life sciences industry network,

[16] OxLEP, Oxfordshire Sector Profile: Life Sciences.

working together to innovate in ways that secure new funding (replacing funding expected from EU programmes). This will ensure continued access to venture capital and early stage growth funding.

- Cross-sector collaboration: Cross-sector knowledge spillovers and collaboration will also provide opportunities for growth going forwards – for example in the growing digital health sectors. This could include linking the Oxford, Cambridge and Buckinghamshire clusters with the high performance technologies cluster in Silverstone, and the space cluster in Harwell, where there are clear possibilities for applying digital health technology.

Case Study:

The HealthTec cluster in Harwell is able draw on the expertise and strengths over 200 organisations based at the site, such as the space and computing clusters. The cross-fertilisation of ideas across different fields is typified by Diamond Light Source, the synchrotron facility at Harwell. The intense beams of light that it can produce have been found to have uses for aerospace and engineering component design as well as investigating protein structure for new drugs. Cross fertilisation has helped to grow several areas of production simultaneously, with the site due to expand by over 1,000,000 sq ft in the coming years.

- Testbed for new healthcare technologies and services: Planned housing growth across the Arc will provide opportunities to pioneer new approaches to healthcare locally, testing and evaluating the application of new technologies and services. By creating testbeds for innovation we will enable businesses to better commercialise new technologies and services, and also improve quality of life and build healthy sustainable communities. The new and existing garden towns in Oxfordshire and Buckinghamshire, as well as new developments in the South East Midlands, provide unparalleled opportunities for siting these living laboratories.

3.3 Aerospace

The Arc is home to key economic assets across the field of aerospace, from nationally significant aviation development to its cutting-edge space sector. It is home to the largest space cluster in Europe, competing against global aerospace players such as Silicon Valley in the USA and other emerging clusters in Europe and Asia.

The space cluster at **Harwell Science and Innovation Campus** in Oxfordshire is the gateway to the UK space sector, with 80 space organisations employing 800 people. It is home to leading public space organisations, including the European Space Agency, RAL Space, Satellite Applications Catapult and UK Space Agency. It is also home to the Science and Technology Facilities Council, with over £2 billion of infrastructure for research and development. Oxfordshire's capabilities stretch across the industry,

Figure 3 – Diamond Light Source at Harwell Science and Innovation Campus

from ‘upstream’ manufacturing of spacecraft to ‘downstream’ application where companies offer services and products reliant on space-based data or services.

Global space companies such as **Airbus Defence & Space** have established presence at Harwell, which is also home to innovative companies pushing the boundaries of space such as Reaction Engines Limited, who are pioneering the next generation of hypersonic and space access propulsion. There are also a range of SMEs from start-ups in the European Space Agency Business Incubation Centre to rapidly growing companies such as Oxford Space Systems.

Westcott Venture Park in Aylesbury Vale, Buckinghamshire, is also home to an important space cluster, with particular strengths in upstream space – the manufacture of spacecraft and sending objects into space. Westcott is home to the National Propulsion Test Facility where the UK Space Agency are investing over £4 million to develop space propulsion engines, along with a 5G Catapult Centre and a new innovation and incubation centre.

Figure 4 – Westcott Venture Park

The space clusters across the Arc have already formed a number of connections – both within sectors and across them. In particular, the unprecedented amounts of data generated from satellite applications is used for an array of ‘big data’ services that brings benefits to many other sectors.

Case Study:

Reaction Engines, an Oxfordshire based company, has now chosen Westcott in Buckinghamshire as the site for developing its new, innovative SABRE engine technology. This fast-growing, innovative company represents the type of organisation that could crystallise into a major international competitor in the space sector given greater infrastructure investment and talent retention across the Arc.

In aviation, Bedfordshire’s **Cranfield University**, has distinction in aerospace engineering and is home to the Aerospace Integration Research Centre and Aerospace Technology Institute. Together with the new Digital Aviation Research and Technology Centre (DARTeC), Cranfield is the nation’s flagship research institution in the Future Flight aerospace sector deal. To complement this, **Central Bedfordshire** is the home to the Aircraft Research Association (ARA) which has a global client base, and aerospace manufacturers Lockheed Martin, Rockwell Collins, MBDA Missile Systems and Brinkley Propellers.

The East Midlands also benefit from their proximity to the Midlands aerospace cluster, especially around Northampton, where several members of the Midlands Aerospace Alliance are based. Aerospace manufacturing by Alliance members covers propulsion systems, moving parts of aircraft and engines, composite material production and engineering design.

Beyond Harwell's space research, **Stevenage** is the primary base for the Airbus Defence and Space team. **Luton** houses a cluster that specialises in aircraft manufacturing and maintenance, one of the top three hubs for business aviation services. Furthermore, **London Luton Airport** has been the fastest growing major airport in the UK for the last 4 years and provides connectivity between the Arc and the rest of the world, and has an ambition to grow to 32 million passengers per annum by 2050.

Opportunities

The UK space sector is rapidly growing, and has unique potential to generate growth for the UK. Space sector productivity is nearly three times the national average, and the industry is expected to grow rapidly over the coming decades. The UK Government's ambition is to capture 10% of the global space market by 2030; investing to better connect the Arc's unique and world-leading space cluster is critical to achieving this. Specific opportunities for the space industry include:

- Arc Space Network: We will establish an Arc-wide network of companies and universities in the space industry to enhance collaboration between key players across the Arc.

- Extend the Westcott cluster: We will extend the Westcott cluster as a key link in the UK space supply chain, building on its capabilities in early-stage propulsion testing and drone applications, and establishing the UK's first in-orbit service demonstration centre.

- Collaborate to increase skills provision: We will establish the Space Academy, bringing together partners across the Arc to create new STEM and degree apprenticeships and specialist PhD programmes.

- Aviation Network: Benefitting from existing network precedent set by the Midlands Aerospace Alliance, the Arc could benefit from linking its own aviation development sector into a wider forum for collaboration, bringing together companies from the Luton, Bedfordshire and Northampton clusters. This could allow changes in market demand (such as for business aviation) to be brought to aerospace manufacturing directly, helping to influence the direction of new designs and wider projects.

- Cross-industry production collaboration: We will encourage partnerships between aviation and space businesses where there is capacity to share production insights. These may include areas of common interest such as propulsion systems, or composite material development and production.

Figure 5 – Silverstone technology cluster

3.4 Advanced manufacturing

The Arc is a world leader in advanced manufacturing, with particular specialisms in sub-sectors including high-performance technology and motorsport engineering. The Arc's world-leading high-performance technology & motorsport cluster centred in Northamptonshire is a particularly unique concentration of industries that specialise in the design and manufacture of innovative technologies, engines and products, incorporating low carbon engineering and the application of lightweight materials and composites.

Silverstone is the heart of the advanced tech sector in the Arc. It is home to 40 advanced manufacturing companies, testing facilities for materials and vehicles, the Silverstone circuits including the iconic F1 Circuit, a rapidly growing Enterprise Zone, and the workforce training capabilities of the National College of Motorsport and a University Technical College.

There are over 4,000 companies, employing 36,000 people, operating in this sector and based within a one-hour radius of Silverstone in 'Motorsport Valley', crossing over the three LEP boundaries.[17] This brings significant benefits of co-location, networking and a specialist skills pool with strong local roots. This broader region is also home to 8 of the 11 Formula One teams, with every F1 winner since 2010 based in the Arc, as well as iconic businesses like Aston Martin, Nissan, Cosworth, Prodrive, Mahle Powertrain and Mercedes AMG Petronas. Cosworth and Mahle Powertrain are located in the Northampton Waterside Enterprise Zone which is one of the largest in the UK, with scope to accommodate further business growth opportunities for high value manufacturing.

Case Study:

A consortium led by Milton Keynes College, including partners such as Microsoft and City & Guilds, is planning to develop an £18m Institute of Technology at the historic Bletchley Park site used by codebreakers in the Second World War. This Institute would instruct up to 1,000 students per annum in fields such as intelligent systems, network engineering, games development and cybersecurity. This represents a well-timed move into commercially lucrative markets and demonstrates the extent of commitment within the Arc to digital up-skilling.

This 'Motorsport Valley' extends from Northamptonshire via Silverstone into Oxfordshire, a £6bn global cluster of automotive, motorsport and advanced manufacturing companies. **Milton Park** in Oxfordshire is home to a specific cluster of technology and manufacturing firms such as Cobalt Light Systems, General Electric, BMW and Jaguar.

The Arc's strengths in advanced manufacturing expand beyond motorsports to include a range of other sectors, including defence, electronic sensors and medical devices. The Arc also has unique and globally distinctive strengths in underpinning technologies such as cryogenics, the production and behaviour of materials at very low temperatures.

Case Study:

Cranfield University, well known for its established MBA and Finance and Management MSc programmes, also has research specialisms in automation, manufacturing, energy and aerospace, as well as key infrastructure such as a digital air traffic control remote tower. On this basis Cranfield is developing a new aviation and drone technology hub alongside Barclays.

Oxfordshire is the global leader in cryogenics, with the most powerful concentration of cryogenic expertise in the world. This is a critical enabling technology that underpins high value manufacturing and engineering across a broad range of sectors. The **Oxfordshire cryogenics cluster** includes the RAL at Harwell Innovation Campus, which pioneered the development of a multifilament superconducting cable known as the 'Rutherford Cable', and a number of manufacturing and supply chain companies.

The Arc is home to several globally-leading education institutes that are critical to developing the workforce the region needs to succeed, such as **Cranfield University** with its specialisms in engineering. The Arc is also home to a number of University Technical Colleges (UTC), for example the UTC in Didcot which is the world's first school to install a cryogenics lab, and the Silverstone UTC which specialises in high performance engineering, business and technical events.

[17] Silverstone Park (2017), https://silverstone-park.com/media/latest-news/silverstone-park-commercial-director-roz-bird-confirmed-as-one-of-grant-thorntons-100-faces-of-a-vibrant-economy/

Figure 6 – Cranfield University

Further high-performance manufacturing clusters exist in:

- Peterborough, where this industry contributes 20% of the area's GVA;
- Cambridge, which is home to a number of manufacturing companies based in Granta Park and in and around Huntingdon, alongside Amazon's drone development laboratory where their first drone delivery took place; and
- Milton Keynes, home to Aston Martin, Red Bull Racing and Honda F1 research & development facilities.
- Brackley and Brixworth, which are home to Mercedes AMG Petronas and the F1 team.

Opportunities

- Arc Advanced Manufacturing Network: We will establish a network to better connect the advanced manufacturing and automotive clusters across the globe. For example, the Northamptonshire to Oxfordshire motorsport cluster could benefit from greater collaboration and knowledge sharing. We will also support further access to, testing facilities and R&D across the area, including non-destructive testing (NDT), materials, aerodynamic other testing.

- Institutes of Technology: We will look to build upon the Bletchley Park precedent and examine options for new institutes within the Arc, increasing the supply of skilled workers in fields of strength, such as advanced manufacturing and aerospace. £170m of Central Government funding allocated to new Institutes could be relevant for achieving this.

- University Technical Colleges: We will explore ways to support the role of UTCs, learning from experiences to date, working with the Arc Universities Group to increase the role that they can play providing young people with the practical skills they need to help deliver the Vision for the Arc.

Cross-sector collaboration: We will enhance cross-sector collaboration and horizontal innovation. This will include developing Silverstone as a global super cluster, driving growth of the Advanced Manufacturing sector and collaboration across other sectors in which the Arc has strength, including healthcare, clean-tech, space, materials and electronic sensors. Recent examples of successful collaboration in this area include origami technology, which has been developed through partnerships between materials scientists, engineers and artists. Uses have included collapsible forceps used in keyhole surgery and fairings for trains, which have the potential to greatly improve fuel efficiency through reducing aerodynamic drag.[18] The opportunities to develop similar technologies based on the Arc's industry mix are clear.

3.5 Future transport

The Arc is at the forefront of innovation in the future of transport - specifically in the research, development and commercialisation of Connected and Autonomous vehicles (CAV), a sector identified by Government as having the potential to be worth £28bn to the UK economy. Under future of transport we are specifically looking at connected and autonomous vehicles, electric vehicles, and the impact of future transport technologies on traditional industries such as logistics, which is a significant industry in the Arc.

Oxfordshire is at the forefront of CAV development; this is a vanguard use of Robotics and Autonomous Systems (RAS), in which RACE at **Culham Science Centre** is a key UK centre of excellence. RAS shows us how robots can move people and goods more

[18] The Economist (2018), Origami Spreads its Wings.

efficiently with far-reaching implications across many sectors. Oxford Robotics Institute kick-started the UK's CAV programme in 2010; their spin-out Oxbotica is leading a UK consortium to launch a fleet of driverless vehicles to drive from Oxford to London. Furthermore, RACE at Culham is one of the four national CAV testbeds. Oxfordshire is also home to a number of other companies including Zeta, Latent Logic and Arrival.

The wider Arc is becoming globally renowned as a testbed region for CAV, with a number of areas across the Arc investing in test sites to commercialise CAV technologies. **Millbrook Proving Ground** in Bedfordshire is now employing 5G technology to its CAV testbed, allowing innovative real-time connectivity and location trials. As such it is proving to be a key site for development of autonomous electric vehicles (EVs). Its viability as a site is being demonstrated by firms such as Five AI, who are now using the site to compete with global corporations such as Google and Uber on CAV research.

Case Study:

Northampton is a rapidly growing urban centre, but with a largely historic road pattern. This means that there is limited scope to create additional road space to meet growing demand. The Smart Move concept looks to optimise the use of the existing network. It does this by deploying sensors and capturing 'floating data' to gather intelligence on how the network is operating and different modes of travel. This is then used to provide live information to the public enabling smart decisions to be made on travel, reducing congestion. The project has already seen the installation of a comprehensive network of journey time sensors, the latest digital totems, variable message signs, digital real time public information displays on key routes, and the introduction of 'smart junctions' which enable buses to operate more effectively particularly during peak times. A smart dashboard has been created showing how the network is operating in real-time. The project aims to introduce an electric bike scheme and a network of Charging Points across the urban area. In the short-term, the project will help to accommodate plans for 2,700 new homes within the urban centre of Northampton by March 2022.

At Silverstone Park the Swedish car manufacturer Uniti are developing a pilot production facility for the UK's first domestically produced EVs, with an expected opening date in 2020. The facility will be used to produce the Uniti One EV, while serving as a blueprint for globally licensed "digital" assembly plants throughout the world. The initiative aligns with the UK's industrial strategy to lead the world in zero emission and autonomous vehicle technologies.

Milton Keynes is another key cluster for future transport systems in the Arc, with Smart Cities innovation stimulated by the **Transport Systems Catapult**. It is home to advanced EV charging infrastructure – with around 150 charging points - and an EV experience centre – the first in the UK. The **UK Autodrive** project in Milton Keynes is a world first in demonstrating a new form of public transport within a shared urban space. Northamptonshire is also home to a strong logistics sector, including DIRFT, the largest rail freight centre in the UK. The logistic sector has significant potential to benefit from the innovation and new technologies developed across the Arc, boosting productivity for the region.

Other testing sites stretching across the Arc include **the Multi User Environment Autonomous Vehicle Innovation** project at Cranfield; the 70 mile radius testing area around Oxfordshire linking both London and Birmingham; and Northampton's 1.5 mile route for fully autonomous vehicles between its town centre, Enterprise Zone, University Campus and Brackmills Business Park.

Autonomous vehicle advances extend to public transport, such as the **Luton Direct Air-Rail Transit (DART)**, a driverless people mover due to improve airport-rail connectivity and reduce transfer times from its opening in 2021. In Cambridge a 12 seat autonomous shuttle is being developed, which will operate on the public guided busway.

Opportunities

- Arc Future Transport Network: We will establish a network that brings together the future transport clusters from across the Arc, increasing collaboration between the clusters. In particular this could include further developing the cluster at the Milton Keynes Transport Catapult as a central node along the Arc for future of transport innovation, coordination and collaboration. This network will also look at ways to create a fully integrated cross-Arc transport system, incorporating new technologies in transport such as CAVs, live journey mapping and ticketless systems. It will also explore future infrastructure schemes to 2050 that can harness new technologies for freight and commuter use.

Figure 7 – Milton Keynes UK Autodrive project

- Testbeds for future mobility solutions: We will build up living laboratories to test new solutions to mobility and future transport technologies across the Arc. These will build on existing testbeds such as Millbrook Proving Ground, and will also be incorporated into developments in new settlements such as new Garden Communities. As new homes and infrastructure and designed and built, we will ensure that they are future-proofed and ambitious, incorporating the newest technologies for mobility and clean growth. They will innovate with entire transport and mobility systems developed to include sensors that enable smart infrastructure, communications systems such as 5G, MaaS (mobility as a service), and use of data to evaluate technologies for further development.

- **Carbon Emissions:** CAV technology is well suited to exploiting recent advances in electric vehicle (EV) and battery technology, both of which can help in driving low-carbon industry growth (or decarbonising existing car manufacturing) across the Arc. Uniti's presence at Silverstone may help to develop an EV cluster at this location as a basis within the Arc. CAV testing will also aim to encourage a modal shift away from private car usage, critical to reducing congestion, emissions and achieving our vision of a carbon neutral Arc by 2050. Through developing cleaner, low carbon and energy-efficient products and solutions, the Arc has the capacity to contribute powerfully to meeting the UK's Clean Growth Grand Challenge.

- Logistics: We will invest in our logistics sector based in the South East Midlands, encouraging integration of new technologies and innovations from across the Arc into logistics business models. This includes the logistics hub of excellence being developed in the centre of the Arc, benefitting from this area's strong geographic location between many of the UK's key economic centres. We will encourage collaboration in planning freight infrastructure and cross-Arc supply chains. As part of this we will also look at new modes of transport for first/last mile delivery, such as drone technology.

- Vehicle Production: The Arc already has manufacturing facilities in place for conventional vehicle production, such as the BMW central assembly facility in Cowley, Oxfordshire, and the Vauxhall plant in Luton. Such facilities can be adapted to allow future CAV and EV transport options to be produced within the Arc once design and development is complete.

Figure 8 – Culham Science Centre's nuclear fusion tokamak

3.6 Future energy & resource efficiency

The Arc is home to a number of cluster that are innovating in future energy technologies and services. These clusters are important in tackling the UK's Clean Growth Grand Challenge, and achieving our vision of clean growth and carbon neutrality by 2050. Similar to future transport, this industry will be critical to the development of the Arc. As new infrastructure and settlements are built between now and 2050, we must harness innovations and new technologies in these sectors to future-proof our communities.

Oxfordshire is home to a nationally leading energy cluster. It is unique in the UK for its specialism in developing future energy systems that can work at scale; these have significant overlaps with other sectors, such as transport and electricity. This includes strengths in areas such as high-capacity batteries, battery management systems, and data analytics.

Oxfordshire's cluster includes nuclear fusion research, centred on the Culham Centre for Fusion Energy and the Faraday Institution. **The UK Atomic Energy Authority (UKAEA)** at Culham Science Centre is a lead participant in the coordinated EU fusion programme managed by EUROfusion, and operates JET, the largest fusion device in the world. By hosting JET, UKAEA is developing a globally unique fusion capability that has the potential to remodel renewable energy supply worldwide.

Westcott in Buckinghamshire is also home to a significant energy cluster, with specific capabilities around hydrogen fuel cell testing and development. These make it one of very few locations in the UK where the final stages of development and pre-market safety testing can be done for this technology. Buckinghamshire houses further innovation facilities focussed on lithium ion battery development.

Renewable energy generation is being pioneered in several mid-Arc locations, such as Electric Corby and the Kettering Energy Park, which uses a solar-wind hybrid site to improve the consistency of supply.

Opportunities

- Arc Future Energy Network: We will establish a formal cross-Arc network to bring together clusters working with future energy technologies, both within the energy industry and linking in with other industries such as transport. Existing renewable network organisations such as the Great South East Energy Hub (GSEEH), Cambridge Cleantech and Oxford Greentech could be used as a catalyst for this.

Figure 9 – Kettering Energy Park

- Pioneering energy infrastructure: We will pioneer innovative energy infrastructure as part of the development of new settlements and infrastructure across the Arc, to achieve the Government's target of building up to one million new homes. Arc collaboration on an innovative energy strategy, which ensures a viable and secure energy supply, will be critical to achieving this growth. This includes a focus on energy efficiency and usage reduction, working to help offset the environmental constraints around this growth.

- Clean Growth: We will seek to pioneer new solutions to the UK's Clean Growth Grand Challenge, harnessing the expanding market for 'clean' technologies & services and attracting new investment into the region. We will work across our future transport and energy networks to shift towards low carbon transport systems. We will seek to promote new technology which is energy efficient, improving the Arc's environmental credentials through supporting capital projects aligned with this value.

3.7 Creative and Digital

The Arc is home to a number of leading creative and digital clusters. The creative industries including advertising and marketing, arts and film, TV and radio, museums and galleries, as well as computer services and wider digital industries. The Arc's most significant creative and digital cluster is located at **Pinewood**, which is globally renowned for its state-of-the-art film and TV production. Milton Keynes, Peterborough, Cambridge, Luton, Northampton, Oxford, High Wycombe, South Bucks and Aylesbury all have highly concentrated creative and digital clusters with diverse specialisations.

Oxfordshire is home to a globally competitive creative and digital cluster, with more than 4,700 businesses. Oxfordshire's strengths include computer games, software development, cybersecurity, high performance computing as well as film and TV. It is home to major companies including **Sophos** (cybersecurity), **Natural Motion** (animation), and **Rebellion** (gaming), some of which developed as spin outs from the universities and have successfully grown to scale.

Case Study:

For over 80 years, Pinewood Studios' facilities, services and expertise have shaped its global reputation as a trusted partner to the creative community. That enduring spirit now supports a new generation of creative talent in the field of entertainment, from film and TV to games and audiobooks. Recent expansion of the site has doubled the capacity of the Studio, home to some of the most important franchises in film history, including Star Wars and James Bond.

Pinewood is home to over 150 independent businesses in the UK. Companies in film, television, games, design and photographic industries form a unique cluster and centre of excellence for the creative industries. They support production on and off-the-lot, including international brands which are driving the UK's fast-growing creative exports market.

These sectors are also particularly strong in Cambridge, which is home to a number of award-winning games companies such as **Jagex**, with over 400 staff in its two studios. Cambridge is also home to the **Microsoft Research Lab**, the company's first lab outside of the UK, and is joined there by Google, Amazon and Apple. In the city of Cambridge, the IT and digital technologies cluster is highly concentrated, and has a track record of creating companies such as Arm, which was bought for £24bn in 2016. Cambridge, Oxford and Peterborough are also home strong publishing sectors, with Oxfordshire being the largest centre in the UK outside London.[19]

The Arc is also pioneering digital infrastructure development within the UK. Advanced 5G network testing and deployment has begun at **Millbrook Proving Ground**. This is part of the AutoAir project, led by Airspan Networks, and signals the future of testing and validation of Connected and Autonomous Vehicle (CAV) technologies. Representatives from DCMS, which is part-funding the ambitious project, were present during the first, crucial step of deployment in July 2018. A digital model of the proving ground is also being made available to vehicle manufacturers and CAV developers to take full advantage of its facilities.

Figure 10 – Pinewood Studios

[19] Nesta (2016), The Geography of Creativity in the UK.

From the other creative and digital clusters across the Arc, Milton Keynes in particular has an emerging and growing creative and digital sector, with the second highest proportion of SMEs in high-tech and digital sectors in the UK.[20]

Opportunities

Looking forward to 2050, we have an opportunity to better connect these existing clusters within the Arc to stimulate growth within these sectors.

- Connect new and existing clusters: We will establish stronger links between specific creative and digital clusters across the Arc. For example, 'Film City' being developed in Upper Heyford in Oxfordshire could be better linked to the nearby Buckinghamshire Pinewood cluster, the latter also drawing upon Crossrail investment through nearby Iver. This would open up opportunities for collaboration between Pinewood and the film and television cluster in Oxford, as well as the wider creative and digital industry. The area benefits from existing agglomeration around transport and labour costs, notably the existing 250 creative and digital businesses clustered at Pinewood, but also relative affordability and space to expand.

These advantages are unique versus larger existing clusters in the South-East, notably within London. Other clusters which could be linked include the High Wycombe Station Quarter Hub, particularly for gaming, and the Luton Cultural Quarter.

- Sector and sub-sector networks: We will establish sector and sub-sector networks to encourage collaboration between clusters across the Arc. More developed levels of networking are critical to future growth of the creative clusters outside of the main cities, as networking is essential for enabling businesses to have rapid access to information required to detect and adapt to new disruptive trends.[21]

- Vocational skills at HE and FE levels. We will work across the Arc, with businesses, stakeholders and education providers, to pioneer new approaches to vocational skill development at HE and FE levels. This could include pioneering creative and digital T-Levels, and establishing a Centre for Immersive Technologies in Buckinghamshire for skills training at all levels.

Case Study:

In September 2018 Santander unveiled plans for a state-of-the-art new campus in Milton Keynes to support its long-term growth strategy, representing an investment in excess of £150m in the town. The new Milton Keynes campus will act as the bank's UK digital technology hub, delivering a boost for the Government's vision of Cambridge-Milton-Keynes "growth corridor" nurturing the UK's most innovative industries. The proposed new office, which is expected to be home to over 5,000 staff in a collaborative working environment, will be supported by innovative digital technology.

[20] Centre for Cities (2015), Small Business Outlook.

[21] Nesta (2016), The Geography of Creativity in the UK.

4 The Innovation & Growth Network

4.1 Introduction

Central to our Vision is building a network of business clusters across the Arc ecosystem. When connected and enabled through a marketplace of support, coaching, mentoring and finance, economic hubs have the potential to interact within and between sectors in ways that enhance their productivity, creativity and competitiveness. Connection brings economic adjacencies, agglomeration and scale which will promote the region to the status of **a globally leading innovation and growth network.**

Our vision is to build on our distinctive assets and strengths from across the Arc to create an innovation economy that is greater than its component parts. Together, the Arc can provide the critical mass necessary to create an innovation and growth leader that is capable of pushing the UK to the forefront of global competition.

To achieve the envisioned network, there is a clear role to be played by other organisations beyond traditional businesses, notably academic and research bodies. Their involvement in clusters, such as through provision of research facilities and expert partnerships, should play an important part in joining up clusters across the Arc.

By joining business growth, market access, productivity advice and coaching with academic partners, we can create the opportunity to better connect our clusters and provide across them, the same quality of growth support that has made growing businesses inside Cambridge and Oxford, so much faster and more sustainable than outside those hotspots. This means we must help to replicate some of the business support conditions that have made Cambridge and Oxford globally successful. These include; dense business networks, the right balance of competition and collaboration, access to finance, and the provision of high-quality business growth, productivity, innovation and global market access support.

We will do this by ensuring that we expand and build on the clusters and networks that have enabled these two cities to become global leaders in innovative growth, by better integrating industry across the Arc. New and innovative forms of growth support will encourage individual business leaders, sectors, and places to join together to build an economy-wide business support eco-system to enable one another.

Figure 11 – Microsoft Research Lab

We have the opportunity of better connecting and networking firms and growth support expertise, sitting mainly at the two ends of the Arc in Cambridge and Oxford, with the most exciting firms outside those two growth hotspots. We must, going forward, ensure all firms with potential have access to growth support networks to help them maximize their opportunities and overcome leadership, organisation, or market access challenges to faster and greater growth.

We recognise the challenges of establishing an innovation and growth network of this scale, especially with the Arc's diverse sectors of specialism and large geographic area. However, existing successful networks of growth advice within the Arc have indicated that networks are feasible, desirable and effective. To achieve success there is a need for dedicated management capacity, supported by expert and credible advisors, to scale up this network to a self-sufficient level within the commercial marketplace.

The previous chapter set out the main economic sectors that we will build on to achieve our Vision. In this chapter, we set out how we can create the route to market for this innovation and growth service, by creating a network of highly connected clusters.

Case Study:

At the heart of the Arc, Aylesbury has recently benefitted from Garden Town status, major planned road and rail connections (including easy access to East-West Rail), and the development of one of the largest Enterprise Zone locations in the south of England. Building upon Stoke Mandeville's global status as the Birthplace of the Paralympic Movement the town provides a compelling location to act as a living lab to test the development of digital health, mobility and social care solutions to provide a framework for healthy new towns and communities across the Arc. This growing hub has been identified as a promising opportunity for trialling of locally-developed advanced technologies, such as CAVs, 5G internet and digital home healthcare support. This will draw on local expertise such as the UK's national spinal centre, also at Stoke Mandeville.

4.2 Network design: A hierarchy of hubs

This network will be centred on a spine: the three principal economic hubs of Cambridge, Milton Keynes and Oxford, each of which connects out to a network of emerging centres and economic assets that cooperate across the whole Arc.

The areas around Oxford and Cambridge have already developed considerable knowledge-intensive economies, with strong industry clusters in science and technology-based industries. They are home to world-class universities and specialists, as well as numerous research and development assets and globally competitive businesses. Beyond their own distinctive strengths and specialisms, these locations will both continue to be the principal hubs for stimulating research and innovation across the region, attracting global top talent and businesses to the Arc.

We will also centre the network around a rapidly growing third hub: Milton Keynes. It has seen impressive growth over the last few decades, in sectors such as consulting and digital marketing, but there is much more latent potential. Milton Keynes will become the key connectivity point and commercial linchpin at the heart of the Arc. Its central location, tied to its specialisms as a leading business and professional services cluster, will enable it to become the pivotal node in the Arc that facilitates collaboration between clusters in all sectors across the region.

Emerging hubs are essential to spreading success, providing room for growth and receiving the benefits of this in return. High Wycombe, Northampton, Luton, Aylesbury, Bedford, Peterborough, Banbury and Bicester all represent specialised locations for business growth with much higher levels of economic growth potential and underutilised skilled labour supply than in the current innovation-growth hotspots of Cambridge and Oxford. They also offer an array of land and business accommodation at a range of price points. They also contribute substantial economic input, markets for products and housing and services for residents.

Investment in infrastructure and business networks is needed to connect these hubs to other sites and clustering locations across the Arc, allowing the network to work as a single ecosystem.

Investment in business support infrastructure and business networks will also enable businesses and talent to have more flexibility in where they choose to locate, helping solve the critical challenges of affordability and availability of residential and business space that exist within the hotspots of Oxford and Cambridge.

It is vital to recognise that the connectivity of hubs is about more than linking markets and labour pools. Transport infrastructure investment is also key to improving places, ensuring that growing GVA will not be at the expense of increased congestion and poorly-connected urban sprawl. Modes of infrastructure must expand alongside economic growth because they can be crucial as quality place-makers.

4.3 The network effect

The network will be built on the industry clusters in each region that will drive forwards economic growth in the future. It will be a polycentric network that is focused on business clusters rather than geographical areas, and that highlights the unique contribution of each sector within the Arc.

Clusters will be highly interlinked, harnessing new technology that to enable greater physical and digital connectivity. Increasing the connectivity between businesses or clustering businesses together in the same geographical area can both lead to direct increases in productivity through economies of agglomeration.

Academic partnerships will play an important role in linking clusters and stimulating innovation based growth through their leading-edge facilities and research output. A group of ten university Vice Chancellors has agreed to support the Arc vision through collaboration with the LEPs. Their planned cross-Arc leadership and governance structures will help to bolster the network effect by providing a framework for academic-private sector collaboration.

Case Study:

The Northampton area has recently seen growth, partly driven by the benefits of a comparative increase in the supply of affordable housing and commercial premises, as well as close links to industrial sectors in the West Midlands and service hubs to the south. Northampton has above average business birth rates, consistently above 1,500 per year since 2014. There is a large proportion of small and micro businesses, with business survival rates several percentage points higher than the national average in the first five years.[20]

This will stimulate growth across the Arc through two types of linkages:

1) Links between businesses *within* the same clusters and industries

Clustering businesses that work in the same industries into the same geographical area, and ensuring that clusters within the same industries across the Arc are well connected and accessible, will stimulate growth. It can lead to direct increases in productivity through:

- Improved access to a pool of skilled labour and labour matching: businesses are attracted to an area because of the availability of skilled workers, and skilled workers are attracted because of the availability of high quality jobs. The Arc also provides attractions less accessible in large metropolitan areas, such as outdoor pursuits and major green spaces.
- Enhanced inter-firm collaboration: businesses are more likely to collaborate with other businesses they are most aware of and have easy access to. Enhanced collaboration can lead to new opportunities, research collaboration, and collaboration to access international markets and attract private investment.
- Knowledge spillovers between businesses in the same industry and clusters: Small and medium sized enterprises (SMEs) can be better supported to grow to scale through learning from the expertise and advisory support available across clusters, as well as from other businesses within their cluster and industry. This will require clear definition of property rights and incentives for partners to share knowledge, including commercial incentives where relevant to overcome the market failures exhibited in SME business advisory market.
- Shared supply chains and infrastructure: business operating in the same area and industry have the ability to share supply chains and infrastructure, including innovation infrastructure built specifically for the industry. This includes shared testing facilities, such as the Multi-User Environment for Autonomous Vehicle Innovation (MUEAVI) at Cranfield University, usable by ground and airborne autonomous vehicles, and the Catesby Aerodynamic Research Facility for vehicle testing.

2) Links between businesses *across* clusters and industries

We are the midst of an unprecedented era of disruption, characterised by the blurring of boundaries between traditional industries as new technologies underpin innovations across sectors. Connecting businesses and clusters across multiple different industries can have a dynamic effect on growth and productivity by stimulating innovation. This can happen through:

- Cross-sectoral knowledge spillovers: increased collaboration between businesses and movement of workers between different industries leads to wide dissemination of ideas that stimulate innovation. Many of the most powerful innovative ideas arise when firms or workers from two distinct but related sectors interact. Delivery mechanisms could include the development of a commercial marketplace for growth, global market access, productivity, leadership and strategy coaching. This could harness areas of expertise that have historically been based at either end of the Arc. This would help to ensure that firms across the Arc would benefit from this expertise. This can lead on to a mentoring culture amongst supported entrepreneurs and small business leaders, willing to offer technical or subject matter mentoring and secondments from one business to another.
- Convergence of technologies: traditional industries are increasingly being disrupted by technologies that are shaping the twenty first century. Enabling links between industries will support the convergence of technologies across sectors, stimulating innovation as new technologies unlock new opportunities through being used in new ways.

5 Achieving Ambitions

5.1 Key Challenges

In delivering this vision it should be noted that some key challenges to growth must be factored into any delivery model, with controls introduced to mitigate related risks where feasible. If no mitigation of specific risks is possible, Arc partners must be prepared either to accept the inherent risk or alter the implementation approach to avoid risks.

Within the Arc constraints to consider include:

- Current lack of coordination or a shared brand between key economic centres and clusters;
- Lack of support for scaling of small businesses;
- Mismatched resident skills sets to current employment opportunities & pockets of low productivity;
- Labour and affordable business space deficits, especially in Oxford & Cambridge, and a shortage of suitable commercial premises in the central area;
- Lack of strategic sites safeguarded for large scale investment and relocations;
- Water, energy, and infrastructure constraints on rapid population growth;
- Travel congestion;
- Gaps in full-fibre digital coverage;
- Uncertainty on 5G deployment and coverage across the Arc
- Supply and affordability of housing, e.g. for key workers.

It should be noted that risks around these constraints may be mitigated in many circumstances. In particular, making use of the latent potential of existing communities within the centre of the Arc (such as Bedford, Luton, Aylesbury and Northampton) may be highly effective given:

- New and funded planned infrastructure connections, such as Crossrail and the East-West rail and Expressway across the Arc;
- Their competitive advantages versus high-density areas of the Arc, notably a growing skilled workforce and access to more development sites with greater capacity for new economic growth; and
- Their proximity to major economic centres, in particular London and Birmingham.

5.2 Building the Innovation Ecosystem

These challenges stand before our vision of the Arc as the research & development powerhouse for the UK's new innovation economy. To overcome them we need to initiate a step change in the way we work together to support our businesses. It is essential that the workstreams of the four LEPs and authorities across the Arc are integrated to achieve these ambitions and geographically expansive goals. A cohesive Arc approach will allow authorities to realise this vision in partnership with HM Government.

We need businesses that are highly connected, able to collaborate across regions and industries, and have access to the business space, talent and investment they need to grow. Going forward, each industry must undertake detailed analysis of its specific needs for growth. Below, are the overarching themes around which we will structure growth across each sector and for the Arc as a whole. Based on LEP-commissioned research, these themes were identified as the most crucial building blocks of a successful innovation ecosystem. They will be critical to develop if the Arc is to redefine itself as the research & development powerhouse for the UK's new innovation economy.

These themes are:

i. Globally recognised proposition

ii. Future proofed places

iii. Commercialisation culture

iv. Innovation assets

v. Workforce of the future

vi. Investor ready region

i. A globally recognised proposition

The Arc will be globally renowned as a breakthrough region for the new innovation economy. It will have a strong, instantly recognisable brand that is centred on its unique innovation and commercialisation strengths in industries that are shaping our futures.

The Arc will have a globally-known brand around which communities, investors and national & international partners can unite. This will position the Arc as the breakthrough region for the new innovation economy, competing with locations across the globe, such as Silicon Valley in the USA and the Guangzhou-Hong Kong Corridor in China. We will work together as the Arc, along with Central Government, to develop and promote a strong brand for the region that represents our unique proposition. It will set out how our individual industry clusters work together to create a whole that is significantly greater than the sum of its parts. This brand will also promote the Arc's quality of life offer, the diversity of places along the Arc, and the opportunities for communities and businesses to locate here.

Figure 12 – Williams Formula 1

Developing an international brand will include:

- Brand promotion: We will work with the Department for International Trade to develop the Arc's brand – home to the world's highest concentration of research and innovation assets and a highly connected network of clusters in industries that are shaping the twenty-first century.

- Industry propositions: We will work with the Department for International Trade and our industry bodies to develop propositions for each of our key industry sectors per Chapter 3. These will set out the range of assets in each industry from across the entire Arc, demonstrating how together they provide the critical mass necessary to place them at the forefront of global competition.

- Increased international presence in global markets: We will work with the Department for International Trade to set out a strategy to increase our presence in global markets, opening new opportunities for trade with and investment in the Arc. Through this, the Arc will funnel investment both into the region and into the rest of the UK, accelerate export-led growth, and increase the UK's global market share in key sectors.

ii. Future proofed places

The places along the Arc will harness new technologies and innovation to be future-proofed, pioneering examples of twenty-first century development. We will work to ensure high connectivity for the network of clusters, enabling people and ideas to move easily across the Arc to stimulate innovation and productivity growth. The Arc will also be home to healthy and connected communities that use the technologies and innovations developed in the Arc to improve quality of life and enhance their natural, cultural and heritage assets.

Better connectivity and commuter journeys will widen labour markets and create new opportunities for employment across the Arc. This will increase the economic capacity of each employment hub, increase the levels of interaction and integration across the Arc, and increase affordability of business and residential space.

This streamlined movement of people and ideas across the Arc will enable it to attract and retain a highly skilled and globally agile workforce; it will enhance the Arc's quality of life offer if employees and business owners can move easily across the region, living and working in separate locations of their choice.

Figure 13 – Cambridge Science Park

We will develop new and expanded settlements in a way that harnesses the newest technologies and innovations developed in the Arc, future proofing these places. This will enable the Arc to become a living laboratory that tests and evaluates technologies in real life communities, and will also shape communities that are technology-enabled to have a higher quality of life. New infrastructure and settlements will be ambitious, looking forwards to 2050 and the new technologies and capabilities that will be reshaping the art of the possible.

This will include:

- Infrastructure. We will work with the private sector and Government to complete the East-West Rail link that will provide fast and extensive rail connectivity across the Arc, including to London Stansted. We will push for the full deployment of Smart Motorway technology across the Arc. This should include the introduction of similar technology on other parts of the strategic network such as the A34, A43 and A45 which provide links to the cities of Cambridge and Oxford from much of the Arc area to help reduce congestion and improve the efficiency of the wider network.

Complementing this, the proposed new East-West road represents a fully realised expressway to link Cambridge, Milton Keynes and Oxford, and upgrade the radial links that connect the Arc to London and upwards to the Midlands. We will provide full level transport integration between regional and local-level transport systems, ensuring seamless connectivity across the entirety of the Arc and reducing congestion within and around urban centres. We will investigate possible partnerships with key infrastructure providers, such as an expanded Heathrow Airport. We will assess possible solutions for improving infrastructure capacity, such as regulations around CAV private use, peak-time road tolls or road ownership models.

- Future of mobility. We will model the Arc as the future of mobility for the UK, as a global innovator in multi-modal future transport and energy systems that enhance connectivity, the natural environment, and healthy and inclusive communities. This will include being the first region to roll out widespread use of autonomous, electric private and shared vehicles. We will use new technologies to deliver a fully integrated, technology-enabled, real-time multi-modal transport system to provide seamless connectivity for passengers. We will address congestion and air quality in the region by encouraging shared, clean mobility wherever possible and active transport as the priority mode for short journeys, building on successfully schemes such as Nextbike UK's bicycle sharing service in Milton Keynes.

- Living laboratories. To meet the Government's ambition to deliver up to one million new homes in the Arc by 2050, we will need to develop new and expanded communities. This provides an unparalleled opportunity to create communities that are living laboratories, developing innovation in place-making at scale. These communities will be globally recognised as sustainable, liveable places that utilise new technologies and services to tackle challenges, including the UK's Grand Challenges: mobility; ageing society; data and artificial intelligence; and clean

growth. They will incorporate new ways of building housing, designing communities, providing public services, and improving mobility. They will be healthy, inclusive and sustainable.

iii. Commercialisation culture

We will make the Arc and its network of clusters a testbed for commercialising innovation and technology, especially intellectual property. It will have a dynamic business culture that encourages entrepreneurship and commercialisation and enables businesses to grow to scale. The Arc will become a world leader in spinning out companies that grow to international market value milestone of USD 1bn.

A dynamic business culture is a culture in which entrepreneurship, investment and innovation thrives. It covers broad factors, such as regulation and competition, as well as cultures of collaboration and knowledge exchange that encourage innovation and commercialisation. The network of business and industry clusters across the Arc will be underpinned by a dynamic business culture that enhances collaboration between and across industries.

Alongside the linking of firms between clusters, the culture must also stimulate the flow of knowledge and capability building through these new connections, including commercial knowledge flows. This knowledge is vital for helping small businesses scale up in size and build capacity. The pilot for building these commercial knowledge flows in the north-east of the Arc (the Global Growth Champions Pilot) should help to demonstrate how to overcome current market failures in commercial knowledge flows to SMEs. It should help in testing alternative solutions, including a plan to build sufficient confidence in the market to remove these market-failure-solutions longer term.

The Arc has a particularly strong opportunity around the commercialisation and utilisation of intellectual property. Alongside training and support for encouraging academic spin-outs into commercial ventures, this also represents scale-up support for existing entrepreneurial firms, helping them to reach a global market.

- Industry working groups: The Arc's network of clusters will be underpinned by enhanced collaboration. We will instigate a ramping up of partnerships by establishing a working group for each sector that brings together the clusters and economic actors in that industry from across the Arc. Each industry working group will be supported to develop its own secretariat and a space in a central location to connect and collaborate.

Working groups will be responsible for a number of linked recommendations, such as liaising with DIT to develop sector propositions for international trade, as well as developing industry-specific skills and apprenticeship schemes for residents across the Arc.

Working groups will also support firms in commercialising intellectual property; they will collaborate to identify suitable products and services that could drive growth. They will also work to identify market-pull demands for new intellectual property and how firms can direct research & development to harness this demand. Boards could then assist in developing product growth programmes on this basis. They could fit into a new governance structure for the Arc, to be agreed with Central Government in early 2019 per Chapter 6.

- Cross-sector networks: We will establish cross-sector networks to enable businesses across different industries to collaborate and initiate knowledge transfer that will stimulate innovation, productivity growth and capacity building. In order to ensure that businesses receive the knowledge needed to scale-up. As described and potentially piloted, these knowledge flows will be commercial as well as altruistic. This will be responsive to changing technological trends, and the new industries and technologies that will emerge over the next thirty years, to ensure that the Arc is at the forefront of the industries of the future.

- Testbeds and living laboratories: Linked to the above theme on liveable place, we will work together across the Arc to designate new and existing communities as living laboratories that act as test bed for innovations and technologies, encouraging smart economic growth of new developments.

As part of this, we will work with central Government to designate new regulation zones across the Arc that will enable businesses to more easily test and commercialise technologies. We will also create cross-Arc partnerships for specific living laboratories and testing zones that go across existing boundaries and borders.

New testbed zones and commercialisation centres will be particularly well placed across the central portions of the Arc, where they can benefit from comparatively affordable land values and their unique proximity to all three development centres of the Golden Triangle (Cambridge, Oxford and London). These new commercial premises should be part of a balanced pipeline of commercial and non-commercial premises.

iv. Innovation assets

Our vision is for the Arc to have the highest concentration of innovation assets in the world, which are highly integrated into the economy through the network of clusters.

A strong innovation economy must be anchored by national and international innovation assets, ranging from education institutions, national and international research facilities, and world-class industry clusters. The Arc already has one of the highest concentrations of innovation assets in the world. Its world-class universities and research institutions attract global top

talent & business, as well as stimulating innovation, spin outs and business growth across a range of sectors.

We will build on these, ensuring they are better connected as part of our network of clusters. We will also invest in new keystone assets that will enable us to become the research & development powerhouse of the new innovation economy.

One key aspect will be innovation infrastructure. We will invest in developing innovation infrastructure, linked to our network of clusters, which will push us to the forefront of global innovation in the new technologies and industries of the future. This will include, for example, being home to the UK's first twenty cubit quantum computer by 2020, or using Millbrook Proving Ground to test the application of 5G to autonomous vehicle development.

v. Workforce of the future

We will make the Arc both a source of world-class talent and a top UK career destination. This will be through attracting global top talent and nurturing the local labour market to develop the skills needed from the Arc workforce of the future. The Arc will be a place of opportunity and inclusivity, where people are enabled to succeed.

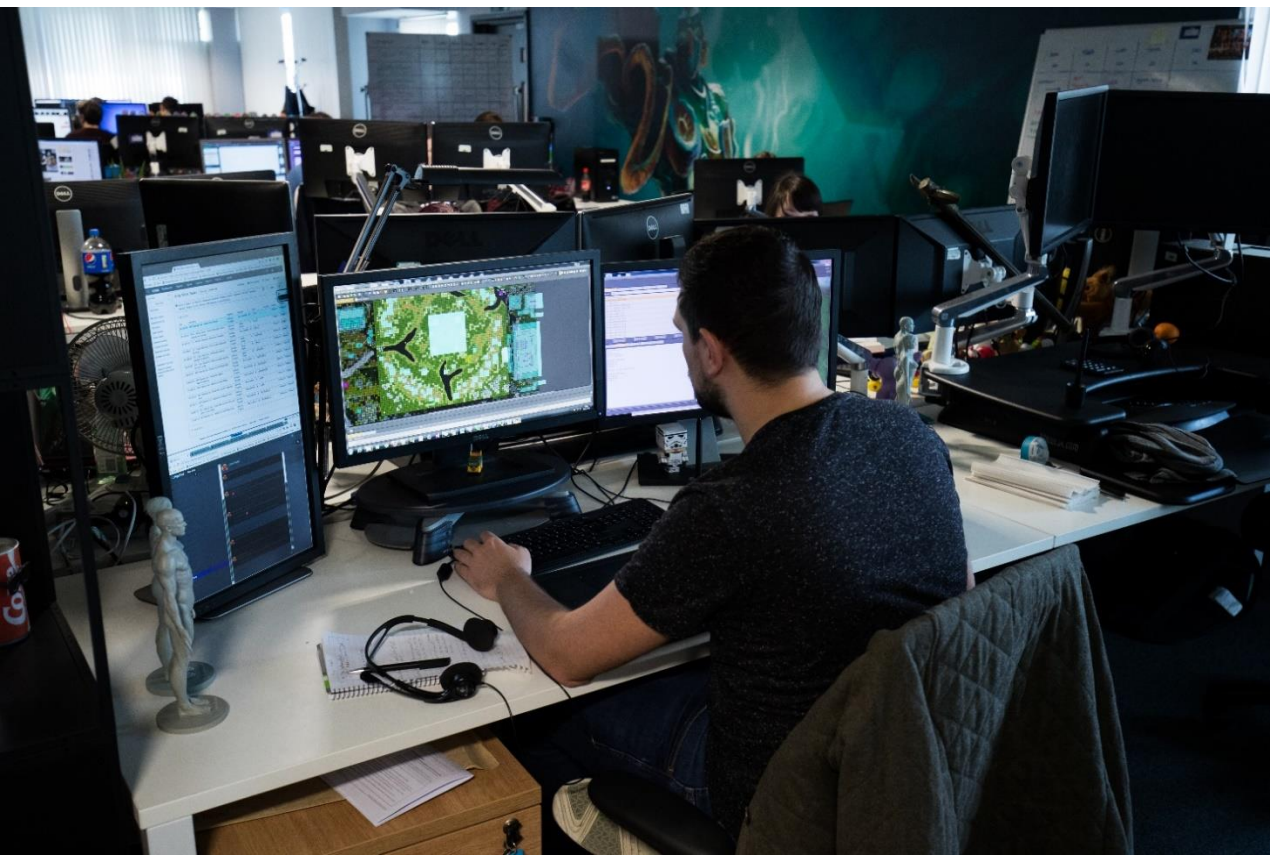
Talent is integral to the knowledge-intensive innovation economy. The ability to attract but also retain world-class talent, as well as nurture the talent and skills of the existing local workforce through developing skills aligned to business and industry need, is critical for future growth.

We will build on the Arc's already highly skilled and qualified workforce to become a hub of world-class talent. This agile workforce will be mobile across different areas of the Arc as well as across industries, stimulating knowledge spillovers and enhanced collaboration. We will work closely with businesses as well as education providers to ensure that skills development is aligned with the changing needs of business. This will ensure that our workforce is fit for the future, and that people across the Arc can be reskilled and upskilled to engage in the twenty-first century economy.

Implementing this Economic Vision's connectivity strategy will also widen the labour markets, increasing the available pool of talent for businesses across the Arc to hire from, as well as expanding job opportunities for local, national and international talent. On top of this, we will also introduce:

- Industry-specific skills programmes: The industry working groups will bring together businesses, as well as education providers and professionals for secondary, further and higher education. They will be responsible for establishing programmes to upskill and reskill the workforce. Industry working groups will work both individually and collaboratively where skills

Figure 14 – Game development at Jagex



overlap, and will ensure that skills programmes work towards inclusive growth and towards aligning skills development with business need. This will help to ensure greater business leadership and engagement in local skills development.

- A renewal in education: We will set up a cross-Arc education panel to work with local authorities, education providers, professionals and businesses to initiate a step change in early years, primary and secondary education. This will support all children and young people from across the Arc to be coached and mentored about the opportunities of the innovation economy. They will be supported to develop the skills needed to succeed in the workforce of the future.

- Lifelong learning: We will offer workshops and training to help workers to upskill or retrain during the course of their career. With the extension of the retirement age, possibility of automation replacing jobs and the growing emphasis on flexibility in many modern careers, we will work to support workers who are transitioning from one role to another. This will help to improve workforce productivity and reduce instances of economic activity or restricted career opportunities in the Arc labour market.

- A university network. We will build on existing networks of collaboration between universities in the Arc to improve skills and educational advantage for existing and future communities. This will be centred on the direct involvement of university Vice Chancellors, who have already engaged with the Arc vision through establishing a formal Arc-wide partnership. This valuable network, working alongside the LEPs and local authorities, should also help to ensure that education and skills are being matched more effectively to the Arc's economic needs.

vi. Investor ready region

We will make the Arc an investor ready economic region, a central UK hub for attracting a diverse range of regional investment, alongside investment for the rest of the country more widely. Our vision is to maximise returns for investors and build an investor community that will enable transformative growth across the Arc between now and 2050.

Availability of finance is essential to creating and commercialising innovation, scaling spin outs and investing in the talent and infrastructure necessary for innovation to flourish. We will diversity our investment strategy to attract venture capital, business angels and sovereign wealth. We believe that the strong economic track record of startup and spin out success within the Arc will give investors confidence to make larger investments, both in scaling up existing businesses and in funding new ventures.

Figure 15 – Microsoft Research Lab

6 Conclusion: Critical Mass

This document has set out our Economic Vision for the Arc to 2050 – to become a breakthrough region for the new innovation economy. It is a **call to action for both public authorities and private investors**, as both will be needed to make this Vision a reality; through funding, through policy changes, and through coordinated action.

This is a **critical turning point for the Arc and the UK**. The national economic outlook is at its most uncertain for a decade, and it is essential that the UK uses its leading assets to improve productivity and build its competitive advantage in key sectors.

The Arc currently has a competitive advantage in several specialist fields but, as some of its growing businesses begin to reach their **potential for full-scale international competition**, it is essential that growth is coordinated and supported at this crucial juncture.

This crystallisation of the Arc's economic potential will be founded on a **distinctive network of clusters** that promote collaboration and integration across the Arc, which is uniquely well-positioned due to the existing concentration of research & development entities in the region. By better connecting our clusters and providing them with the infrastructure and support they need to locate investment, business space and talent, **the Arc will provide the critical mass necessary to become a global innovation leader**.

The UK needs the Arc to achieve this vision if it is to continue to compete at the forefront of global innovation in key markets and industries of the future. If the support is not there, the opportunities of this new innovation economy may pass us by, competitive advantage may be lost, and businesses may choose to base themselves at other international locations.

6.1 Key priorities

If this vision is to be realised before the present opportunity passes, the following implementation steps will need to be taken in the immediate future:

1) Governance Structure

The Economic Vision demands that region can be engaged as one entity, rather than as a collection of local authorities and Local Enterprise Partnerships. Establishing a visionary regional governance mechanism will be critical to delivering the Arc's partnership potential with HM Government. It will enable cross-Arc collaboration, connecting the network of clusters and unifying the new innovation economy.

The Government has set out its commitment to working with local authorities to implement Arc-wide governance mechanisms. Such a structure will support the joint delivery of local growth while retaining democratic accountability. It will:

- have a clear remit for proactive interventions;
- be streamlined and designed for effective engagement with HM Government, stakeholders and investors; and
- have sufficient influence and expertise to manage decisions and maintain confidence in the success of the Arc.

2) Delivery plan and investment prospectus

This Economic Vision will be followed by a delivery plan and joint investment prospectus. This delivery approach will be a priority for the Arc's new governance structure. This will set out:

- how we will work with our local, national and international stakeholders to deliver our vision;
- potential delivery mechanisms, including policy interventions, to achieve transformative development;
- where this development might occur and where services and infrastructure might be provided;
- preferred delivery phasing and priorities;
- potential sources of public and private financing, including those being developed locally that government may choose to match fund;
- a funding strategy for revenue interventions and capital projects that span the Arc.

Following these key priorities will give authorities and private stakeholders **the best possible opportunity** to bring economic transformation to the region, developing an innovation powerhouse to bolster the Arc and the wider UK.