

SHARED INTELLIGENCE

**BUCKINGHAMSHIRE THAMES VALLEY
LOCAL ENTERPRISE PARTNERSHIP**

**LOCAL INDUSTRIAL STRATEGY EVIDENCE
BASE**

1 Foreword

- 1.1 The Government's Industrial Strategy white paper was published in November 2017 following an extensive engagement and consultation exercise between Government and its partner agencies of business and industry, (& their representative bodies) the higher and further education sector and public institutions totalling almost 2,000 responses to the initial green paper exercise in 2017.
- 1.2 Reflecting this engagement Buckinghamshire Thames Valley Local Enterprise Partnership (BTVLEP) were invited, with neighbouring LEP's within the Oxford – Cambridge Arc to be one of the three (x3) trailblazer LIS area in England including Manchester and the West Midlands. This document therefore sets out our evidence base of the BTVLEP economy, key assets and propositions that can drive sustainable and inclusive growth and productivity that contributes to the long-term prosperity of both the LEP and national economy. The national Industrial Strategy reflects this engagement, aligning policies to ensure the UK economy as a whole becomes both more productive and a competitive edge.
- 1.3 This document set out the evidence base on which our long-term interventions are planned and the approach we will put in place to ensure inclusive and sustainable growth and productivity for all Buckinghamshire businesses and residents, thus ensuring that the 5 foundations are aligned with BTVLEP's 4 propositions where we have competitive advantage or appetite.
- 1.4 This document provides the evidence for investment in the Buckinghamshire Local Industrial Strategy (LIS), in effect forming a local chapter of the Government's national Industrial Strategy. The LIS also exploits Buckinghamshire's location at the centre of the Oxford – Cambridge Arc. The BTVLEP emerging LIS sets out an ambitious programme of activity to ensure that the county's economic assets contribute more to both the national and local economies. It will be a key feature in the family of strategies covering the Arc.
- 1.5 We are clear that the Buckinghamshire Thames Valley Local Enterprise Partnership's LIS will focus on how to strengthen and exploit the county's most important economic assets, assets that are distinctive to Buckinghamshire and are significant nationally and internationally. It will identify action to develop those assets and secure maximum benefit from them for the national and local economies to raise productivity and support growth. The LIS and the process by which it is produced is intended to raise the profile of Buckinghamshire, Buckinghamshire businesses and its economic assets and potential. This reflects the growing economic importance of the area within the country's productivity puzzle.

2 Executive Summary

Buckinghamshire is a prosperous county in a prime location. It benefits significantly from its geographical location, which provides both commercial and employment opportunity and an appealing semi-rural residence for highly skilled individuals who work in Buckinghamshire and surrounding economies. Major railway lines, such as the West Coast Main line, run through Buckinghamshire, connecting the county to London, Birmingham, Manchester and its surrounding areas. International markets can be quickly accessed via Heathrow airport, which provides logistic and transport links and a major source of employment for the Buckinghamshire economy. These and future transport connections such as the East-West Rail and HS2 are fuelling growth in Buckinghamshire and the wider Oxford – Cambridge Arc and are contributing to a significant uplift in yearly output.

Employment in Buckinghamshire is among the highest in the UK, with 81.9 per cent of working age residents in employment in March 2018, more than the average for both London and the Southeast at 78.4 and 81.3 per cent respectively. Underpinning high employment in Buckinghamshire is a very highly skilled workforce, with 18 per cent more people educated to degree level or higher than the average for England. It is therefore not surprising that a large section of employment in Buckinghamshire is in professional, scientific and technical professions, and that there is a high and increasing employment rate for those who are working in professional and managerial occupations.

Across the UK, productivity growth is 20 per cent below the pre-recession trend and is growing slower than comparative economies such as Germany and France. Buckinghamshire has historically seen high productivity with the Berkshire, Buckinghamshire and Oxfordshire NUTS2 area being ranked fourth highest in the UK and the highest outside of London. Buckinghamshire's LEP is also one of only nine LEPs where productivity is above the average for England. However, in recent years Buckinghamshire has seen slowing levels of productivity growth, bettering the national rate of only twice in the last four years. GVA per hour in Buckinghamshire has risen by just 4.5 per cent since 2012, the third smallest increase of all LEPs and well below the 8.2 per cent increase of the UK. This suggests that new work undertaken in Buckinghamshire is of lower value per hour than existing activity, for example, within the wholesale and retail sector. Much of the growth in productivity is predicted to occur in the professional, scientific and technical sector, with lower entry and skill requirements, lower salary levels and lower levels of capital investment impacting those sectors with low GVA growth. Low investment in R&D is also stymying productivity growth and innovation.

Buckinghamshire has an unusually high number of SME's, stemming from years of entrepreneurialism which has contributed to the high levels of employment seen across the county. These businesses are often specialised within the professional, scientific and technical employment sector, and are often located in one of the clusters around Silverstone or Westcott. 77.4 per cent of businesses in Buckinghamshire employed fewer than five people, the highest share of any county council or Local Enterprise Partnership (LEP) area. Around a third of all businesses in Buckinghamshire have turnovers between £50,000 and £100,000, with many unable to grow beyond that bracket due to a lack of investment and ability to commercialise their innovation. To the contrary, just 9% of Buckinghamshire's businesses have turnovers of more than £1m; this ranks 23rd

out of the 38 LEPs. While high levels of start-ups indicate a thriving economy, the SME base suffers from major productivity problems, in part perhaps due to the limited HE presence and larger SME R&D investment meaning many micro-firms are not commercialising this innovation to the extent they might with more institutional and network of support.

Buckinghamshire is fortunate to be home to several key assets which underpin the economy and are a significant driver of highly skilled employment in the county. Westcott Venture Park is home to a cluster of businesses which are highly specialised in the aerospace industry, at the core of which is the National Propulsion Test Facility, a nationally recognised facility for testing high-tech space propulsion systems. Together, this cluster is an important part of a much wider base of Space focused companies within Buckinghamshire. The aerospace industry is one of the most rapidly growing in the UK, with the upstream sector currently worth £13.7 billion in added value to the UK economy and expected to reach £40 billion by 2035. This expansion in upstream capability will yield £250bn in downstream value chains, generating an annual £47.5bn return to the exchequer, in which Buckinghamshire is playing a key part in this growth. A similar success story is the Silverstone Technology Cluster, a world leading cluster of high-tech businesses which has grown significantly in recent years. Over 4,000 companies operating in precision engineering alone are located within a one-hour radius of Silverstone. This distinctive labour market has contributed to Buckinghamshire having a locational advantage in service-based high-technology industries and certain aspects of more knowledge-intensive manufacturing. Additionally, contributing to the local Buckinghamshire economy is the Silverstone University Technical College, a centre of excellence which provides key training for young people working towards a career in High-Performance Engineering fields.

Pinewood Studios is a globally recognised film and television studio, the facilities of which have been used in production by major film franchises such as 007, Star Wars, and Marvel. Pinewood is of significant benefit to the Buckinghamshire economy, driving a large proportion of the fast-growing creative export market worth £46 billion to the UK. The creative industry is a heavyweight in the UK economy, with Government tax breaks able to stimulate both considerable production and the broader creative economy. The National Film and Television School is also a considerable contributor to the area's capabilities, from where a notable alumnus of directors and producers have hailed and new techniques in immersive content continue to pioneer new techniques in film.

Buckinghamshire is additionally the home of Stoke Mandeville Hospital, which has historically been a pioneer in cutting edge medical techniques and technologies. The hospital is also home to the UK's national spine centre, one of the largest specialist spine units in the world. Buckinghamshire has been chosen to be in the first wave of eight integrated care systems which will pioneer new approaches to health and care integration locally. This will centre around Stoke Mandeville, with the area around the hospital functioning as a living lab to test new technologies particularly relating to med tech, enabling the creation and growth of new businesses which plan to transform health and care.

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4 OVERVIEW OF THE BUCKINGHAMSHIRE ECONOMY

- 4.1 Buckinghamshire has a growing economy. It lies at the heart of the Oxford – Cambridge Arc, one of the UK’s key growth regions with neighbouring London and the UK’s international gateway at Heathrow close by. The area has a dynamic and resilient employment base driven by a strong SME business community. Alongside much of the UK over the past 30 years the area has witnessed a decline in many traditional industries such as printing, furniture production and to a lesser degree agriculture. These have however been replaced by new enterprises including digital services, film and TV production, life-sciences and high-performance engineering – as identified in our proposition development. Productivity in the area remains strong but is not without threat of our changing industrial structure. By supporting the conditions for modern economic growth, we must cultivate our leading business sectors and wider economic ecosystem.
- 4.2 There were 231,000 employee jobs in Buckinghamshire in 2017, 4,000 (1.6 per cent) fewer than in 2016. Total employment fell by 3,000 (1.2 per cent) to 241,000. Across England, employee jobs grew 1.1 per cent in the last year. Buckinghamshire recorded the 5th weakest performance among the 38 Local Enterprise Partnerships (LEPs) for jobs growth in the last year and was one of only seven LEPs to see a fall in jobs. This masks recent positive performance in Buckinghamshire with an additional 26,000 net jobs in 2016 compared with 2010 a 12.5% increase.
- 4.3 Moreover, the employment rate (a measure of the numbers of people in work of working age) is amongst the highest in the UK with 81.9% of residents in work in March 2018 compared with 81.3% in the southeast region and 78.4% in the UK as a whole, indicative of a thriving local economy. Buckinghamshire also had the highest employment rate of all Arc LEPs in 2017.
- 4.4 Welcome though the overall trend has been, recent updates suggest we cannot be complacent, and finer grain detail is required. Understanding where growth is happening, likely trends in automation, future employment patterns and the impact of innovative activity, data and the digital will be central to improving productivity levels and capacity for future growth. We must recognise the challenges and continue to determine how the BTVLEP economy can be supported to move forward to deliver sustainable and inclusive growth for residents and businesses.
- 4.5 This evidence base therefore identifies the major sectors and capabilities operating locally that have growth potential viewed within the context of the government's national Industrial Strategy’s ‘Foundations of Productivity’ and ‘Grand Challenges’. The overall aim will be a Local Industrial Strategy that identifies the key priorities for investment (our propositions) and the challenges to be addressed (the drivers) in order to secure maximum benefit for Buckinghamshire.
- 4.6 This specific evidence base whilst focussed on the BTVLEP area should also be seen in the context of the Arc in terms of:
- Contributing to and marshalling the added value of the Arc;

- Focussing on economic strengths which span the Arc as a whole;
- Maximising the impact of economic strengths or assets which are sufficiently important to warrant attention at this level; and
- Addressing cross boundary issues which cannot be addressed through normal joint working between neighbouring LEPs or councils.

5 OUTLINING THE POLICY CONTEXT

- 5.1 The Government's Industrial Strategy (IS) sets out how the Government will seek to coordinate policies designed to deliver higher investment and productivity. These are ideas (R&D and innovation), people (education and skills), infrastructure (road, rail, housing and fibre & digital), business environment (finance, business support, inward investment) and places (regional growth). The IS has a focus on grand challenges (missions) which are major social needs that can give direction to private sector investment and help strengthen supply chains, these are artificial intelligence and data, clean growth, our ageing society and future mobility.
- 5.2 The BTVLEP propositions (as featured in detail from Chapter 12) intend to strengthen the foundations of productivity thus developing a skilled, innovative and balanced local economy and address the Grand Challenges. We propose to stimulate the widespread adoption of new technologies across businesses and organisations. The Buckinghamshire Thames Valley LEP Local Industrial Strategy (LIS) therefore sets out the areas' key economic assets and an associated series of propositions forming a testbed of ideas and innovations that can deliver long term transformational changes in businesses, people and place.
- 5.3 Policies surrounding local government finance, the health and care sector, the welfare system and education and skills all impact on local economies and will be relevant to our propositions. For example, business rate retention incentivises local areas to support the start-up of new businesses in their areas and therefore if we support the development of sectors that supports our regional innovation system, new businesses, 'spin-outs' from university, and businesses R&D will positively impact the amount of money in the local economy.
- 5.4 Buckinghamshire needs to be at the forefront of governments plans to increase R&D investment to 2.4% of Gross Domestic Product (GDP), a 50% increase, by 2027. Businesses currently make up sum two-thirds of UK R&D and it is therefore essential that businesses keep pace. Buckinghamshire is well positioned to build on its strong commitment to Business Enterprise Research and Development (BERD) and Higher Education Research and Development (HERD).
- 5.5 Recent evidence also demonstrates how government tax reliefs can help stimulate key parts of the UK economy. A new report commissioned by the BFI has revealed roughly that a £632 million in tax relief planted £3.16bn in direct production for the UK's screen industries, a 17% increase from 2015. This illustrates unequivocally the importance of national intervention to boost economic growth and has direct implications for Buckinghamshire's local economy given the location of Pinewood Studios and the National Film and Television School (NFTS).
- 5.6 Similarly, the Government pledge to increase the numbers of new houses constructed means that the new housing, particularly in the Aylesbury garden town development scenario will both generate finance locally (through, for example New Homes Bonus) and provide the opportunity for digital infrastructure in the home that will support technology led health and care solutions such as GP to patient diagnosis and reducing the more costly face to face appointment and potentially the much more expensive acute care given our ageing society. Our propositions that have come out of this evidence base and extensive consultations are designed to complement these UK national policies.

5.7 Education and skills are similarly critical to improve productivity levels amongst the workforce and businesses in the UK. Notable attention has been on links between Higher and Further Education and businesses to improve take up and achievement of STEM subjects in our schools. Our propositions that come out of this evidence base and extensive consultations are designed to complement these UK national policies.

Sector deals

5.8 Through sector deals the Industrial Strategy recognises the importance of supporting strong and growing industries that have international comparative advantage. The government will continue to partner with industry on sector-specific issues to improve skills, employment, productivity and innovation. Recent successful examples include creative industries, space and professional and business services. The Industrial Strategy extends sector deals to life sciences, the automotive sector, creative industries, artificial intelligence, construction, and the nuclear sector. This evidence base and subsequent strategy needs to acknowledge that there will be sectors that will benefit greater from government intervention.

Grand Challenges

5.9 The 'Grand Challenges' put forward by Government in the Industrial Strategy, aim to take into account the current positioning of our economy and its interaction with our society to place the UK in a strong position to be confident that the country will live to the expectations of its leaders and population to become a world leader in certain sectors. It also invites stakeholders to benchmark performance and be competitive in a fast changing and complex world economic reality. Our LEP's response to these challenges is outlined below.

Ageing society

5.10 We are committed to enabling our business community to use innovation in order to meet the needs of our ageing society, to meet the acute pressure of the Buckinghamshire population. The prospect of longer lives will require people to plan their careers and retirement differently. It is inevitable that ageing populations will create new demands for technologies, products and services, including new care technologies, new housing models and innovative savings products for retirement. This will also mean longer working lives: in Buckinghamshire the proportion of economically active individuals has increased by 45% between 2004 and 2018. We have an obligation to help our older citizens lead independent, fulfilled lives, continuing to contribute to society and we are proposing actions to ensure this happens.

AI and data

5.11 Our LEP understands the importance of AI and machine learning in shaping the world's economy. We also appreciate the relationship with the use of data and the opportunities presented for commercialisation. We will work with our public sector partners to drive transformation and support collaboration between businesses and public service providers. We will stimulate our related sectors to have the capacity and capabilities to be competitive and world leaders in applying AI into their business practices. We will support our business community to embed AI across the region, as this practice will create good quality jobs and drive local economic growth.

Clean growth

- 5.12 We will encourage and support the manufacture and use of low carbon technologies, systems and services that cost less than high carbon alternatives. We will encourage our businesses to participate in collaborative work to tackle global warming, climate change and contribute towards environmental sustainability in the region, nationally and across the globe.

Future of mobility

- 5.13 We will use our assets to support the reduction of the UK on car ownership through providing greater alternatives to accessibility and transport. The increased growth proposed will need to be carefully managed to support alternative forms of future mobility. This will be driven by investing in innovation in engineering, technology and sustainable, innovative business models and practices. The proximity of Milton Keynes as a potential centre for ‘Smart, Shared, Sustainable Mobility’ means Buckinghamshire LEP is well positioned to develop new approaches to this grand challenge. We propose to develop links with other key assets, notably high-performance technology (Silverstone) and Space (Wescott) and develop SME and large business (BMW) collaborations with HE through innovative capabilities & explore the potential for bespoke high-quality engineering workspace and facilities.
- 5.14 We will encourage businesses to invest in research and development in this sector, particularly looking for opportunities to improve customers’ experience, drive efficiency and enable people to move around more freely.

Pillars of productivity

- 5.15 The government raises a further set of issues with our economy which causes problems for firms and their supply chains. In our LIS evidence base, we have set out the areas that will bring the greatest benefit to Buckinghamshire.

Productivity

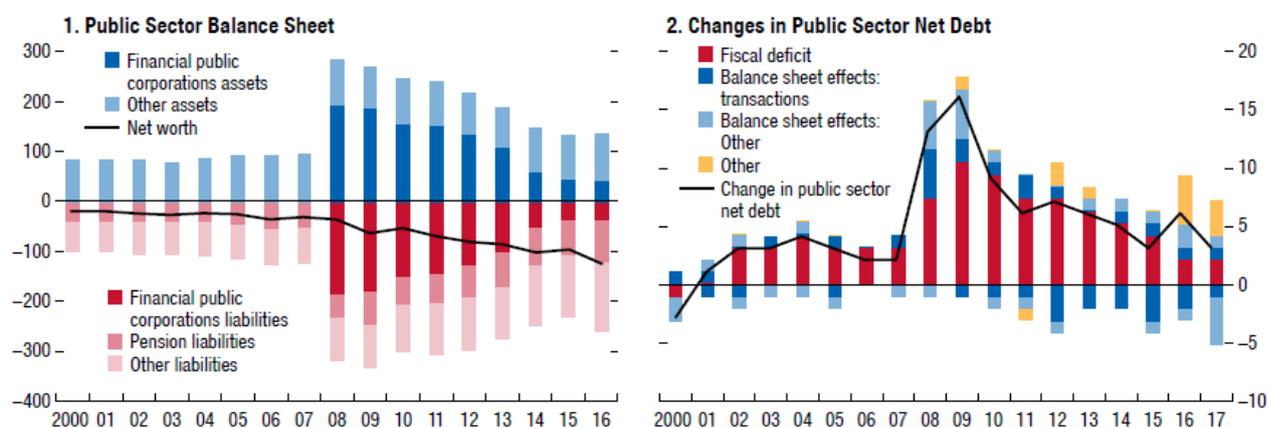
- 5.16 UK productivity is today some 20 per cent below the pre-financial crisis trend, and this has implications for the UK’s wider global competitiveness. Recent research by the IMF¹ has highlighted the deteriorating position of the UK’s international balance sheet position:

¹ <https://www.imf.org/en/Publications/FM/Issues/2018/10/04/fiscal-monitor-october-2018>

Figure 1: IMF research into the UK's public finances

Figure 1.7. The United Kingdom: Balance Sheet Developments, 2000–16
(Percent of GDP)

The United Kingdom balance sheet expanded massively during the crisis, with balance sheet effects driving much of the movement in net debt.



Sources: Her Majesty's Treasury 2018a; and IMF staff estimates.

5.17 Britain remains less productive than other developed economies such as France and the US, despite its flexible labour laws and attraction as a destination for overseas investment. The government's Industrial Strategy identifies five foundations of productivity: innovation, people, infrastructure, places and business environment. As part of its effort to drive higher output per hour by workers, the strategy cites a plan to raise total research and development investment to 2.4 per cent of gross domestic product and proposes more funding for maths and technical teaching as well as for digital infrastructure.

5.18 The strategy does not however address what is needed to drive the productivity of small and medium-sized enterprises, where major problems lie, and in the supply chain. The creation of a national Industrial Strategy Council, which will have oversight of implementation of the proposals and hold this and subsequent governments accountable for progress will provide a consistent spotlight on the challenges. One of the drivers we have identified through the evidence base and consultation with the private and public sector is the need to support businesses to drive growth and employment in their own territory to generate greater levels of productivity.

Skills

5.19 A persistent complaint from all sectors of industry is a lack of relevant skills, particularly as an ageing population begins to retire en masse. According to Engineering UK, a lobby group, 1.8m engineers and technicians will be required by 2025. The government acknowledges the need for an urgent focus on new types of skills, but also on a new way of learning. The view of UK economic prospects from the OBR along with increased funding for the stem subjects — science, technology, engineering and mathematics — the government will create a new regulator, the office for students, to address employer and student needs. It also wants to create a new national retraining scheme to support reskilling. However, some suggested this fell far short of what was needed. Michael Dall, economics director at Barbour ABI, the construction market analysts, said the impact was likely to be muted in this sector given that Brexit would reduce the supply of overseas labour coming into the country. Ben Willmott, head of public policy at the CIPD, the professional body for human resources and

people development, said the level of investment proposed by the government was “inadequate given the scale of the productivity challenge facing the UK”.

Digitalisation and technology

- 5.20 The Industrial Strategy identifies the growth of data and artificial intelligence as major challenges for the economy but plans to tackle it are limited to a collection of small investments such as £45m for new post graduate degrees in the field and £30m for testing the use of AI in online education. Although the strategy outlines a plan for a new government “office of AI”, it does not specify the funding that will be allocated to the new office. “The government has set the ambition and momentum on AI, but this investment alone won’t be enough for the UK to establish itself as a leader,” said Jon Andrews, head of technology and investments at PwC, the consultancy.

Brexit

- 5.21 With confusion reigning over the terms of Britain’s exit from the EU, a coherent Industrial Strategy that will encourage investment is more vital than ever, said industrialists. Mike Hawes, chief executive of the SMMT, the motor industry trade body, said the measures “will help the UK automotive industry meet some of the many global challenges it faces”. Josh Hardie, deputy director-general of the CBI, the employers’ organisation, said the Industrial Strategy marked a “decent first step”. But without a sensible deal on the transition after Britain quits the EU, the strategy would be irrelevant. “For the strategy to work we need a good deal on Brexit,” added Mr Hardie. “There is no point putting your foot to the floor on an Industrial Strategy while Brexit applies the brakes.”
- 5.22 One example of how Brexit may apply the brakes to UK growth sectors is through uncertainty around access to the EU digital single market. The Digital Single Market will allow free movement of (sharing of) data across the EU, complementing the principles of free movement of people, capital, goods and services.
- 5.23 Another example is around Higher Education and the level of international and joint research undertaken in collaboration with EU institutions. Despite being a net contributor to the overall EU budget; the UK was a net-beneficiary receiving 8.8bn Euros² (from a 5.4bn Euro contribution 2007-2013).
- 5.24 The UK’s continuing participation in the Galileo Space Programme as a joint venture between the ESA and UKSA is also in question, with implications for data and military and cyber-security infrastructure, including for GPS systems used in vehicles and by the UK Armed Services.
- 5.25 Within this wider context of some existing uncertainty around the implications of Brexit. The Government’s Industrial Strategy (IS) sets out how the Government will seek to coordinate policies designed to deliver higher investment and productivity. These are ideas (R&D and innovation, people (education and skills), infrastructure (road, rail, housing and fibre & digital), business environment (finance, business support, inward investment) and places (regional growth). The IS has a focus on grand challenges (missions) which are major social needs that can give direction to private

² <http://blogs.bath.ac.uk/iprblog/2018/06/05/the-impact-of-Brexit-on-higher-education-in-the-uk-and-beyond/>

sector investment and help strengthen supply chains, these are artificial intelligence and data, clean growth, our ageing society and future mobility.

The National Infrastructure Commission

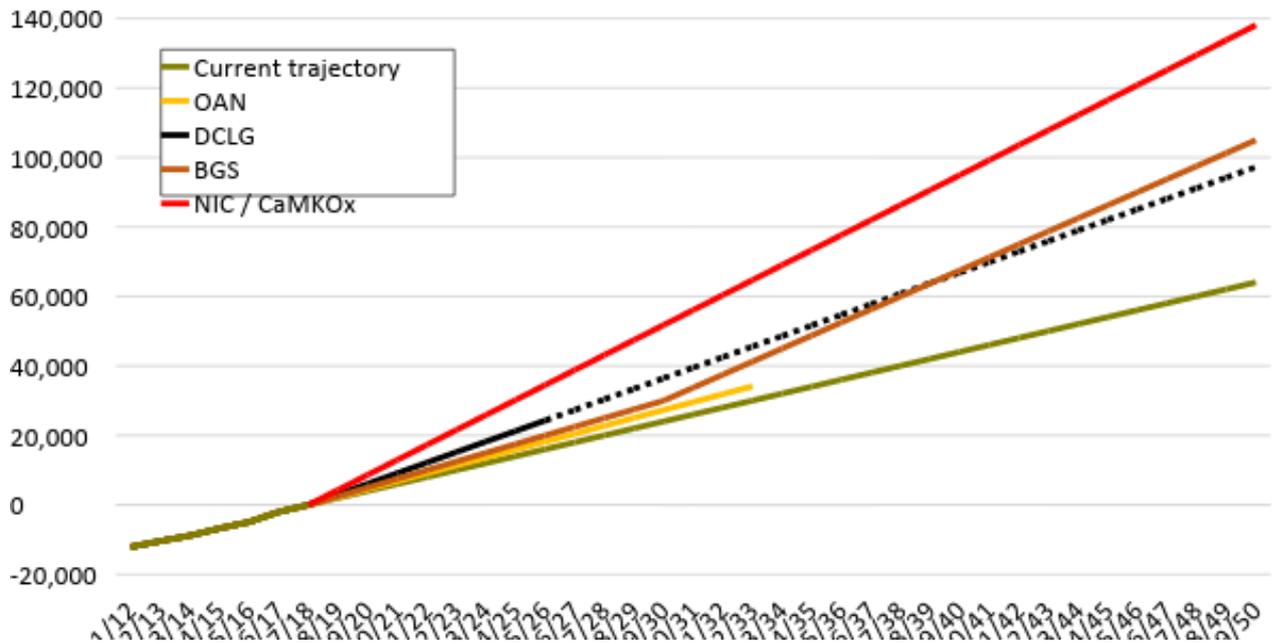
5.26 The National Infrastructure Commission (NIC) proposes that with interventions the yearly output in the Oxford – Cambridge Arc could be uplifted by £163bn. The government’s response to the NIC report will be vital when considering this LIS. It included:

- A housing deal with Oxfordshire with a target of 100,000 homes in the region by 2031 in return for infrastructure and economic growth support.
- A commitment to match funding (up to £5million) from the Cambridgeshire and Peterborough Combined Authority, Greater Cambridge Partnership and AstraZeneca for the development of a Cambridge South train station, with construction and delivery beginning in the early 2020s.
- Commitment to co-fund a study into the Oxfordshire Rail Corridor.
- Provision of funding to Network Rail to deliver the second phase of the western section of the East West Rail (from Bicester to Bedford and Milton Keynes to Princes Risborough).
- Commitment to develop an east-west expressway between Oxford and Cambridge.
- Continue to develop driverless vehicle infrastructure between Culham Science Park in Oxfordshire and Millbrook in Bedfordshire.
- Government aims to build 1 million new homes across the Oxford – Cambridge Arc by 2050 and boost the area’s economy (particularly focusing on tech, AI and life sciences).

5.27 The NIC scenario represents BTVLEP providing a location for 13.8% of 1m new homes at an Arc level to 2050. The current trajectory would, by 2050, fall short of the NIC transformative scenario (138k completions) by 74,000, reaching just 46% of this 138,000 BTVLEP target figure.

5.28 It will also be important to consider policies that will alter the way that housing, transport and digital infrastructure support local and national economies. Buckinghamshire is well placed to support changing ideas, innovations and technology that will utilise these shifts to support local and national economic development.

Figure 2: Housing growth - Predicted completions in BTVLEP to 2050 based on various scenarios



Source: MHCLG; NIC; BCC; Recent completions

5.29 The response signposts important policies concerning housing and transport investment. The nature of the economy that surrounds the new developments and housing areas must be central to local government thinking. The scale and nature of housing provided will determine the new residents and their ability to drive forward the economy. Equally important will investment in digital infrastructure. Digital bandwidth capacity in terms of fibre acts an enabler or constraint on business investment, growth and scaling. Evidence suggests that internet down time costs each business £3,125 per year³.

5.30 Investment in digital infrastructure chimes with government statements to deliver positive incentives for investors⁴, enable entrepreneurs, unlock innovation, and provide the capability to deliver digital health and e-learning equally and for all is enabled. This is reflected in government's statement in 2017 that Full fibre broadband could potentially allow⁵:

- Hospitals to share HD quality graphics of medical scans in seconds to improve diagnosis speeds.
- Businesses to reach ever more customers online, increasing transactions by uploading even the largest files quickly and easily.

³<https://www.duocall.co.uk/blog/internet-down-time-costs-each-business-3-125-per-year-can-your-business-afford-this/> / <https://www.itproportal.com/2016/06/10/internet-downtime-lost-uk-businesses-12bn-last-year/>

⁴ There is nil 'displacement' from this type of intervention. The internet has no designated 'planning use-type'.

⁵ Source: <http://www.centreforcities.org/publication/how-cities-can-make-the-most-of-digital-connections/>

- School classrooms to see a vast increase the number of pupils who can stream educational videos at the same time.
- The government has also announced the ambition to provide a minimum level of service and access in terms of download speeds i.e. a Universal Service Obligation (USO) to reduce the digital divide.
- We acknowledge that digital infrastructure investments alone will not be a panacea for local and national economic development. As has been argued by the Centre for Cities, it will be vitally important that local people have skills and confidence.

5.31 Our propositions set out in this LIS need to be viewed in the wider context of wider UK macro-economic and domestic policies that impact on areas and regions. Both demand side policies of fiscal (e.g. taxation and government spending) and monetary policies (interest rates), affect economic growth. Government policies to increase economic growth are focused on trying to increase aggregate demand (demand side policies) or increase aggregate supply/productivity (supply side policies) such as capital investment tax incentives, improving education and infrastructure which contribute to a rise in productivity levels. There are also wider international policy drivers that impact on UK regions and areas such as the pound relative weakness against the euro and dollar a boost for UK exporters. The position regarding Brexit is not yet fully known but in understanding the consequences, we will address business challenges.

6 INDUSTRIAL STRUCTURE

The economic logic follows that for any modern industry strategy, the location and type of business activity will be critical. Productivity and wages vary considerably by industry – for example manufacturing is more productive than retail services in every OECD country. Equally where there are positive or mutually beneficial reasons for firm co-location, this agglomeration of industry can be a critical driver for individual firm and local economic growth.

Recent evidence⁶ suggests that cluster policies have generally had mixed and sometimes unsuccessful outcomes. A key question arising from this evidence base will be to consider more horizontal interventions in Buckinghamshire (such as investment in skills programmes and digital infrastructure) which might help grow the agglomerations of economic activity⁷ that already exist in Buckinghamshire.

Key summary figures:

- Buckinghamshire's impressive performance in jobs growth has experienced a recent blip with total employment falling by 1.2% between 2016 and 2017. This included a fall in professional, scientific and technical services by 15.2% and a 6.3% drop in information and communication technologies.
- Buckinghamshire has the greatest proportion of employees jobs in wholesale, information and communication, property, and motor trades and art, entertainment and recreation.
- Buckinghamshire's comparative strength in the high-technology sector is predominantly service-based. This extends to Berkshire, Buckinghamshire and Oxford being the NUTS2 area in Europe with the highest share of employment in high-technology sectors but with the strength drawn from services.
- Knowledge-Intensive-Businesses have generated disproportionately high employment growth relative to the level of business formation.
- Business Administration and Support as well as Information Technology created 48.1% of employment growth between 2010 and 2016.
- Buckinghamshire has a significant micro-economy with a higher proportion of micro businesses than England or the South East.
- The Health sector employs the most people in Buckinghamshire (28,000).
- The professional, scientific and technical sector is the largest in Buckinghamshire, accounting for 21.0 per cent of all businesses in the county, the highest share of any LEP outside London.

⁶ Mason, G. and Nathan, M. (2014) Rethinking industrial policy design in the UK: foreign ideas and lessons, home-grown programmes and initiatives, published by the Centre for Learning and Life Chances in Knowledge Economies and Societies at: <http://www.llakes.org>

⁷ Nathan M, and Overman, H. 2013. Agglomeration, clusters, and industrial policy, Oxford Review of Economic Policy, Volume 29, Issue 2, 1 July 2013, pp.383-404.

- Management consultancies account for 45.6% of businesses in the sector and 9.6% of all businesses - the highest share of any LEP or county council area. These businesses will be an essential part of improving business competitiveness e.g. by providing incentives to cut costs.

Focus on industrial structure

6.1 We are targeting investment in four areas and in order to understand our rationale for focusing on certain sectors and economic assets, the following section provides an overview of the economics of industry in Buckinghamshire.

6.2 This section measures business activity and the industrial profile of Buckinghamshire in the following ways:

- Using employment data to understand Buckinghamshire's economy by looking at the share of employment in particular sectors and how this is changing over time.
- Looking at business formation and start-ups to understand the scale and nature of entrepreneurial activity in Buckinghamshire.
- Concentration of industry using Location Quotients.

Figure 3: Location quotients of employment by sector and BTVLEP district

Industry concentrations of employment in BTVLEP districts and London, Indexed against England					
Industry sector	Aylesbury	Chiltern	South Bucks	Wycombe	London
Agriculture, forestry & fishing	16.7%	16.7%	0.0%	16.7%	0.0%
Mining, quarrying & utilities	63.6%	18.2%	63.6%	181.8%	54.5%
Manufacturing	98.8%	81.3%	62.5%	93.8%	27.5%
Construction	111.1%	120.0%	117.8%	115.6%	80.0%
Motor trades	122.2%	88.9%	105.6%	111.1%	38.9%
Wholesale	136.6%	175.6%	226.8%	280.5%	70.7%
Retail	91.5%	92.6%	85.1%	104.3%	83.0%
Transport & storage	72.0%	44.0%	80.0%	64.0%	92.0%
Accommodation & food services	76.7%	74.0%	109.6%	75.3%	109.6%
Information & communication	104.5%	163.6%	152.3%	181.8%	181.8%
Financial & insurance	61.1%	63.9%	36.1%	47.2%	208.3%
Property	105.9%	152.9%	194.1%	117.6%	129.4%
Professional, scientific & technical	81.1%	153.3%	125.6%	108.9%	164.4%
Business administration & support services	122.8%	63.0%	122.8%	100.0%	114.1%
Public administration & defence	125.0%	35.0%	22.5%	47.5%	105.0%
Education	110.0%	144.4%	63.3%	95.6%	81.1%
Health	108.6%	90.6%	83.6%	71.9%	76.6%
Arts, entertainment, recreation & other services	102.2%	120.0%	126.7%	95.6%	115.6%
Column Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: BRES 2017

6.3 This section predominantly uses the Business Register and Employment Survey (BRES) – the official source of employee and employment estimates by detailed geography and industry. It is the most comprehensive data source for looking at the size of businesses in the UK.

Jobs in Buckinghamshire, 2017

6.4 Recent figures from BRES show that Buckinghamshire’s steady and impressive performance experienced a glitch between 2016 and 2017.

6.5 There were 231,000 employee jobs in Buckinghamshire in 2017, 4,000 (1.6 per cent) fewer than in 2016. Total employment fell by 3,000 (1.2 per cent) to 241,000. Across England, employee jobs grew 1.1 per cent in the last year. Buckinghamshire recorded the 5th weakest performance among the 38 Local Enterprise Partnerships (LEPs) for jobs growth in the last year and was one of only seven LEPs to see a fall in jobs. The South East recorded England’s weakest performance, with employee jobs falling 1.1 per cent, with five LEPs of the regions LEPS recording falls.

6.6 Among Buckinghamshire’s districts, South Bucks recorded the strongest growth at 1.3 per cent in the last year but still ranked only 167th among the 380 local authorities in Great Britain. Aylesbury Vale also recorded growth, employee jobs, all in the public sector, growing 0.4 per cent, to rank 213th. Chiltern and Wycombe both saw a fall in employee jobs, with Wycombe’s 4.4 per cent fall the 23rd weakest performance of any local authority in the country, with falls recorded in both the private (4.4 per cent) and public (4.2) sectors.

6.7 Employee jobs in the private sector in Buckinghamshire fell by 3,900 or 1.9 per cent in the last year, while public sector employment rose by less than one hundred (0.2 per cent). The share of employee jobs in the public sector in Buckinghamshire has risen to 11.9 per cent, the lowest rate recorded among LEPs and third lowest among county councils, behind Leicestershire and Warwickshire.

6.8 The number of part-time jobs in Buckinghamshire grew by 4.1 per cent in 2017, the 5th fastest rise among county council areas but only 10th highest among LEPs. Over the last two years the number of part time jobs has risen by 10 per cent. Over the same periods the number of full-time employee jobs has fallen by 3.2 per cent, including a 4.4 per cent fall in 2017, the second weakest performance of any LEP. Part-time jobs now account for more than a third of the total (33.5 per cent), up from 31.6 per cent in 2016.

6.9 Part-time roles make up more than half of all employment in Buckinghamshire’s accommodation and food service and retail sectors (both 57.1%), ahead of education (47.6%), arts, recreation and culture (46.2%) and health (42.9%). Health, arts, entertainment and recreation and retail were on the only sectors to see growth in both full-time and part-time roles, with part-time roles growing more than full-time roles in each case. While professional, scientific and technical services, property and information and communication technology saw falls in both full and part time roles.

6.10 By broad industrial group, health employs the most people in Buckinghamshire, with 28,000 jobs in the sector, ahead of the business administration and support sector (22,500), retail (21,500), education (21,000) and the professional, scientific and research sector (19,500). At the two-digit level, retail is Buckinghamshire’s biggest sector, providing 21,500 jobs, ahead of education (21,000), wholesale (17,000), human health activities (16,500), food and beverage service activities (11,500) and computer programming and consultancy and employment activities (both 8,500).

- 6.11 Over the last year, the health sector has added the most jobs in Buckinghamshire, with employee jobs up 2,300 (7.7%) compared to 2016. Other sectors showing strong growth include art, entertainment and recreation (1,500, 13.6%), and construction and retail (both up 1,000, 8.3% and 4.9% respectively). Professional, scientific and technical services saw the largest fall at 3,500 (down 15.2%) while wholesale saw a fall of 3,000 employee jobs (15.0%), with transport and storage and information and communication technologies both seeing falls of 1,000 (down 13.3% and 6.3% respectively).
- 6.12 By location quotient, Buckinghamshire has the greatest concentration of employee jobs in wholesale (LQ=1.9), information and communication (1.6), property (1.3) and motor trades and art, entertainment and recreation (both 1.2). Buckinghamshire has the highest concentration of employment of all county council areas in both wholesale and information and communication technologies, ranking 3rd in property and 4th in both business administration and support and arts, entertainment and recreation.

Employment trends

- 6.13 The following information presents employment trends between 2010 and 2016 (prior to Buckinghamshire's recent blip in performance). The table below provides a comparison of the total number of employees in various sectors between 2010 and 2016 indicating a net job increase figure of 26,000 (12.5%) over the 6-year period.

Figure 4: 2010 - 2016 BTVLEP employee growth by industry

Industry of employment	2010	2016	Growth	Percent
14 : Business administration & support services (N)	14,000	22,000	8,000	57.1%
10 : Information & communication (J)	11,500	16,000	4,500	39.1%
8 : Transport & storage (inc postal) (H)	5,500	7,500	2,000	36.4%
2 : Mining, quarrying & utilities (B,D and E)	1,875	2,500	625	33.3%
6 : Wholesale (Part G)	16,000	20,000	4,000	25.0%
9 : Accommodation & food services (I)	12,000	14,000	2,000	16.7%
BTVLEP TOTAL	208,500	234,500	26,000	12.5%
12 : Property (L)	4,500	5,000	500	11.1%
17 : Health (Q)	24,500	26,500	2,000	8.2%
16 : Education (P)	20,000	21,500	1,500	7.5%
13 : Professional, scientific & technical (M)	21,500	23,000	1,500	7.0%
1 : Agriculture, forestry & fishing (A)	150	160	10	6.7%
3 : Manufacturing (C)	16,000	16,500	500	3.1%
7 : Retail (Part G)	20,000	20,500	500	2.5%
4 : Construction (F)	12,000	12,000	0	0.0%
5 : Motor trades (Part G)	4,750	4,750	0	0.0%
18 : Arts, entertainment, recreation & other services (R,S,T and U)	12,000	11,000	-1,000	-8.3%
11 : Financial & insurance (K)	5,000	4,500	-500	-10.0%
15 : Public administration & defence (O)	7,500	6,000	-1,500	-20.0%

Source: ONS BRES 2016

- 6.14 Of particular note is that knowledge intensive business services (KIBS) companies have generated disproportionate employment growth relative to the level of business formation. This may relate to the inward-location of some larger companies, or high levels of domestic expansions in these sectors, or both. Between the 2 sectors, business administration and support, and Information and communication sectors they have in total generated 48.1 per cent of total employment growth in the period.
- 6.15 Professional Scientific and technical firms tend to be smaller and often micro businesses. They also tend to have higher levels of human capital (qualifications), be innovation active and use 'new' technologies with greater levels of prevalence.
- 6.16 It should also be noted that employment data lags behind business data by one year, however with an additional 1,645 businesses generating 1,500 professional scientific and technical employee positions in the period. Importantly there is a critical mass of specialist 'knowledge intensive business service' (KIBS) businesses that are fundamental to drive growth in our proposition sectors. This shows that Buckinghamshire has considerable strengths in knowledge-intensive services, which is further substantiated by the proportion of high-tech employees working in service jobs.
- 6.17 High technology in the broadest – Eurostat compiled definition – places BTVLEP fourth on a list of LEPs for higher concentrations⁸ employed in high-tech industries at a national level and above neighbouring Arc LEPs. Buckinghamshire's high-tech sector employs 24,545 people, which accounts for 10.2% of total employment. that the largest portion of this local specialisation is made up by computer consultancy activities (6,500 employees), followed by engineering activities and related technical consultancy (3,000 employees), computer programming activities (2125 employees), and other telecommunications activities (1,750 employees) and other information technology and computer service activities (1,625 employees). This suggests that a large part of BTVLEPs high-tech locational advantage is service-based.
- 6.18 Data at a NUTS2 gives an idea of where comparative strengths might lie for the Berkshire, Buckinghamshire & Oxfordshire NUTS2 area (which includes Milton Keynes as part of ceremonial Buckinghamshire).
- 6.19 Berkshire, Buckinghamshire and Oxfordshire were the NUTS2 area ranked top in Europe in 2017 for share of employment in high-technology sectors (high-technology manufacturing and knowledge-intensive high-technology services) but with strength very much drawn from services. Bucks-Ox-Berkshire ranks 3rd in Europe for Knowledge-intensive high-technology services (and would rank 1st in Germany) but only 32nd for high technology manufacturing (and would be 12th in Germany – 3rd in UK- behind Bedfordshire & Hertfordshire and Cheshire). Bucks-Ox-Berkshire would rank last in NUTS2 regions in Germany for proportion employed in medium high-technology manufacturing.
- 6.20 Bucks-Ox-Berkshire ranks third in the UK for proportion employed in Information and Communication; would be first in Germany, and third across Europe.
- 6.21 Like the Silverstone Technology Cluster, the Arc area has the opportunity to draw on its distinctive local labour markets. The evidence indicates that Buckinghamshire has a locational advantage in

⁸ Concentration/ specialisation is measured using location quotients whereby a value greater than 1 indicates that there is a higher concentration (proportionally) of that industry compared to the national level.

service-based high-technology industries and certain aspects of more knowledge-intensive manufacturing.

- 6.22 The above suggests that the area has the potential to grow within the identified proposition sectors. The lagging behind of employee numbers as compared to business formations can be viewed in two ways. It is either the new companies are single owner/employee type or creating new product/service trading arms staffed with existing employees. In both scenarios there is an opportunity to create more employment opportunities if the demand continues to increase. However, there might be a need for providing targeted business support, particularly to the owner/employee type of companies, focusing on growth strategies and managing human resources.
- 6.23 For certain industries economic activity is constrained to a handful of locations. Evidence⁹ put together by the LSE's Centre for Economic Performance (CEP) provides analysis on the location and performance of British firms with an explicit local/ regional focus. One of its findings shows that certain industries have a single hub with the clearest examples being information and communication technology and the creative sectors with both around London and the South East (including Buckinghamshire). Both industries are also considered to be key parts of the knowledge economy. Using the Herfindal-Hirschman-Index¹⁰ also shows that the creative sector has a high level of geographic concentration. The concentration around Buckinghamshire and the South East will therefore be an important point to consider for the propositions that underpin the LIS.
- 6.24 This evidence base intends to identify proposals sectors/assets which can become employment generation catalysts if their interaction with subcontractors and the supply chain is channelled to reflect and accommodate companies with more internal capacity, rather than single employee entities. This can be achieved with direct support from the LEP and promoting ideas such as sector collaboration, consortia setting, franchising, etc.
- 6.25 The next section looks at business formation across Buckinghamshire.

Buckinghamshire's businesses 2018

- 6.26 There were 33,900 VAT / PAYE registered businesses in Buckinghamshire in 2017. Of these, 77.4 per cent employed fewer than five people, the highest share of any county council or Local Enterprise Partnership (LEP) area. Over the last year, the number of businesses in Buckinghamshire has fallen 0.8 per cent (275 businesses), failing to match the national rate of growth (0.1 per cent), ranking 23rd among the 27 county council areas and 29th among the 38 LEPs.
- 6.27 Despite having the highest share of businesses in the smallest employment bands, 9% of Buckinghamshire's businesses have turnovers of more than £1m, ranking 23rd among the 38 LEPs, while 16.2% of Buckinghamshire's businesses have turnovers below £50,000, to rank 15th. Buckinghamshire businesses most commonly have turnovers between £50,000 and £100,000, with a third (33.4 per cent) of businesses falling into this band.

⁹ Centre for Economic Performance. (2017). Industry in Britain - An Atlas, Special Paper No. 34. September 2017.

¹⁰ The Herindahl-Hirschman Index provides a simple tool to measure whether specific industries are geographically concentrated in a small number of areas or if they are evenly distributed across the whole area.

6.28 The professional, scientific and technical sector is the largest in Buckinghamshire, accounting for 21.0 per cent of all businesses in the county, slightly down on 2017's figures but still the highest share of any LEP outside London. Management consultancies now account for 45.6 per cent of businesses in the sector and for 9.6 per cent of all businesses, the highest share of any LEP or county council area. Construction businesses showed the strongest growth in the last year in all sectors, increasing by 130 businesses to stand at 3,720 businesses or 11.1 per cent of the total. Since 2010, Buckinghamshire's professional scientific and technical sector has grown by 1,500 businesses accounting for 30.6 per cent of all growth.

Business Formations and Starts

6.29 Analysing the trends in business formation and start-ups assists policymakers understand the relative buoyancy of the local economy, high levels of start-ups are generally a good indicator of a thriving economy. The sectors in which these businesses are formed in provides a further indicator if these start-ups are in high growth and productive sectors.

6.30 In the BTVLEP area there has been an overall net business formation of 5,185 enterprises between 2010–17 (a rise of 17.9%). Of this total 3,245 enterprises (62.6%) are business formations in private sector KIBS¹¹ [we use the definition of 'professional scientific and technical (+1,645); Information and Communication (+890); Business administration and support' (+710)].

6.31 BTVLEP also had significant numbers of these KIBS businesses in 2010, and so despite the high total additional numbers from KIBS, several other sectors have grown by higher than average percentage figures despite much lower total numbers, as indicated in the table below.

Figure 5: 2010 - 2017 BTVLEP business growth by industry

Industry	2010	2017	Growth	Percent
2 : Mining, quarrying & utilities (B,D and E)	90	155	65	72%
17 : Health (Q)	1,120	1,575	455	41%
12 : Property (L)	995	1,350	355	36%
10 : Information & communication (J)	2,775	3,665	890	32%
14 : Business administration & support services (N)	2,335	3,045	710	30%
13 : Professional, scientific & technical (M)	5,605	7,250	1645	29%
8 : Transport & storage (inc postal) (H)	750	940	190	25%
11 : Financial & insurance (K)	540	675	135	25%
16 : Education (P)	670	815	145	22%
BTVLEP TOTAL	28,990	34,175	5185	18%
1 : Agriculture, forestry & fishing (A)	1,015	1,150	135	13%
9 : Accommodation & food services (I)	1,225	1,355	130	11%
4 : Construction (F)	3,325	3,640	315	9%
15 : Public administration & defence (O)	180	195	15	8%
5 : Motor trades (Part G)	840	895	55	7%
3 : Manufacturing (C)	1,405	1,485	80	6%

¹¹ Typically, these sectors drive productivity gains and are higher value, resulting in net benefits to the treasury. Market capture and growth serve as initial proxies for (thus far) 'hidden industrial capabilities' which confer market advantage and growth impetus. These can be analysed further with more detailed insight into sub-sector clusters.

7 : Retail (Part G)	2,335	2,325	-10	0%
6 : Wholesale (Part G)	1,440	1,410	-30	-2%
18 : Arts, entertainment, recreation & other services (R,S,T and U)	2,360	2,250	-110	-5%

Source: ONS Business Counts 2017, local units

6.32 The table above indicates that business formation and entrepreneurial capacity in BTVLEP are high, stemming from high levels of human capital and locational factors. The extent to which this translates into more realised 'market capture' in terms of employment, employment growth and productivity per worker growth can be triangulated to provide insight into the areas' ability to 'leverage' its industrial strengths and capabilities¹².

- Mining and Quarrying +72%
- Health +41%
- Property +36%
- Finance & Insurance +25%
- Transport and storage +25%
- Education +22%.

6.33 Of particular interest are the 3 sectors highlighted in bold in figure 5 (see above), these businesses generate high productivity levels, associated with the growth sectors as per our propositions. It must be noted that Business Administration and Support Services, though not included as one of our Propositions, can contribute towards increased productivity, if new technologies (such as AI, for example) are applied and embraced within the supply chain of the other high growth sectors.

6.34 One additional point from the table is that the BTVLEP has not seen strong performance amongst 'place specific' local trades and services. To some extent this raises the issue of the polycentric and rural nature of the BTVLEP economy, and a potential need to strengthen local centres, and internalise the additional spend and value in the economy.

In order to sustain and further grow business formation action needs to be taken to:

- Ensure an adequate supply of small business premises and move on accommodation that gives small businesses the opportunities to enter bigger markets and commercialise innovative output.

¹² The fact that KIBS growth is driving business formation is useful: if it is also strongly driving employment formation then it is likely that we will be able to pick up the effects in terms of productivity changes. These productivity changes can manifest in the form of overall area GVA being driven by sector growth; and/or where there is strong niche sub-sector growth, we can look at within-sector productivity-per-worker. Where this is growing alongside actual employment numbers we can directly infer 'specialised industrial capability'. This method of identification will not reveal all industrial capabilities, many will remain hidden. It does however identify growth drivers and create a basis for follow up investigation. We will identify the effects [where they manifest] of industrial specialisms, and then attempt to understand the nature of them.

- Provide programmes to deliver supply chain activity that will bring forward growth and create a stronger eco-system of enterprises thereby increasing resilience in the economy.
- To ensure a high level of nomadic start-ups thrive investment in 5G is required or full broadband coverage and digital services that are ‘fit for purpose’ in terms of upload and download speeds. This will also require digital skills programmes.
- Ensure that education and training providers equip new entrants to our growth sectors with the current and future skills required. This will require new methods of promoting e.g. STEM careers by plugging key members of entrepreneurial business community (e.g. Satellite Applications Catapult) into Further and Higher Education.
- Identify and promote key commercial & employment testbeds for ideas that provide Grade A business accommodation to retain existing businesses and attract relocators and mobile firms, from for example, overheating areas of London
- Ensure that new housing developments and the associated growing population provide the right mix of transport, education, leisure and commercial infrastructure services to promote sustainable and balanced communities.

6.35 Business administration and support services is a sector with projected growth of 30% and we must acknowledge its importance to the local economy and employment potential. However, this sector, in its supportive role, in principle delivers growth if the economy is buoyant, which creates demand for these services. We can argue that there is enough capacity and skills level to respond positively by the sector. What we need to be vigilant about is the future new skills requirements, particularly by the high tech and health and medical sectors, and how this might have an effect on the type and level of demand for business and administrative support.

6.36 We must ensure that the SMEs providing these services have training opportunities and the capacity to meet this demand. Attention will be needed to the training providers offer and how it reflects the changes in the economic environment. This is aligned with the identified four drivers (skills, digital, living labs and commercialisation of ideas), which play an enabling role across the economy. If the LEP is to achieve growth it must equip this particular sector with the required level of expertise and also provide opportunities to apply it accordingly. For example, the commercialisation of an idea can take years to achieve, unless there is direct support to push this through the regulations and the legal framework.

6.37 The following table identifies a set of selectively-expanded professional scientific and technical KIBS sub-sectors that have driven business formation growth.

Figure 6: Detailed 2010 - 2017 BTVLEP business growth - sub-sectors with knowledge services and technology innovation sectors highlighted

Industry	2010	2017	Growth	Percent
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72110 : Research and experimental development on biotechnology	0	15	15	n/a
74901 : Environmental consulting activities	15	45	30	200%
71112 : Urban planning and landscape architectural activities	10	25	15	150%
69202 : Bookkeeping activities	45	95	50	111%
71121 : Engineering design activities for industrial process and production	65	135	70	108%
69101 : Barristers at law	10	20	10	100%
69203 : Tax consultancy	10	20	10	100%
72200 : Research and experimental development on social sciences and humanities	5	10	5	100%
74201 : Portrait photographic activities	10	20	10	100%
74300 : Translation and interpretation activities	5	10	5	100%
74909 : Other professional, scientific and technical activities (not including environmental consultancy or quantity surveying)	260	485	225	87%
70221 : Financial management	105	185	80	76%
71122 : Engineering related scientific and technical consulting activities	125	205	80	64%
74100 : Specialised design activities	195	295	100	51%
71111 : Architectural activities	100	145	45	45%
70210 : Public relations and communication activities	55	75	20	36%
74202 : Other specialist photography (not including portrait photography)	15	20	5	33%
BTVLEP 'ALL KIBS' TOTAL	5,215	6,820	1605	31%
71200 : Technical testing and analysis	35	45	10	29%
70229 : Management consultancy activities (other than financial management)	2,615	3,305	690	26%
70100 : Activities of head offices	75	90	15	20%
69201 : Accounting, and auditing activities	495	570	75	15%
69109 : Activities of patent and copyright agents; other legal activities (other than those of barristers and solicitors) nec	70	80	10	14%
74902 : Quantity surveying activities	80	90	10	13%
72190 : Other research and experimental development on natural sciences and engineering	65	70	5	8%
71129 : Other engineering activities (not including engineering design for industrial process and production or engineering related scientific and technical consulting activities)	530	560	30	6%
69102 : Solicitors	125	130	5	4%
74203 : Film processing	10	10	0	0%
74209 : Other photographic activities (not including portrait and other specialist photography and film processing) nec	85	75	-10	-12%

Source: ONS Business Counts 2017

6.38 Those sub-sectors highlighted in green indicate the potential presence or emergence of more specialist industrial capabilities, with potential interrelationships between several. (The table indicates some level of supply-chain-ecosystem) though not all firms will be 'specialists' benefitting from this.

- 6.39 Where we have highlighted sectors such as management consultancy – a larger and potentially more ‘generic’ KIBS service - sub-elements of this sector are likely to contain specialist knowledge that supports productive links between some other highlighted activities. This is likely to involve larger (i.e. cross-cutting) firms, and some smaller niche specialists. As the largest and fastest scaling sub-sector, this warrants some bespoke insight, which will support the basis for further targeted investigation. It will be necessary to establish the specialism of the Management Consultancy services and encourage/facilitate targeted engagement with the proposed growth sectors.
- 6.40 The space sector, particularly upstream is of significant importance to the future economic performance of our LEP. Westcott Venture Park as a nationally recognised facility for space propulsion testing, and the associated sites and facilities is a major asset, which can provide both the national hub for innovation and new technologies and contribute to addressing the grand challenges. Despite the fact that employee numbers are not growing proportionately to the business formations in the sector, the link to increased productivity and application of new technologies, AI and machine learning will be central to the solutions required under the Grand Challenges and therefore support to upscale and commercial ideas is key. The LEP can significantly benefit from this sector, not only in economic terms, but also in national ranking and recognition of its strategic positioning as a lead future technology conglomerate.

Figure 7: UK space industry employment 2009/10 – 2017/18

	Upstream		Downstream		Total	
	Employees	Growth (% year)	Employees	Growth (% year)	Employees	Growth (% year)
2009/10	7,106	-2.7%	21,889	24.5%	28,995	16.5%
2010/11	7,117	0.2%	21,825	-0.3%	28,942	-0.2%
2011/12	7,406	4.1%	24,618	12.8%	32,024	10.6%
2012/13	7,391	-0.2%	26,491	7.6%	33,882	5.8%
2013/14	8,907	20.5%	28,484	7.5%	37,391	10.4%
2014/15	8,575	-3.7%	29,947	5.1%	38,522	3.0%
2015/16	9,032	5.3%	32,658	9.1%	41,690	8.2%
2016/17	8,940	-1.0%	32,988	1.0%	41,929	0.6%
2017/18*	9,276	3.8%	33,623	1.9%	42,899	2.3%

Note: 2017/18 forecasted based on survey respondents’ forecasts and analysis of available annual reports

London Economics Analysis, 2018

- 6.41 It is necessary to carry out some profiling of the proposed growth sectors to establish the potential ‘growth ceiling’, which might depend on internal capabilities and capacity, and external influences, such as the outcome of BREXIT, developments in digital infrastructure, a changing demand for skills, and a rapidly ageing society.
- 6.42 The next section of this evidence base describes the overall economic output and performance on Buckinghamshire that builds on the sectoral and relative performance of the area in this section.

7 ECONOMIC OUTPUT

The aim of the National Industrial Strategy (NIS) is “to boost productivity by backing businesses to create good jobs and increase the earning power of people throughout the UK with investment in skills, industries and infrastructure”. It is well known that the UK’s productivity – measured by output per hour – is well below that of its European competitors, including Germany and France. There is significant disparity across UK regions, and within for example Buckinghamshire. Even though there have been a number of interventions intended to reduce these disparities little progress has been made¹³. Understanding the spread of productivity is an essential part of developing Buckinghamshire’s Local Industrial Strategy.

7.1 Key points:

- Buckinghamshire’s gross value added (GVA) rose 2.0 per cent in 2016 to reach £16.4bn. This was only the 145th highest rate of growth among the UK’s 179 NUTS3 regions, well below the 3.4 per cent growth recorded across the UK. This was the fourth time in the last five years that Buckinghamshire has failed to better the national rate of growth. Despite slower recent growth, at £30,592, Buckinghamshire’s GVA per capita is the 30th highest of the UK’s NUTS3 regions, 11.0 per cent above the national level., with South Bucks and Wycombe both ranking in the top 50 of the 380 local authorities in Great Britain.
- 84.4% of Buckinghamshire’s GVA is derived from the service industries.
- Buckinghamshire’s productivity is the 3rd highest among the 38 LEPS, ranking 21st among the 168 NUTS3 regions in the UK and 5th highest outside London.
- The productivity of Buckinghamshire’s NUTS2 area, Berkshire, Buckinghamshire & Oxfordshire, ranked 4th among the UK’s 40 NUTS2 regions, behind Inner London West, Inner London East and Outer London West and North West, but saw growth below the national level in 2016.
- Buckinghamshire’s productivity growth in 2017 failed to match that recorded across the country as a whole for a fifth successive year.
- Wholesale and retail (comprising businesses operating in the distribution, transport, food and accommodation sector) forms the largest sector in terms of total numbers of employees (accounting for 29% of total employment in Buckinghamshire), its GVA measure at 21% is low in comparison.
- There are a number of reasons for these relatively low levels of GVA in the sectors noted, these include, lower entry level qualifications & skills requirements, low salary levels and lower levels of capital investment. For less productive sectors interventions would be most apt in improved basic or technical skills, and investment in existing technologies (e.g. broadband or mobile connectivity).

¹³ Overman, H. G. (2017), ‘The UK’s Regional Divide: Can Policy Make a Difference?’, CEP Election Analysis, EA042

- Forecast employment and GVA growth suggest that Information & Communication and Professional Scientific and Technology – the knowledge intensive employment sectors – will continue to provide Buckinghamshire with a competitive advantage to drive growth and productivity levels. Interventions will likely be required to maintain current performance (e.g. investment in skills in and digital infrastructure).
- Recent data for 2016/17 has highlighted that these sectors driving growth have come up against constraints and not sustained this growth in the 2017/18 period. Professional scientific and technical employment has lost two and a half times the number of jobs gained in the first period.

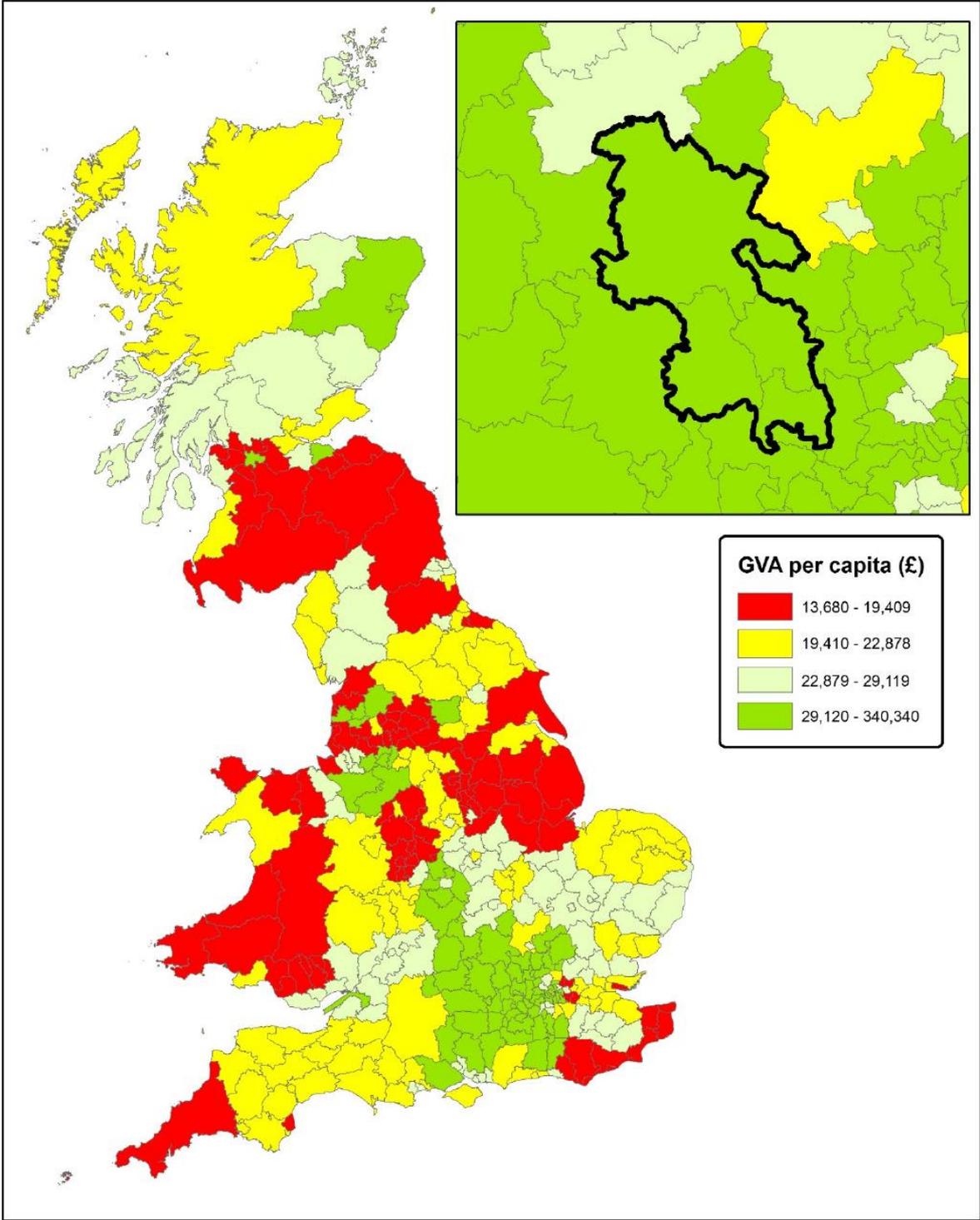
7.2 Productivity gives a measure of output for a given unit of input with labour productivity most commonly used. Gross Value-Added gives (GVA) gives the measure of output and is the value of goods and services produced in an area. It is calculated by taking away intermediate consumption from output.

Buckinghamshire's GVA

7.3 Buckinghamshire's gross value added (GVA) rose 2.0 per cent in 2016 to reach £16.4bn. This was only the 145th highest rate of growth among the UK's 179 NUTS3 regions, well below the 3.4 per cent growth recorded across the UK. This was the fourth time in the last five years that Buckinghamshire has failed to better the national rate of growth. Since 2011, Buckinghamshire's growth in economic output has trailed that of all its neighbouring NUTS3 regions with the exception of Berkshire. However, the 23.1 per cent growth in the county's economic output since 2011 is the 40th highest seen in any UK NUTS3 region, ranking 26th for growth since 2007.

7.4 Despite slower recent growth, at £30,592, Buckinghamshire's GVA per capita is the 30th highest of the UK's NUTS3 regions, 11.0 per cent above the national level., with South Bucks and Wycombe both ranking in the top 50 of the 380 local authorities in Great Britain. Buckinghamshire's GVA per capita grew 1.5 per cent in 2017, well below the 3.0 per cent seen across the UK. Since 2012, Buckinghamshire's GVA per capita has grown 13.0 per cent, compared to 15.9 per cent across the UK, to rank just 110th among NUTS3 regions in the UK. With 84.4 per cent of GVA derived from the service industries, Buckinghamshire has the 30th most service orientated of the 173 NUTS3 regions in the UK, ranking 15th outside London. However, since 2011, service sector output in the county has grown more slowly than both construction and manufacturing.

7.5 Figure 8 shows the difference between Buckinghamshire and the national picture. Figure 8: Productivity across BTVLEP districts and relative to other NUTS3 districts across the UK



GVA per capita by NUTS 3 regions, 2017 (£)
Source: Regional Accounts, ONS, 2018

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 Produced by BBF
 12 December 2018

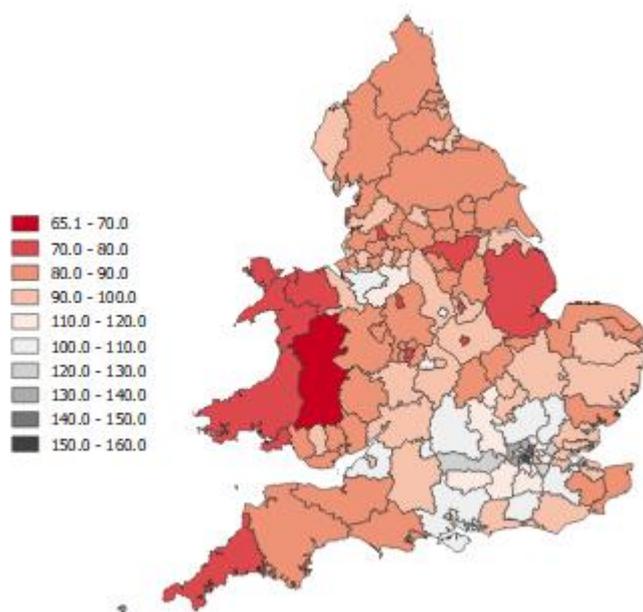
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 0 20 40 80 120 160
 Kilometers



GVA per hour worked

- 7.6 Buckinghamshire's productivity is the 4th highest among the 38 LEPs, ranking 27th among the 168 NUTS3 regions in the UK and 5th highest outside London. Buckinghamshire is one of only eight LEPs where productivity is above that of England's and is one of only 48 NUTS3 regions to better UK productivity, two fewer than last year but the same as in 2007, 2009 and 2014.
- 7.7 The productivity of Buckinghamshire's NUTS2 area, Berkshire, Buckinghamshire & Oxfordshire, ranked 4th among the UK's 40 NUTS2 regions, behind Inner London West, Inner London East and Outer London West and North West, but saw growth below the national level in 2017 at just 1.9% compared to 2.5% across England. Of its four constituent NUTS3 areas, only Milton Keynes' growth of 3% bettered the UK's 2.5%, Oxfordshire's growth of 2.4 per cent bettered the UK's 1.3 per cent, ahead of), Buckinghamshire (1.6%) and Berkshire (1.4%.
- 7.8 Buckinghamshire's real productivity fell in 2017 for a second successive year, and failed to match that recorded across the country as a whole for a fifth successive year. Since 2012 real productivity in Buckinghamshire has fallen 2.2% while rising 2.8% across the UK and 4.2% across the South East. Buckinghamshire's productivity is now the same as in 2008. This suggests new work undertaken in Buckinghamshire is of lower value per hour than existing activity. This is a challenge, which the LEP will need to address through the LIS.

Figure 9: GVA per hour at NUTS3 level in 2015, with UK average set to 100 (index)



(Source: ONS, 2018)

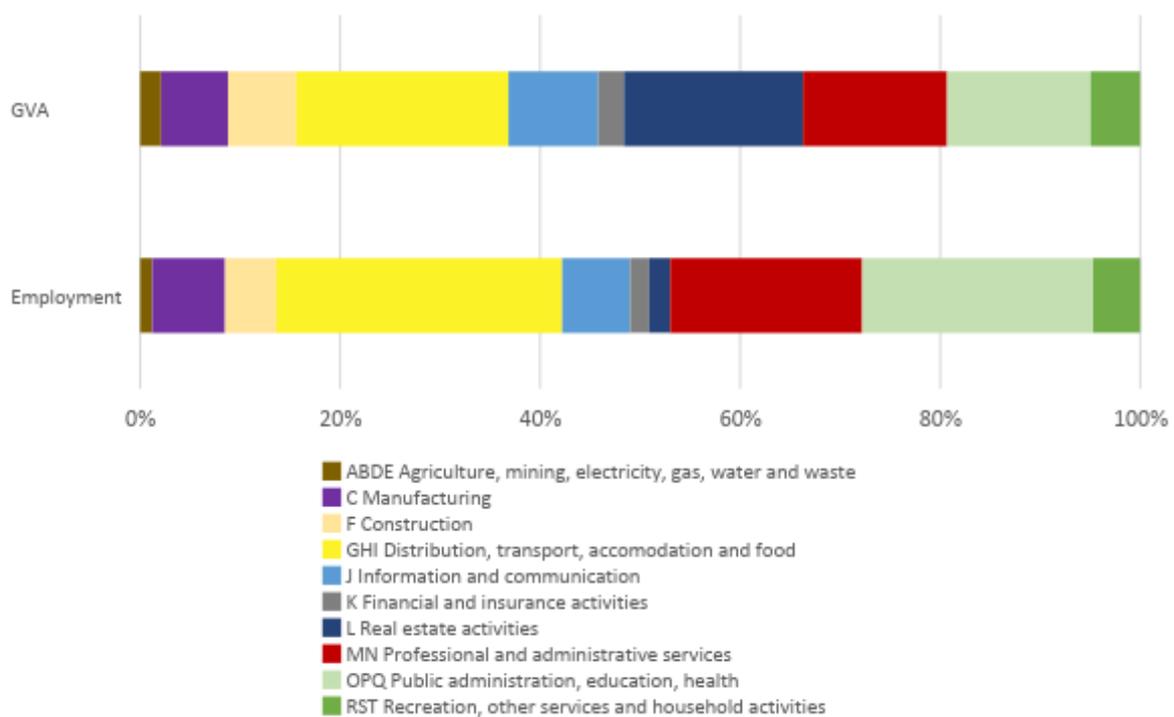
- 7.9 We can also use the ONS analysis of productivity within sectors. It tends to be the case that productivity differences between regions come from differences in productivity within the same sector across regions¹⁴. This means that Buckinghamshire its high levels of productivity is not merely down to industrial structure, rather that particular industries (like KIBS) and the firms they contain

¹⁴ See CBI (2017), 'Unlocking Regional Growth: Understanding the Drivers of Productivity Across the UK's Regions and Nations', March 2017; and CEP (2017)

are far more productive than firms in that same sector but another region. Empirical work by CBI (2017) shows that the most important variables that positively affect local productivity are R&D, skills, transport links, and export/ innovation intensity.

7.10 Through sector deals the Industrial Strategy recognises the importance of supporting strong and growing industries that have international comparative advantage. The government will continue to partner with industry on sector-specific issues to improve skills, employment, productivity and innovation. Recent successful examples include creative industries, space and professional and business services. The Industrial Strategy extends sectors deals to life sciences, the automotive sector, creative industries, artificial intelligence, construction, and the nuclear sector. This evidence base and subsequent strategy needs acknowledge that there will be sectors that will benefit greater from government intervention. Figure 10 shows that some of the industries with the higher shares of employment have relatively lower proportions of GVA. Industrial policies that focus on these industries or sub-sectors of these industries could bring about large overall gains in output. For example, public services and professional and administrative services (which includes a substantial part of knowledge intensive services).

Figure 10: GVA versus employment by grouped industrial sector, 2016



Source: ONS Regional Accounts

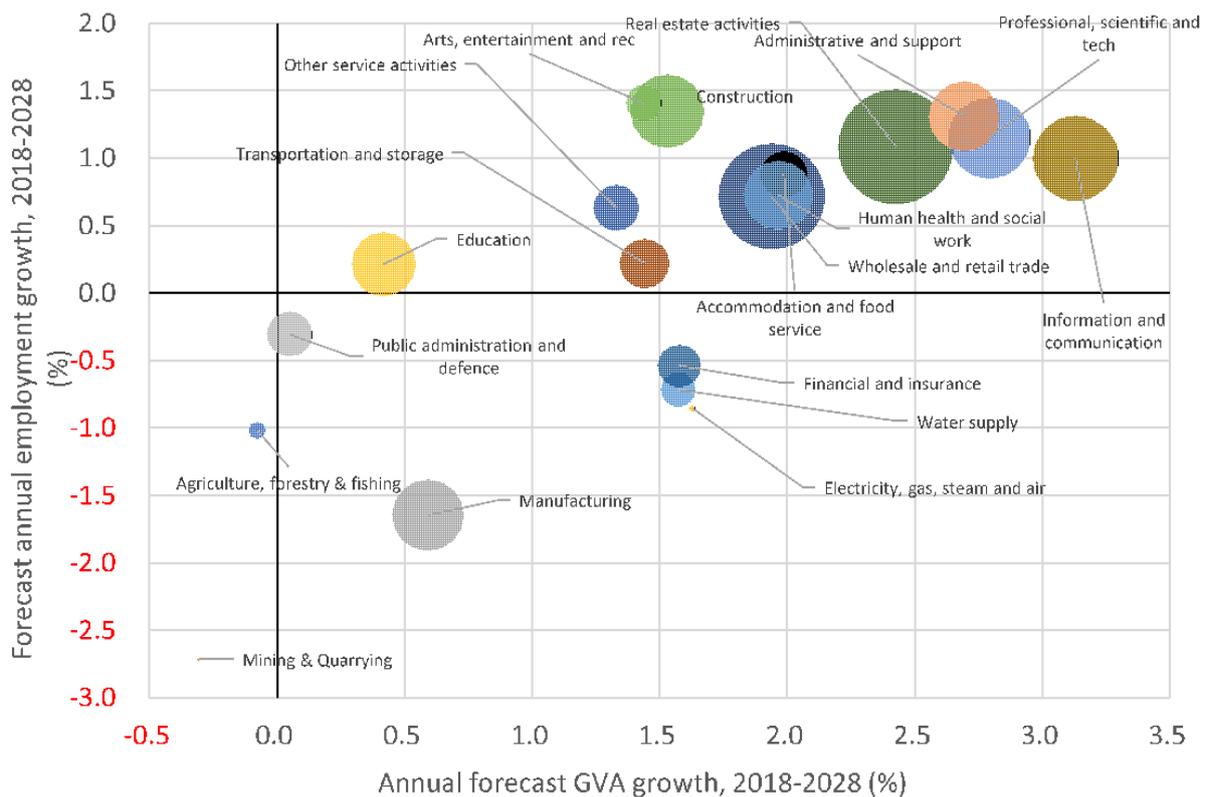
7.11 There are a number of business sectors that are mainstays of any local economy, such as public sector services, business administration and the wholesale and retail services sectors that are ‘employee intensive’. These sectors’ Gross Value Added (GVA) figures compare unfavourably with our target sectors identified in this LIS. For example, although wholesale and retail (comprising businesses operating in the distribution, transport, food and accommodation sector) forms the largest sector in terms of total numbers of employees (accounting for 29% of total employment in Buckinghamshire), its GVA measure at 21% is low in comparison. Lower productivity sectors are a

concern at a national level and are likely to hold back overall national productivity. These sectors often have low levels of remuneration and are described as unproductive.

- 7.12 There are a number of reasons for these relatively low levels of GVA in the sectors noted, these include, lower entry level qualifications & skills requirements, low salary levels and lower levels of capital investment. For less productive sectors interventions would be most apt in improved basic or technical skills, and investment in existing technologies (e.g. broadband or mobile connectivity). These are all areas that require attention and feature as drivers in the emerging LIS.
- 7.13 The importance of the sectors locally will however continue given that the area is part of the largest consumer market in Europe (i.e. London and the south east). The propositions in this LIS that include support for ‘enabling business sectors’ such as ICT and electronics that drive productivity improvements across the whole economy and any opportunities for cross sector collaboration with will be explored to benefit all local sectors.

Figure 11: Projecting GVA and employment based on past trend

Bucks growth by sector GVA and employment

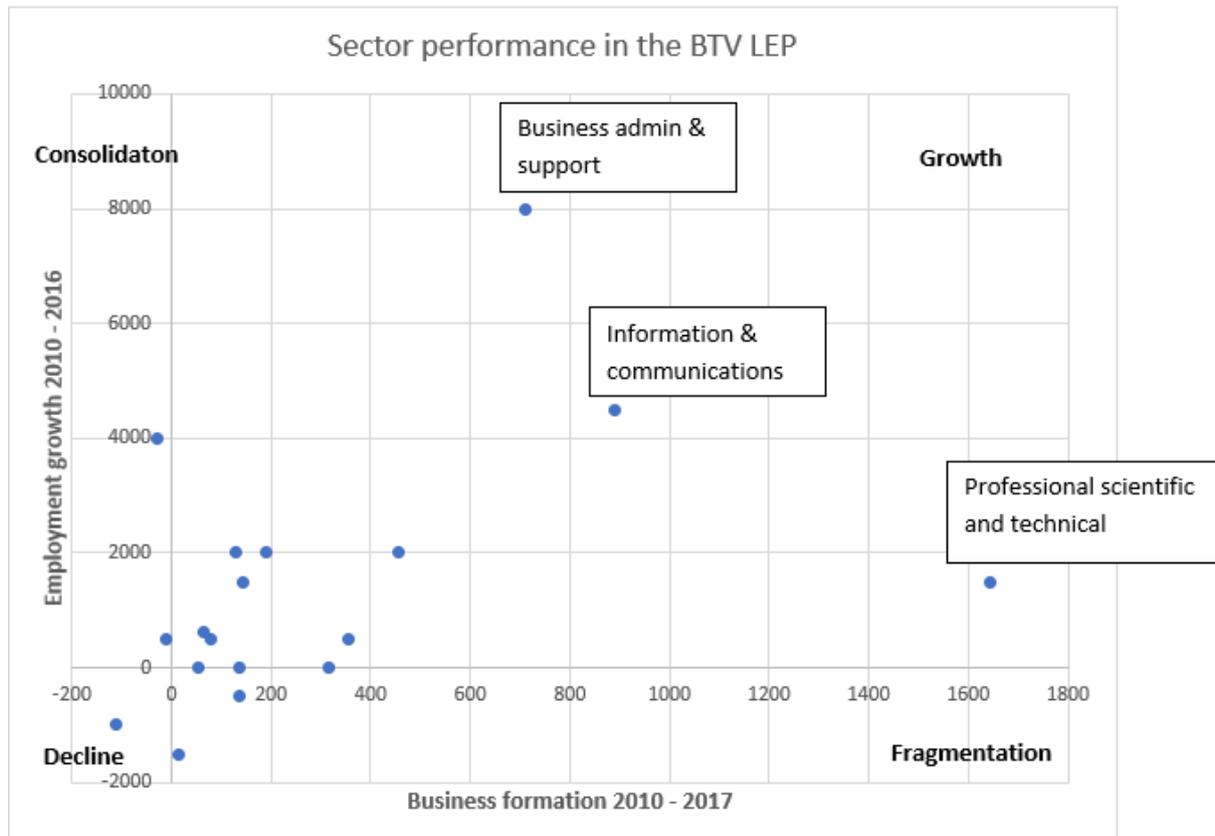


Source: Oxford Economics analysis of BRES and ONS Regional Accounts

- 7.14 The graph above is a forecast of the GVA sectoral growth for the next 10 years, our specialisms in Information & Communications and Professional Scientific and Technology towards the top right of the graph are the knowledge intensive employment sectors that provide BTVLEP with a competitive advantage to drive growth and productivity levels. The education revolution and investment in digital infrastructure will need to respond to these predicted changes in the demand for skills.

7.15 The past trend highlighted between 2010 and 2016/17 underpins this forecast and is highlighted in Figure 12 below.

Figure 12: the 2010 - 2016/17 business and employment trend



Source: ONS BES 2016 and ONS Business Counts 2017

8 INNOVATION

Innovation is increasingly key to productive performance. It describes the development and application of ideas and technologies that improve goods and services or make their production

more efficient and in the long term is the key determinant of economic growth. Innovation is often understood as something carried out using high levels of human capital in R&D intensive environments with strong links to centres of excellence and high-technology.

It is important to acknowledge a wider understanding of innovation – something that is a part of almost all economic activities and seeks to try new or improved ways of doing things and products¹⁵.

Key points:

- Berkshire, Buckinghamshire and Oxfordshire features as the NUTS2 region with the 19th highest R&D intensity across Europe. Within the area Buckinghamshire has a strength in Business expenditure on R&D but weaknesses in HE R&D capacity.
- BTVLEP ranks especially highly for new business processes but is more average across other measures.
- BTVLEP ranks ‘average’ for total Innovate UK and ‘Catapult’ investment, but scores in the top tier of LEPS for technology activities across 8 of 22 specialist areas.

8.1 Innovation is the successful exploitation of new ideas that take the form of:

- New technologies;
- New products; or
- New structures and ways of working, including new business models.

8.2 Such innovations can boost productivity, for example as better equipment works faster and more efficiently, or better organisation increases motivation at work. It allows key sectors the opportunity to sit at the limit of global technology. Increasingly important to technological innovation is the data (particularly geospatial) that underpins the digital economy.

8.3 The key test of success is the ability to translate ‘ideas and innovations’ into its application in strong industrial and commercial products & practices to increase productivity.

8.4 Innovation is an area where the market failure is clearly articulated – innovative activity often creates spillovers that tend not to be internalised by whoever (the firm) producing the innovation. This means there is less incentive for firms and the market to invest in R&D as they can essentially ‘free-ride’ on spillovers from other firms’ innovative activity. Crucially this means that all stakeholders in the UK economy (business, government, HE/FE) need to invest more in research and development (R&D), encourage spillovers of learning and technology, and subsidise innovative activity.

8.5 This chimes with government’s commitment to:

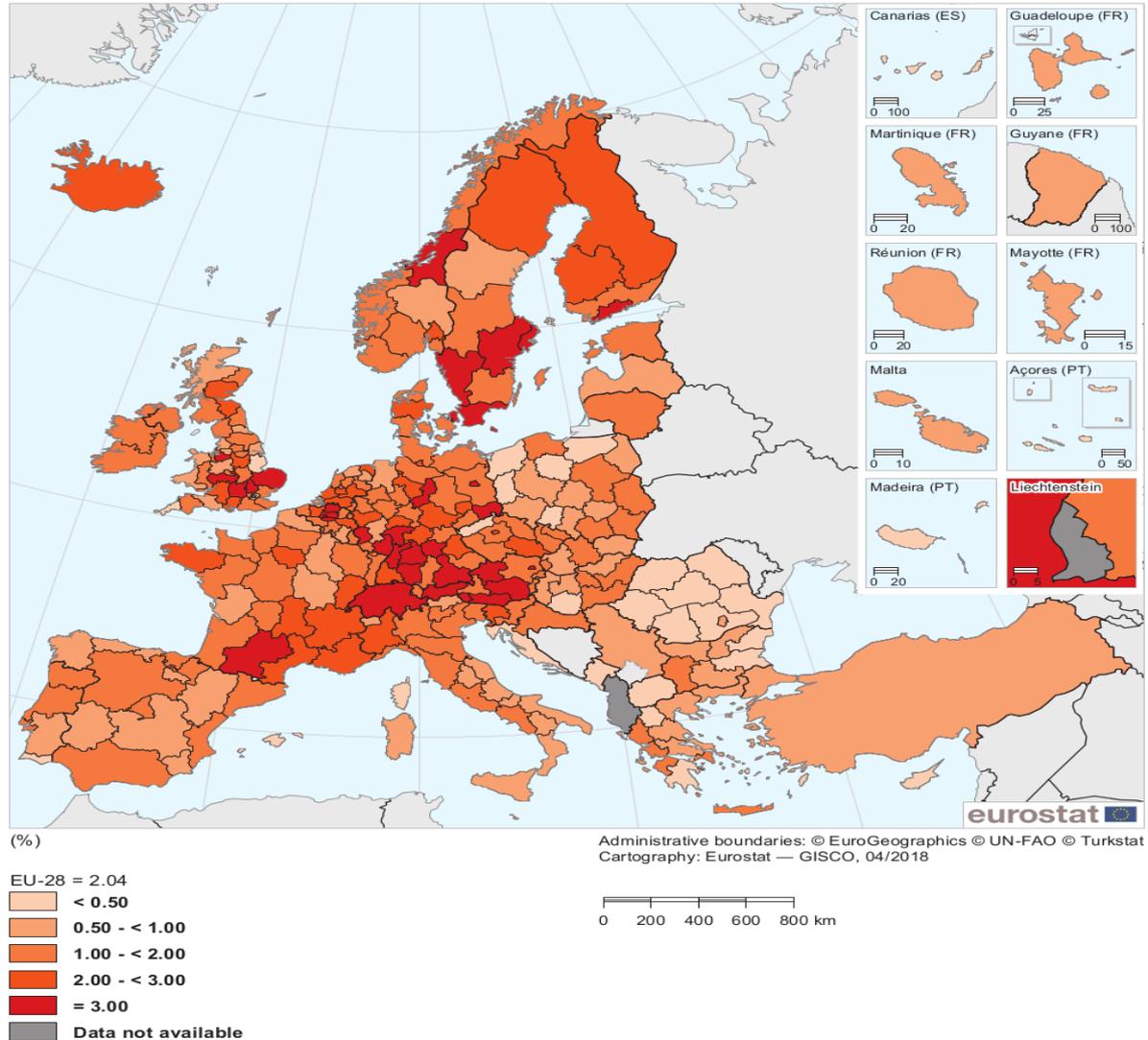
- Raise total research and development (R&D) investment to 2.4% of GDP by 2027;

¹⁵ Fagerberg J, Srholec M, & Verspagen B. 2010. Handbook of the Economics of Innovation, Volume 2, 2010, p833-872,

- Increase the rate of R&D tax credit to 12%; and
- Invest £725 million in new Industrial Strategy Challenge Fund programmes to capture the value of innovation.

Figure 13: R&D across the EU28

R & D intensity, by NUTS 2 regions, 2015
(%)



Note: R & D intensity is defined as gross domestic expenditure on R & D (GERD) relative to gross domestic product (GDP). Départements d'outre-mer (FRA): NUTS level 1. Switzerland, Serbia and Turkey: national data. Molise (ITF2), Umbria (ITI2) and Norway: 2014. Ireland and France: 2013. Molise (ITF2) and Umbria (ITI2): estimates. Denmark: provisional.
Source: Eurostat (online data code: rd_e_gerdreg)

8.6 The point on R&D investment is important to highlight in comparison to our European counterparts. In 2015 Germany, Austria, the UK, Sweden and Belgium were the only EU Member States to report one or more region where R&D intensity reached the EU target of 3%. Of the 31 regions with R&D above the target 11 were in Germany with only 5 in the UK, with East Anglia (4.6%) and Cheshire (4%) having had relatively high R&D intensities (this is shown below). The NUTS2 region of Berkshire, Buckinghamshire and Oxfordshire features as the region with the 19th highest R&D intensity.

- 8.7 R&D spending is the typical metric of innovative effort. The data for this section draws heavily on the Smart Specialisation Hubs data on innovation assets and activities for all LEPs. The Hub intends to show the sectoral and general innovation capabilities of LEPs. This dataset allows us to benchmark Buckinghamshire’s relative innovative performance against all other LEPs. Certain data is not available at the geographic level of LEPs and has thus been estimated. For example. NUTS2 data from Eurostat on Higher Education R&D and Business Expenditure R&D has been weighted.
- 8.8 Buckinghamshire’s spending on R&D is almost 4 times that of the LEP average. However, when we look at the indicator of Staff Submitted for Involvement in Innovative Research Production to the Research Excellence Framework (REF)¹⁶ Buckinghamshire is well below the average for staff involved in the innovative REF. Put together these two pieces of evidence suggest that HERD is not translating into innovative research output. This is not necessarily a cause for concern as Buckinghamshire’s Higher Education reputation is more closely aligned to business and entrepreneurship as opposed to academic citations. This is further emphasized by the fact that BTVLEP has not produced any publication output by Innovate UK priorities (Scopus 2015-2017) or publication output by the 8 great technologies.
- 8.9 Using Business Enterprise spending on R&D (BERD) as a measure of private sector, non-Govt innovation inputs, Buckinghamshire ranks 2nd for all 38 LEPs (NUTS2 region adapted to LEPs by weighted averages). LEPs in the wider Arc area also feature on this list. This reflects the pooling of life sciences and pharmaceutical firms in Hertfordshire, the impact of Oxford and Cambridge University, and Gloucestershire’s commitment to defence and cyber security. Buckinghamshire itself has a host of innovative high-tech companies that includes the Silverstone Technology Cluster and accounts for the high proportion of high-tech employment.

Figure 14: Business enterprise spending on R&D (BERD)

Top 10 LEP regions	£/FTE
Gloucestershire	2183
Buckinghamshire Thames Valley	1991
Cheshire and Warrington	1987
New Anglia	1907
Hertfordshire	1816
Worcestershire	1739
Oxfordshire	1600
Greater Cambridge and Greater Peterborough	1486
Thames Valley Berkshire	1389
Solent	1052

Source: ONS BERD

- 8.10 The commitment from businesses to develop the innovation focus needed to deliver the LIS is evident across the Oxford – Cambridge Arc. This ambition needs to reflect the innovation ecosystem that exists in Buckinghamshire that includes partners in local and central government, business, and academic institutions.

¹⁶ Figures are from the Higher Education Statistics Agency for 2014.

- 8.11 While the wider region that BTVLEP sits within ranks highly on the BERD measure, the Enterprise Research Council notes that HERD and GOVRD – the spending by Govt and HE institutions rather than business – represent areas where BTVLEP may not be performing as strongly.
- 8.12 The Enterprise Research Centre (ERC) assesses LEP areas on a range of innovation metrics¹⁷ and find for BTVLEP that it ranks:
- 2nd of 38 for the percentage of firms introducing ‘new business processes’ (36%).
 - 32nd of 38 for the percentage of firms introducing ‘new methods of work organisation’ (17%).
 - 15th for the percentage of firms undertaking marketing innovation (18%).
 - 17th for the percentage of firms undertaking R&D (20%).
 - 18th for the percentage of firms investing in design innovation (13%).
 - 11th for the percentage of firms involved in collaboration for innovation (29%).
 - 20th the proportion of firms undertaking product or service innovation (22%).
 - 17th for new to the market product or service innovation (8%).
 - 20th Sales of innovative products and services *as a percentage of the sales of innovating firms* (31%).
 - 21st for the percentage of companies involved in process innovation (16%).
- 8.13 Grants offered by Innovate UK also provides further understanding of the nature and scale of innovation business and industry. An overview of current investment by Innovate UK – the UK’s innovation agency is part of UK Research and Innovation funded by UK government – is provided below. BTVLEP ranks ‘average’ for total Innovate UK and ‘Catapult’ investment, but scores in the top tier of LEPS for technology activities across 8 of 22 specialist areas.
- 8.14 BTVLEP’s Oxford – Cambridge Arc neighbours also have complementary strengths in similar areas, highlighting the importance of wider complementary knowledge clusters. The following graphic highlights the broad areas of these, and available details of Innovate UK funded projects provides further insight¹⁸.
- 8.15 Space, Electronics & Photonics, Healthcare, Transport and Digital are particular specialisms at an Arc level. Crucially this supports BTVLEP’s ambition in these sectors and aspirations to link with sector deals.
- 8.16 The breakdown for the sector-technology grants across BTVLEP’s neighbour LEP’s is shown below¹⁹.

¹⁷ <https://www.enterpriseresearch.ac.uk/wp-content/uploads/2017/06/Benchmarking-Innovation.pdf>

¹⁸ These are too extensive to list but underpin the more detailed evidence around how capabilities across the corridor and propositions specific to BTVLEP relate to each other.

¹⁹ Source: Innovate UK; Notes: These data include all grants awarded since 1 April 2010 as well as some active programmes that have become Innovate UK’s responsibility since that time. The location data shown will be

Figure 15: Innovate UK rankings for LEP innovation capabilities

Budget Area	LEP	Catapult	Large	Healthcare	Responsive	Transport	High Value Manufacturing	TSB Programmes	Energy	Digital	Sustainable Agri-Food (SAF)	Low Impact Buildings	Electronics, Photonics & Information & Communication	BIS Financed	Bioscience	Advanced Materials	Space Programmes	Sustainability	Nanotechnology	Development	Buildings	Null	Total	Total excluding Catapult
		Oxfordshire	5	4	1	1	2	10	12	17	11	9	3	5	3	5	4	3	3	1	1	2	-	-
Greater Cambridge & Greater Peterborough	-	12	2	2	8	7	29	3	4	3	2	1	7	-	3	15	15	2	4	1	-	-	6	4
Thames Valley Berkshire	10	26	8	16	27	31	8	12	6	26	6	11	10	-	20	5	6	24	-	17	-	-	18	17
Hertfordshire	-	22	12	12	21	20	-	33	28	35	10	15	27	-	1	31	2	34	27	-	-	-	19	18
Buckinghamshire Thames Valley	-	-	7	13	7	15	32	32	12	23	-	6	-	-	31	7	5	11	-	-	-	-	20	19
Northamptonshire	-	-	30	29	37	-	26	26	13	33	33	3	31	-	29	37	-	25	-	16	-	-	36	36

Source: Innovate UK

- 8.17 Looking at how Buckinghamshire ranks against the average ‘Grants Offered’ by Innovate UK at specific sectors – Buckinghamshire is above the average LEP level for Space and Electronics, Photonics & Electrical Systems. This supports our space sector proposition and digital connectivity economic driver. Buckinghamshire ranks poorly compared to the other 37 LEPs for employment by science & technology category, number of firms engaged in product or process innovation, and number of inventors on patents across various technology areas.
- 8.18 BTVLEP has innovative capabilities around Lithium Ion battery development, supported by investment from Innovate UK. The forecast reduction in the energy-unit-costs of Lithium Ion battery technology is set to have a significant effect in terms of the international and global demand. The 85% reduction in the unit cost of energy from batteries between 2010 and 2030 will drive a comparable increase in technological penetration - from 3% to 27% of the global private car market by 2030, with the EU and UK set to lead demand (and therefore achieve higher penetration rates earlier). This sits in the wider context of Britain’s biggest revolution in energy for more than a century – to electric vehicles, new technology and renewable energy, and the need to think about early investment at the level of the state. For example, new technology delivering fuel cell changes such as that which is being perfected by Ceres Power.

based on the address the company registered for the project. This may be a company’s registered office or head office rather than the location of the innovation project activity itself.

- 8.19 Given the dominance of services in Buckinghamshire’s economy, and the difficulty of R&D measures for services sectors – the headings above cannot be considered an exhaustive list of innovative capacity across Buckinghamshire. The relationship between production and technology sectors and the wider services economy that the majority of residents are employed in is complex - while innovations themselves may be developed in some isolation it is in the combining of them through the wider economic sectors, they penetrate that their broader value is derived.
- 8.20 This dynamic is outlined more clearly later in the report and underpins our approach to understanding the mechanisms through which impacts from propositions can be maximised. A particular strength we have identified within the BTVLEP economy is the presence of skills and sectors that are well positioned to support wider adoption of new innovations and technologies.

9 LABOUR MARKET

High skill levels in the area have supported a high and increasing employment rate for residents who are disproportionately likely to work in higher level professional and managerial occupations; however, over half the domestic jobs in the area are filled by non-BTVLEP residents, and businesses or sectors demanding ‘young’ talent are likely to have to source this from outside the area.

As with many areas across the country demand for ‘mid-level’ skills is falling and mobility through the labour market is increasingly problematic for those entering into lower-skilled service roles, while the higher relative cost of living also places retention pressures on businesses dependent on imported labour.

Key points:

- There are 10% more 90+ residents as a proportion of the population in BTVLEP, generating higher demand for health and care roles in BTVLEP.
- The higher 38-60 cohort proportion have been be linked to higher levels of engineering and manufacturing innovation²⁰²¹ which can be observed in BTVLEP.
- BTVLEP has the highest employment rate of all Oxford – Cambridge Arc LEAs in 2017, standing at 81.8%, compared to 75.1% across England.
- BTVLEP has a high share of workers employed in high skilled occupations, which includes managers, directors and senior officials, professional occupations and associate professional and technical occupations. This is more than both the South East and England.
- At the extreme ends of the labour market (see figure 23) we see shifts of twice the magnitude in workplace roles compared to resident roles. This suggests that BTVLEP is at the leading edge of areas in the UK driving labour market change.
- With the exception of teachers, public service and science professionals are losing share in the labour market.

Demographics

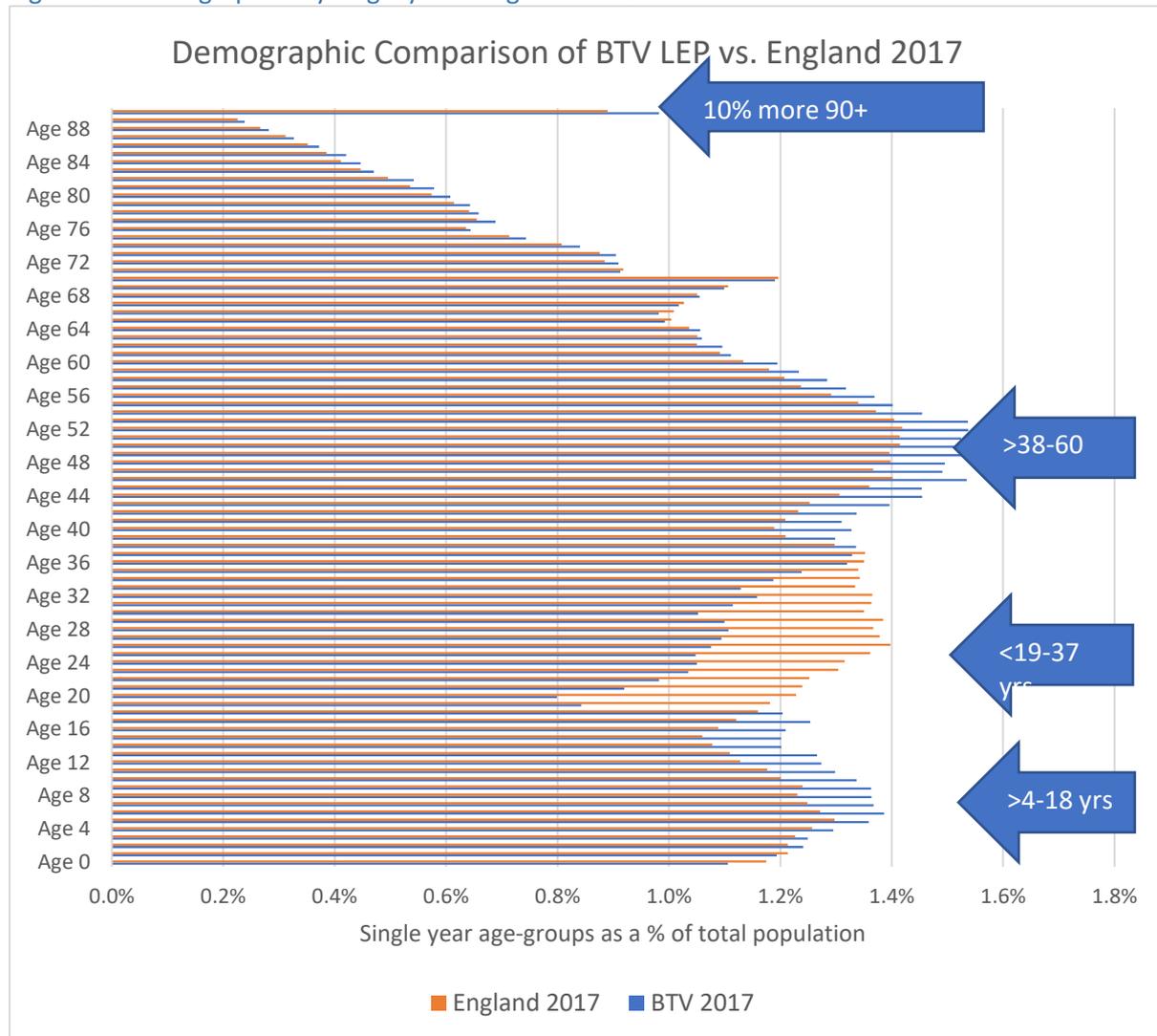
- 9.1 Figure 16 below highlights that: There are 10% more 90+ residents as a proportion of the population in BTVLEP, generating higher demand for health and care roles in BTVLEP.
- 9.2 The higher 38-60 cohort proportion have been be linked to higher levels of engineering and manufacturing innovation from this demographic²².

²⁰ <https://www.scribd.com/document/35227579/The-Grey-Economy>

²¹ <http://i4j.info/wp-content/uploads/2013/05/i4jDaneStanglerDemographicsandEntrepreneurship-1.pdf>

²² <https://www.scribd.com/document/35227579/The-Grey-Economy>

Figure 16: Demographics by single year of age in BTVLEP



Source: ONS population estimates by single year of age 2018

- 9.3 Most entrepreneurs are individuals in their thirties and forties²³, and lower numbers of this key entrepreneur demographic suggests that despite strong performance the area could be considered to be losing some potential start-ups.
- 9.4 Younger working age demographics tend to drive tech-sector, creative and digital development²⁴.
- 9.5 The higher numbers of young people aged 4-18 years also help explain why teaching is growing as an occupation gaining share in workplace jobs.

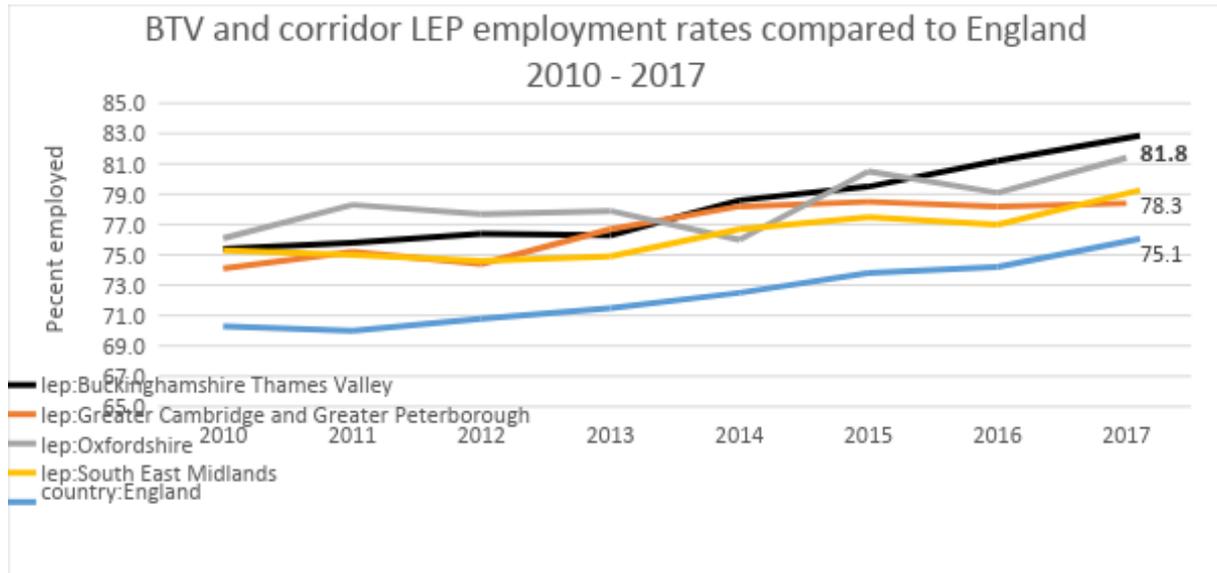
Employment rates:

- 9.6 BTVLEP has the highest employment rate of all Oxford – Cambridge Arc LEPs in 2017, standing at 81.8%, compared to 75.1% across England.

²³ ibid

²⁴ <http://i4j.info/wp-content/uploads/2013/05/i4jDaneStanglerDemographicsandEntrepreneurship-1.pdf>

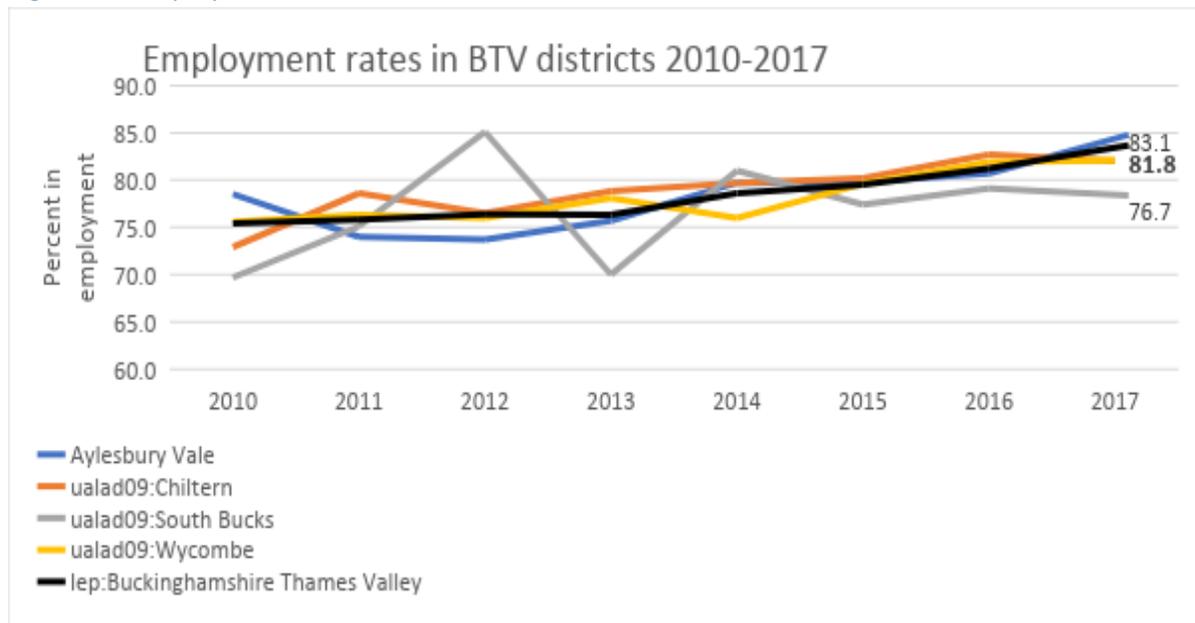
Figure 17: Employment rates across the Arc LEPS



Source: ONS APS 2017

- 9.7 Of the BTVLEP districts, Aylesbury has the highest employment rate at 83.1%. Larger variation in the South Bucks district is due to the relatively small labour market being more sensitive to smaller changes in employee totals.

Figure 18: Employment rates within the BTVLEP districts



Source: ONS APS 2017

- 9.8 Levels of residents commuting²⁵ out of the county are high, with employment opportunities spread across surrounding areas including Milton Keynes, Oxfordshire and London.

²⁵ N.B. that commuting numbers do not include those that work from home.

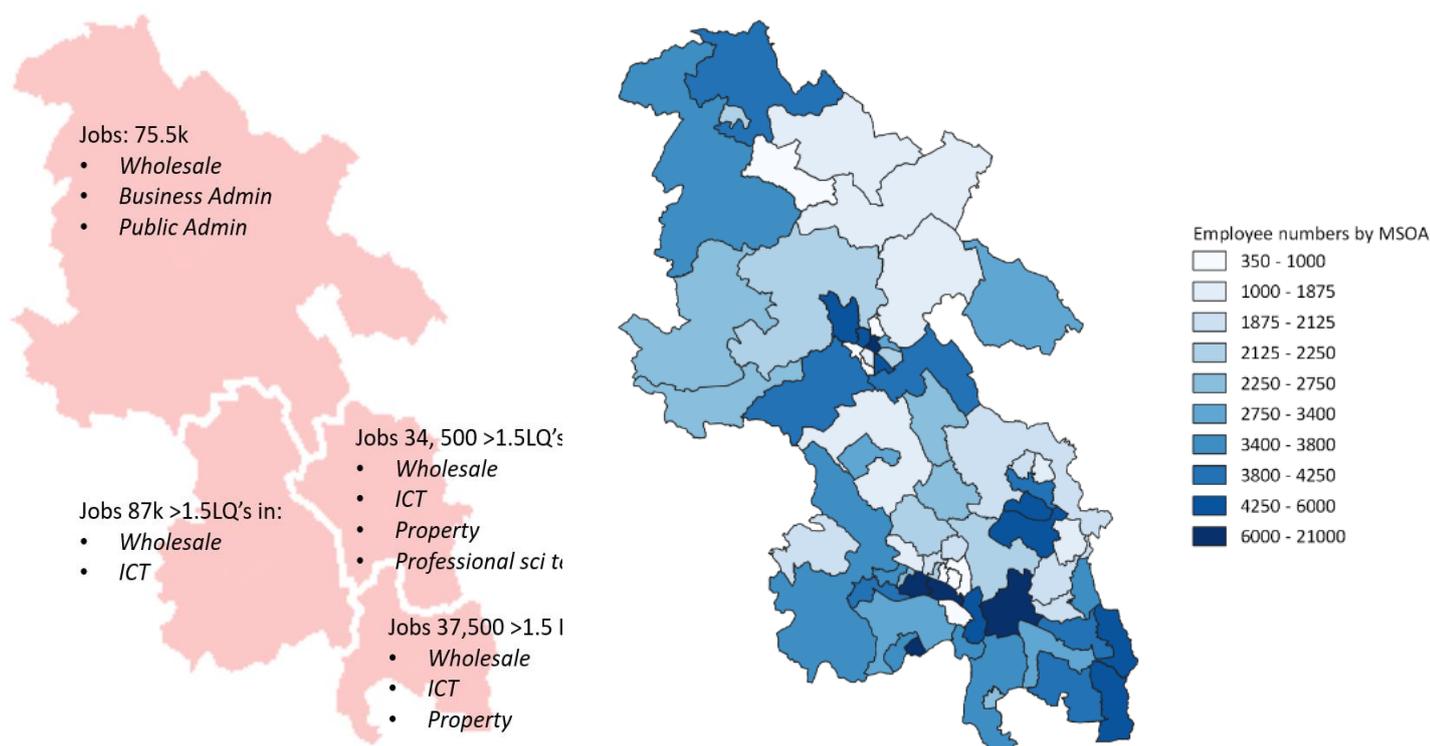
9.9 Three of four areas (excluding Aylesbury) have sectors with distinct Location Quotients of more than 1.5. A 'Location Quotient' (LQ) measures the concentration of a particular industry or sector in an area compared with the UK as a whole. A LQ of more than 1.0 indicates that the area has a higher percentage of employees in that sector than UK, with any LQ above 1.5 would be classed as significant. A LQ can therefore be used to consider the relative concentration or specialisation of certain industries and begin to unpick the industrial capability of an area.

9.10 These sectors are:

- Wholesale
- ICT
- Property
- Professional Scientific and technical.

9.11 Figure 19b shows how the numbers of employee jobs within districts is spread at the MSOA level and highlights the southern band of MSOA's that have seen a greater level of employment clustering around the M40 corridor.

Figures 19a & 19b: Overview of the labour market geography in the BTVLEP area



Source:

9.12 The ICT quotients identified Figure 18a are influenced by London spillover (in 3 of the 4 districts excluding Aylesbury). The extent of inward commuting and the skills pool of London suggest that many workers commute into BTVLEP for this sector in particular serviced by the road and rail network in the area.

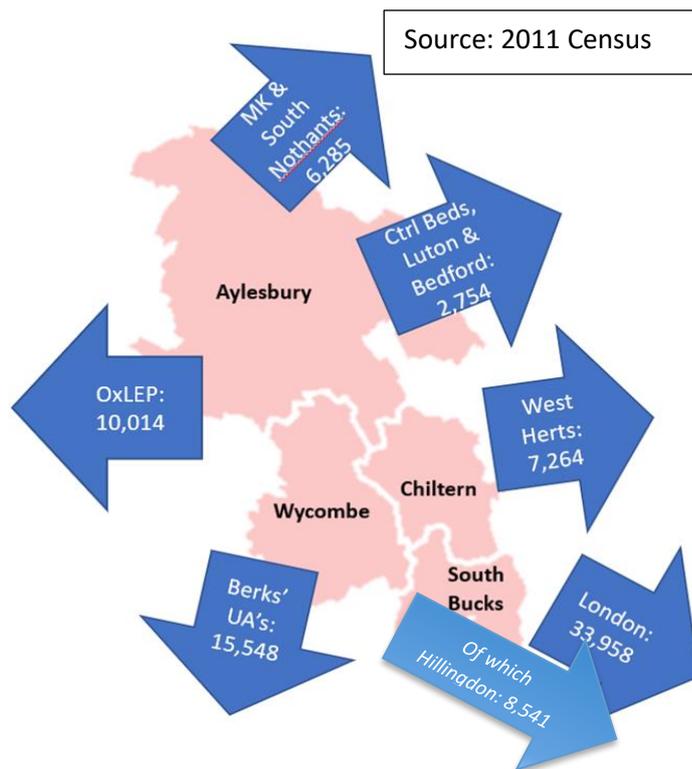
- 9.13 The strength of the wholesale sector across the area in the area is reflected by the availability of land and proximity to the Greater London conurbation.
- 9.14 With regard to the logistics sector this is favoured by locations close to major freight and transport infrastructure with Wycombe and Aylesbury having higher concentrations suggesting strong relationships with logistics in Oxfordshire, MK and South Northamptonshire exploiting the A41 and A413 connections, as well as M4 westward connections and links to Slough via the M40. Further research into the sector at a Oxford – Cambridge Arc level is merited given the infrastructure proposals highlighted by the National Infrastructure Commission.

Commercial property

- 9.15 The Commercial property sector is particularly concentrated in South Bucks and Chiltern, positioned to capture overspill from London and an interlocutor between Londoner and Home Counties property markets.
- 9.16 With regard to the relative costs of commercial property Knight Frank²⁶ quarterly report commercial around the M25 noted that during quarter 2 2018 the relative cost of Grade A office / B1 use class was £59.00 psf in Hammersmith, £38.00 psf in Reading and £33.00 psf in Watford and £32.00 psf in Oxford. It is reasonable therefore to assume that in Buckinghamshire similar commercial workspace in the order of £30-35.00 about 50-60% the costs of Central London.
- 9.17 The professional sector (including legal and accountancy jobs, for example) has high numbers of businesses, but lower numbers of employees. In Aylesbury this translates into a below average employment LQ. In Chiltern and to some extent South Bucks the LQ is high (>1.5 in Chiltern), suggesting a very mature knowledge economy in Chiltern in particular. This level of very dense professional and knowledge services reflects the types of factors that attract high productivity growth businesses to cluster.
- 9.18 Within this sector It is likely that many of these sole traders are mature age people who have set up their business following significant employment and experience in the sector (the so called 'opportunity entrepreneur'). Understanding how this shift to the next generation will be important for the sustainability of the Bucks economy.
- 9.19 Residents commuting to work outside of local travel to work areas (TTWA) often command high remuneration levels and terms of employment. The semi-rural nature of the county additionally appeals to the many highly qualified professional who fall into this cohort. With digital technology and remote working allied to high costs of commercial accommodation in these areas mean there may be opportunities to develop workspace for mobile / agile employees (co-working and touch-down models) in town centres and associated facilities that benefit both the local economy through the multiplier effect and environmental improvements through reduction in commuting and journey down-times.

²⁶ <https://content.knightfrank.com/research/63/documents/en/m25-quarterly-q2-2018-5718.pdf>

Figure 20: BTVLEP Out-commuters' main destinations



9.20 Figure 20 notes the numbers of Buckinghamshire residents who work outside of the county, the destinations dominated by London and Berkshire who together account for approximately 50,000 of the 80,000 or so out commuters. Travel to work patterns of London and Berkshire therefore account for almost 2/3rds of out-commuting residents. The commutes may travel further to secure high salary levels with average wage rates in Inner London being the highest in the UK.

9.21 The location of Buckinghamshire dictates that there will always be a high incidence of outward

commuting of residents. With neighbouring concentrations of business and employers in London, Heathrow, the M4 & M3 corridor as well as Oxford and Milton Keynes almost 1 in 2 of BTVLEPs workforce is employed elsewhere.

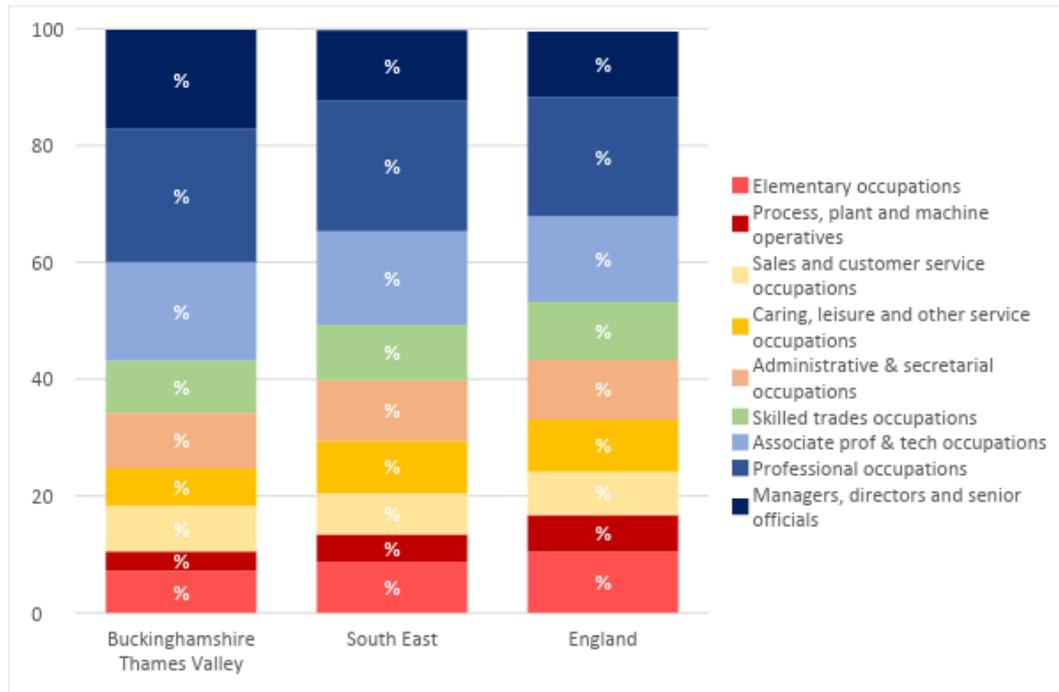
9.22 In particular, Heathrow jobs in the London Borough of Hillingdon form a major destination for BTV residents, making up 25% of the out-commute into London.

Occupational structure

9.23 The economic success (GVA) of Buckinghamshire is driven by a combination of growth in professional scientific and technical, returns from real estate, and strong continued performance in distribution, transport, accommodation and food services. However, not every worker in a high-end industry will have either a technical qualification or an occupation. For example, a cleaner working in a software company would be counted as being employed in a knowledge-intensive industry. Equally, Buckinghamshire's economic success is in part down to high levels of human capital.

9.24 Figure 21 shows that BTVLEP has a high share of workers employed in high skilled occupations, which includes managers, directors and senior officials, professional occupations and associate professional and technical occupations. This is more than both the South East and England. Buckinghamshire needs to ensure that it maintains in locational advantage and competitiveness in highly skilled workers.

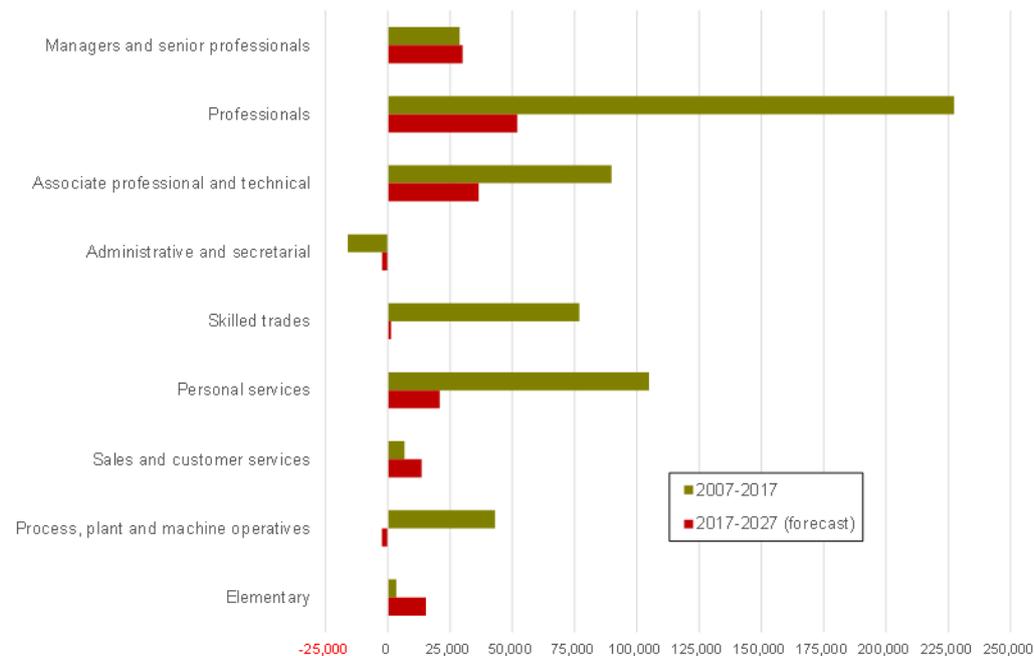
Figure 21: Occupational composition of Buckinghamshire workers compared to the South East and England, 2017



Source: Annual Population Survey

9.25 These more skilled occupations have grown and are expected to continue growing over the next 10 years according to national projections from the Employer Skills Survey²⁷ (previously conducted by UK CES).

Figure 22: Regional projections for occupational growth 2017 - 2027

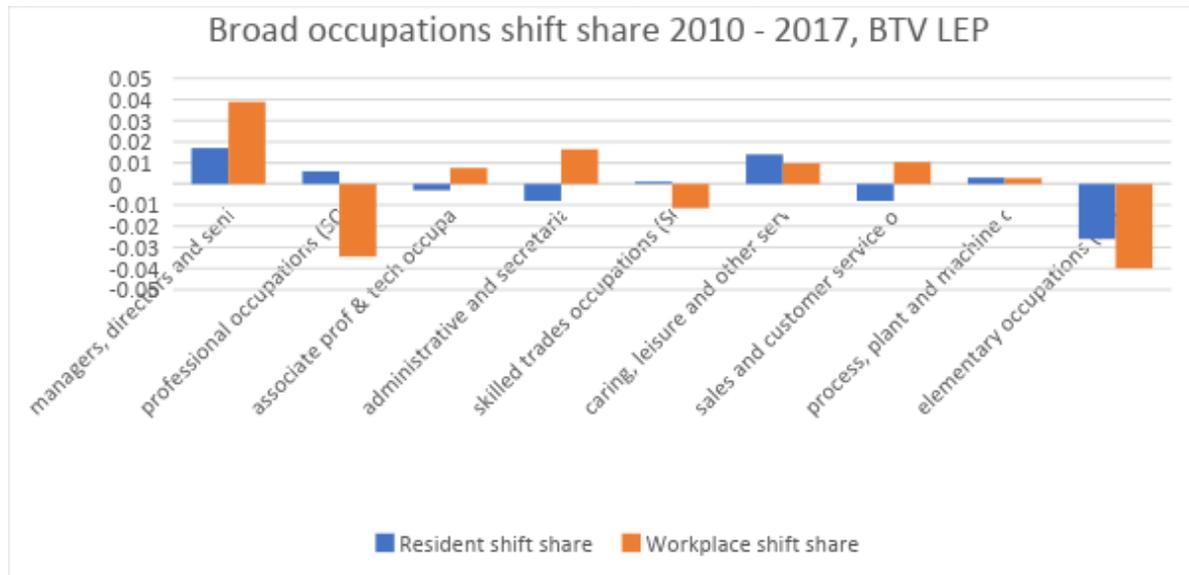


²⁷ <https://www.gov.uk/government/publications/employer-skills-survey-2017-uk-report>

Source: Oxford Economics 2018

9.26 The projected increase in occupations based on ESS data for the South East (above) does not match the observed changes between 2010 and 2017 seen in Buckinghamshire in Figure 23 (below).

Figure 23: Observed shifts in local resident and workplace occupations 2010-2017

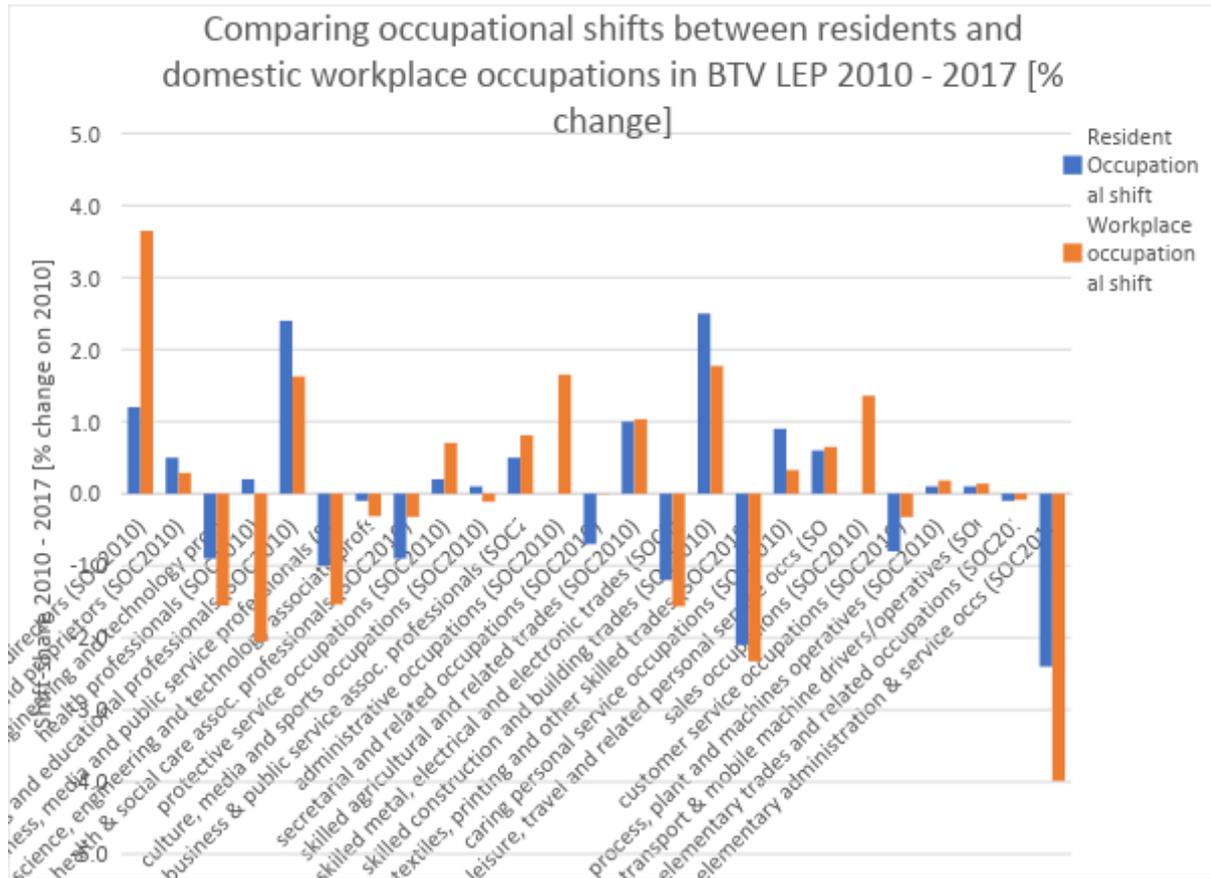


Source: APS 2017 Resident; APS 2017 Workplace

9.27 Looking in more detail at the sub-occupational shifts reveals several trends which are important to note:

- At the extreme ends of the labour market we see shifts of twice the magnitude in workplace roles compared to resident roles. This suggests that BTVLEP is at the leading edge of areas in the UK driving labour market change.
- With the exception of teachers, public service and science professionals are losing share in the labour market.
- For those commuting out, new jobs accessed are more likely to be in teaching or skilled construction roles.
- For those newly accessing employment within BTVLEP, roles are more likely to be in managerial, protective services, admin and sales roles.

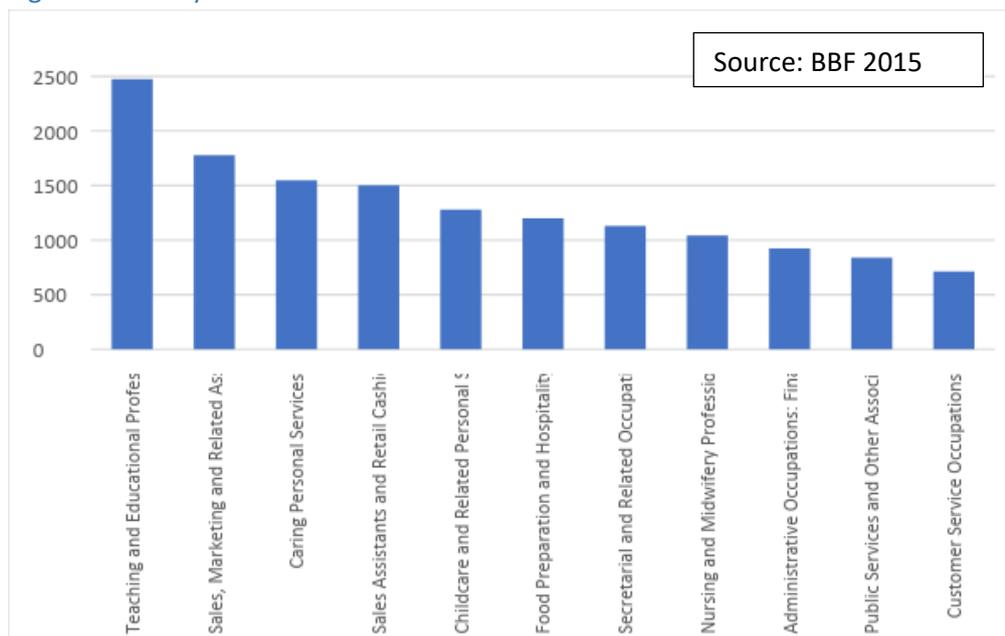
Figure 24: Sub-occupations in BTVLEP - 2010 - 2017 change



Source: APS 2017 Resident; APS 2017 Workplace

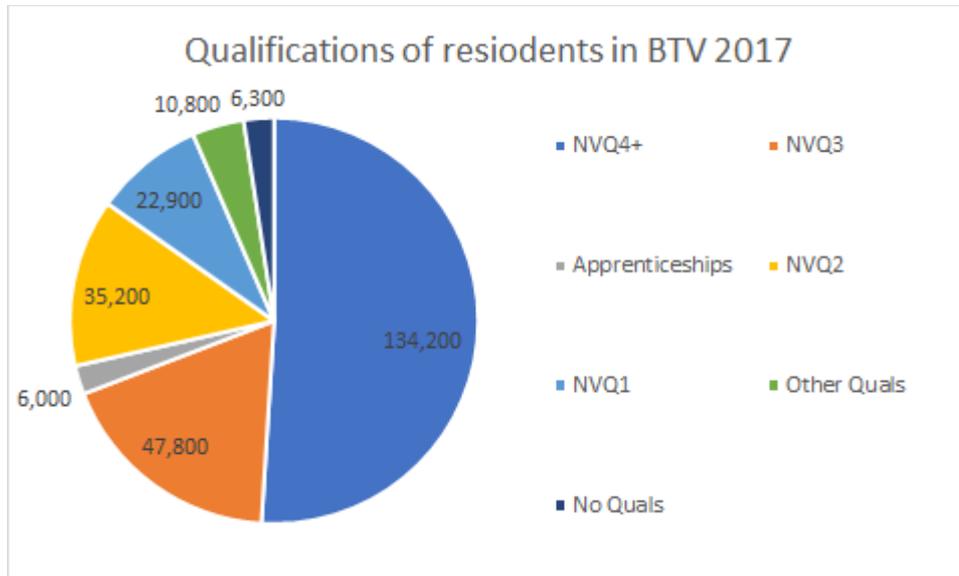
9.28 In 2015, there was 23,937 entry-level job vacancies advertised in Buckinghamshire. Vacancies indicate where there is un-met demand for these positions. This data is for entry-level roles, and so is not the same as for those with low skill levels or qualifications.

Figure 25: 'Entry Level' Vacancies advertised in BTVLEP 2015



10 SKILLS AND EDUCATIONAL ATTAINMENT

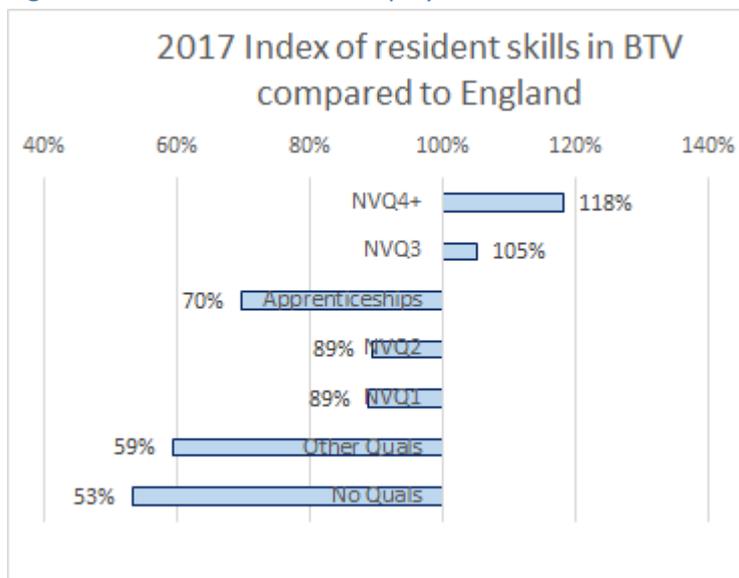
Figure 26: The current breakdown of resident qualification levels 2017



Source: ONS APS 2017

- 10.1 For those residents employed BTVLEP has a very strong skills profile at the degree and higher level, and just 53% of the national proportion of employed residents with no skills.

Figure 27: The skills of those *employed*



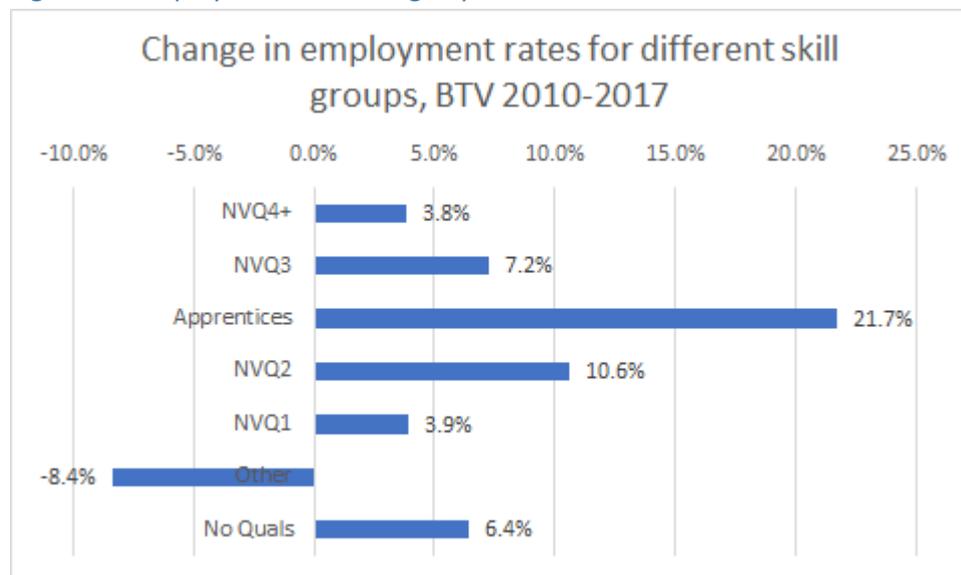
Source: ONS APS 2017

- 10.2 The low level of apprenticeships relative to the national level suggests that to increase take-up of these by both businesses and residents, they will need to target higher levels of accreditation at levels 5,6 and 7 as local skills markets place higher relative premiums on these. In order to create

improved and appropriate vocational pathways greater involvement of local business that demand these types of skills, in partnership with specialist providers will be required.

- 10.3 The high demand for this is evidenced in the figure below which shows how those with apprenticeship skills have seen the highest rates of increase in the overall employment rate.

Figure 28: Employment rate change by skill level between 2010 and 2017



Source: ONS APS 2017

- 10.4 The actual numbers of people with each skill type suggest that older people with apprenticeship trade skills, and those with no qualifications are leaving the labour market. In the case of apprenticeship skills - the need for replacement demand has created the highest increase in employment rates over the period. Over time this type of demand will also create wage pressures and premiums for those with the right type of trade and apprenticeship skills.
- 10.5 Similarly, the employment rate for those with no qualifications has risen despite falling demand for these roles, due to a greater proportionate number of those with no skills no longer being in the labour market.

Figure 29: Actual totals for employment by skill type

Skill level	Change in employment rate	Change in number with the skill type	Change in actual number employed
NVQ4+	3.8%	32,400	33,000
NVQ3	7.2%	6,700	9,200
Apprentices	21.7%	-7,100	-3,600
NVQ2	10.6%	-4,100	2,100
NVQ1	3.9%	-1,800	0
Other	-8.4%	-12,700	-11,800
No Quals	6.4%	-7,600	-3,600
Total change	6.40%	5,800	25,300

Source: ONS APS 2017

- 10.6 To enable business sectors, it will be essential that people in Buckinghamshire have the skills to start businesses, which will in turn improve the economic vitality for the area. We are proposing that to enable growth and productivity will require a programme that focuses on creating an education revolution.
- 10.7 The NIS identifies the continuing challenges of meeting our business needs for talent, skills and labour. It acknowledges that insufficient attention has been paid to technical education and proposes the establishment of “a technical education system that rivals the best in the world, to stand alongside our world-class higher education system”. It emphasises the importance of closer involvement of employers in the education system, including delivering the commitment three million apprenticeship starts by 2020 and address particular shortages of STEM skills.
- 10.8 BTVLEP has already set a vision “that the Buckinghamshire economy will be a vibrant, balanced and resilient economy, underpinned by innovative, high-value, globally-orientated firms”. Skills for growth will be important e.g. STEM, higher apprenticeships.
- 10.9 BTVLEP has identified four key themes and priorities in the Buckinghamshire Skills Strategy based on the current evidence base for Buckinghamshire. They are:
- Developing our future workforce - improve work preparedness of our young people and ensure they are able to make informed career choices.
 - Develop a robust supply of skilled ambitious talent for our priority growth sectors and enterprise zones – creative industries, digital industries, high technology engineering, life sciences, food and drink manufacture, space industries.
 - Address widening skills gaps by supporting lifelong learning.
 - Actively support skills development and recruitment in the health and social care, construction, tourism, service and public sector.
- 10.10 Children are at the heart of BCC Strategic Priorities to keep Buckinghamshire thriving and attractive, safeguard vulnerable children and create opportunities and build self-reliance. This will rely on local employment and matching industry demand with local supply. BCC has also acknowledged that the county’s Post 16 education and training offer needs to help address the local growth agenda.
- 10.11 There are a number of key skills issues (highlighted in BTVLEPs 2017 skills strategy) that will need to be addressed in order to help maintain Buck’s advantage and contribute to national productivity. These include:
- The brain drain of skilled people who commute to London. Buckinghamshire has a comparatively small proportion of people aged 24-30, being in the bottom 25% of all Local Authorities for this measure. These issues may pose a challenge to the unfolding growth agenda in Buckinghamshire, which will be predicated upon the availability of an appropriately skilled workforce.
 - Buckinghamshire has a higher proportion of residents holding qualifications at NVQ levels 2 and 3 or higher than the country as a whole. This strength however is caused by a high stock of NVQ4+ residents and the stock of working age residents in Buckinghamshire with just intermediate/ technical skills only is relatively low

compared to national levels: only 13.5% of working age residents an NVQ level 2 or equivalent as the highest level of qualification compared to 15.2% nationally. Buckinghamshire has a very well-educated population with 47.7% of working age residents with NVQ levels 4 or above (equivalent to a degree), the fourth highest level of any LEP area. Whilst this is good news, it is only an advantage if sufficient high-quality jobs are created to retain the talent within the county.

- 10.12 The LIS acknowledges these key challenges will need to be addressed and overcome to satisfy the demands of the current and future economy of BTVLEP.

11 DEVELOPING PROPOSITIONS

11.1 Our evidence so far has highlighted a number of key features of the BTVLEP economy:

- The overall positive performance of Buckinghamshire's employment growth has experienced a glitch in the most available data 2016-2017.
- The employment rate (a measure of the numbers of people in work of working age) is amongst the highest in the UK with 81.9% of residents in work in March 2018 compared with 81.3% in the southeast region and 78.4% in the UK as a whole.
- Buckinghamshire needs to be at the forefront of governments plans to increase R&D investment to 2.4% of Gross Domestic Product (GDP), a 50% increase, by 2027. BERD & HERD in Buckinghamshire is currently amongst the highest across all 38 LEPs.
- The professional, scientific and technical sector is the largest in Buckinghamshire, accounting for 21.0 per cent of all businesses in the county, the highest share of any LEP outside London. Management consultancies account for 45.6% of businesses in the sector and 9.6% of all businesses - the highest share of any LEP or county council area. These businesses will be an essential part of improving business competitiveness e.g. by providing incentives to cut costs.
- Despite gross value added (GVA) having risen by 2.8% in 2016, Buckinghamshire's GVA growth has only bettered the national rate of growth twice in the last 4 years.
- The Film and TV industry is a significant heavy weight in the UK economy and government intervention e.g. through tax reliefs can have huge impacts on stimulating Film and TV production and the broader creative economy.
- Buckinghamshire's technological and innovative potential lies in services. Strong growth in management consultancies suggests that Buckinghamshire's relative strengths lie as an intermediary between high-technology products and processes, and users, and other parts of the supply chain.
- The Film and TV industry is a significant heavy weight in the UK economy and government intervention e.g. through tax reliefs can have huge impacts on stimulating Film and TV production and the broader creative economy.
- Resident earnings are higher than workplace earnings, relating to the dependence on out commuting for high quality jobs; and, a converse pressure in terms of retention for lower waged sectors inside the area reliant on imported labour.
- There is a 'talent gap' in terms of skilled young people leaving the area, which at least in part relates to the cost of living relative to wages in the area. BTVLEP needs to grow high value activities locally if it wishes to avoid becoming a 'dormitory location'.
- Productivity Growth in the Aylesbury district has been below that of the rest of the area, and this can be linked to slower growth in high productivity digital sectors which are themselves limited by broadband infrastructure.
- However, of all Oxford – Cambridge Arc LEPs, BTVLEP has particular strengths in data economy sectors, and therefore has a particularly strong position to leverage in terms of the projected value growth in AI and data sectors.

Our four propositions set in policy context

Upstream Space

- 11.2 Westcott Venture Park is home to the National Propulsion Test Facility. BTVLEP aims to widen the use of the facility to UK companies, UK space organisations and academia to test and develop space propulsion engines in this developing global business sector. Collaboration with the 5G Catapult centre and Innovation / Incubation Centre at Westcott will provide the seedbed for cross-sector fertilisation such as future mobility technologies. The national centre and allied business facilities will act as a catalyst for inward investment, innovation and research collaboration with universities and other centres of research excellence across the Arc. This proposition will specifically address 3 of the 4 the grand challenges and contribute positively to a number of our productivity foundations.

Creative & Digital

- 11.3 This proposition builds upon the key assets of Pinewood Film Studios and the National Film and Television School and aims to attract international investment and build on the current £1.7bn in services exports by utilising artificial intelligence (AI) and data developments for increased collaboration for creative content makers and creative technology. This proposition will also develop improved linkages with the education institutions to produce a greater supply of a high skilled workforce needed by this global business that has been identified as a barrier to investment from major studios by the Bazalgette Review of the Creative Sector. This proposition specifically supports the ideas, people, place and business environment foundations of productivity.

High Technology (HT)

- 11.4 This proposition aims to exploit Silverstone's international motorsport brand in order to drive international investment and explore innovation transfer and collaboration with other sectors that underpin the Grand Challenges such as Future Mobility and AI. The Silverstone Technology Cluster, with the Silverstone Park Innovation Centre at its heart, is a world-leading cluster of high-tech engineering businesses centred on the cluster of Formula 1 motorsport businesses.
- 11.5 Currently this HT sector is smaller than some of its neighbours, but the existing relationships, proximities and knowledge hubs offer the opportunity to develop this asset further. Significantly, the Silverstone University Technical College (UTC) centre of excellence for young people provides a key asset for young people wanting to break into the specialist fields of High-Performance Engineering thus addressing a number of the foundations of productivity.

Revolutionising Health & Care – increasing importance of digital approaches ageing society

- 11.6 There are a set of unique assets that underpin the propositions to revolutionise the delivery of health and care services. The assets are, the national spinal centre at Stoke Mandeville, two Med Tech innovation hubs, the home of the UKs first private medical school, Buckinghamshire in the first wave of 8 Integrated Care Systems. Together with the planned major housing growth, around Stoke Mandeville, that provide a 'living lab' to test and enable the creation and growth of businesses to support the transformation of health and care in the context of the med tech capabilities. The actions proposed are underpinned by the challenges of the ageing society and the concurrent significant housing growth planned for the area.

12 The Propositions

Upstream Space

Action to support the growth of the National Space Propulsion Test Facility, 5G Catapult Centre and the Innovation/Incubation Centre at Westcott. This will act as a catalyst for inward investment, innovation and research collaboration with universities and other centres of research excellence across the Oxford – Cambridge Arc.

The Asset

- 12.1 Westcott Venture Park, the national space propulsion test facility, is a prime growth opportunity for UK space propulsion. The site has a growing nucleus of space-based activities and forms part of a much wider base of Space focused companies within Buckinghamshire and further benefits from proximity to Harwell Space Catapult, providing local and complementary capabilities to the research and development activities undertaken at the Catapult. The UK Space Agency is investing over £4m in a National Propulsion Test Facility at Westcott. Westcott Venture Park has a heritage of innovation in the sector, with several globally significant upstream capabilities recently relocating there, and further expressions of interest leading to a requirement to expand the facilities at the site.
- 12.2 The facility will allow UK companies, UK space organisations and academia to test and develop space propulsion engines. Buckinghamshire Thames Valley LEP are investing Local Growth Funding in an Innovation / Incubation Centre and skills training hub – both of which will support the space sector.
- 12.3 Upstream Space is a strategic nationally significant sector, underpinning national infrastructure security and ‘downstream’ value growth chains across nearly all sectors.
- 12.4 Westcott currently has the potential to support significant further investment and development. While its current business plan outlines this, the current proposals for next stage investment represents a starting point with further potential for a more significantly national and international focus today than in 2014 when the initial business plans were produced. Reaction Engines Sabre test development is also a global asset and international catalyst for space and aeronautic propulsion testing. This is therefore a timely moment to use the Industrial Strategy to build on this success and progress this ambition.
- 12.5 The scale of the venture park site highlights that the existing investments are limited to just a small section of the site, leaving significant room and capacity to support complementary activities. The Westcott business plan at its current stage has focussed on investments that support key propulsion capabilities identified in the national technology roadmap.

BTVLEP Capabilities

- 12.6 Currently the site has a number of key capabilities that can be strengthened or developed.

- It is a nationally recognised facility for space propulsion testing, with a use designation for activities that is distinct from the downstream Satellite Applications 5G Capability incubator network, which includes 8 sites.
- Westcott, alongside these other 8 sites represent the major hubs of the emerging ‘UK village’ capabilities being drawn together around space.
- The site has a developed business plan that is ready to be progressed.
- Recent investment from NAMMO and UK Space has provided a vacuum pump testing facility which is unique in the UK, providing domestic capability that can compete with an equivalent site in Germany used by the ESA. (This currently cannot service demand and has a waiting list >6months).
- There is a unique opportunity to build on the vacuum facility capability and offer safety compliance testing for fuel-cell technologies, de-risking activities through diversification and supporting a commercial case for the investment.
- Fuel cell pre-commercial testing further supports clean growth and mobility grand challenges at a national level, and as a ‘service-export’ positions BTVLEP to capitalise on a future global growth market.
- Westcott has the potential to act as a unique location for collaboration between the UK’s fragmented HE activities in the upstream space field – convening top researchers and experts in the sector. There is potential to further formalise this role to further support the development of ‘UK village’ capabilities in upstream space.

12.7 Following the Westcott business plan through will also allow Westcott to embed and develop a further set of complementary capabilities.

Evidence Context

Building on an existing national technology roadmap

12.8 The UK National Space Technology Steering Group - as part of to the Space Innovation and Growth Strategy (IGS) 2014-2030 Space Growth Action Plan – prepared The National Space Technology Strategy in April 2014²⁸ to articulate a national space technology strategy that forms a crucial element of the IGS delivery plan. In this Space Technology Strategy, a number of Access to Space Technologies were highlighted as being important for the future, including;

- Low cost chemical propulsion for high thrust (small launch vehicle) systems.
- Low cost chemical propulsion for lower thrust (orbit transfer) systems.
- Improved electric propulsion for orbital transfer and station keeping.
- Systems engineering tools for launch systems.

²⁸https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=3&ved=0CCsQFjAC&url=http%3A%2F%2Fconnect.innovateuk.org%2F%2Fdocument_library%2Fget_file%3FgroupId%3D1583550%26folderId%3D14584920%26title%3DNational%2Bspace%2Btechnology%2Bstrategy%2BApril%2B2014&ei=9PC8U4bCBuWS7AbXx4DACQ&usg=AFQjCNHs1aVDIeXPVF9wzf31DFzkNTZ-fw&bvm=bv.70138588,d.ZGU

- Lightweight and low cost thermo-structural materials with potential both for game changing reusable launch vehicles, and ultra-low-cost expendable vehicles.
- Spacecraft platform designs that enable miniaturisation and significant cost savings through in-orbit maintenance.

12.9 The increased attention on alternative safer chemical propellants (also referred to as Green Propellants) and the successful ventures of entrepreneurial companies such as Space X present an exciting ‘opportunity rich’ environment for technological advancement, and business growth. In particular, the renewed interest in a UK light launcher, targeted at enabling low cost access to space for companies such as SSTL, will generate a rapid expansion in the industry sector with the proper investment.

12.10 A recent EU move to ban hydrazine - used for rocket fuel – has also been pre-empted by NAMMO technologies, who have developed a modular system that can be used to adapt current ‘legacy’ engine and rocketry technologies to use alternative sources.

Upstream Space is of strategic national importance for future growth

12.11 The upstream sector – currently worth £13.7bn in added value to the UK economy (UK Plc) is set to reach £40bn by 2035. Global growth in demand is forecast for space-launch capabilities of which the UK is recognised as a world leader.

12.12 Productivity per-worker in the upstream sector is around £75,000²⁹. This is significantly higher than the national average productivity per-worker (£46k), but only just over half the productivity – according to the upstream SIA – of wider avionics manufacturing which has an output of around £140k GVA per-worker due to the innovation subsidy and lack of direct commercial viability for upstream innovations which have long lead-in times.

12.13 The downstream space sector is at the same time forecast to grow from the current £250bn to reach £500bn by 2035. This £250bn of extra value from satellite data applications to wider industry therefore represents a 10:1 leverage ratio in terms of national value creation.

12.14 The National Industrial Strategy states a clear ambition to double the percentage of GDP re-invested in national R&D projects. Currently this stands at £11.5bn (2016) representing 1.2% of GDP (national GVA). Doubling this would result in an additional £11.5bn available for nationally significant R&D projects.

12.15 The leverage ratio of 10:1 for upstream is significant as it also unlocks growth across UK industry, and additional national GVA growth increases the absolute value of the 2.4% R&D fund³⁰. There is therefore also potential to make an argument for ring-fencing elements of this value growth in downstream for re-investment in upstream space at a rate of 2.4%.

At a BTVLEP level

12.16 Upstream (‘access to space’) is primarily a manufacturing sector: the ability to produce and combine advanced avionics and rocketry technologies is underpinned by specialist engineering,

²⁹ Upstream Space SIA

³⁰ For example, if £23bn = 2.4% of GDP and GDP grows by 10% then £23bn → £25.3bn.

miniaturisation, digital manufacturing and advanced materials capabilities that have been developed as niche areas of UK growth within an otherwise declining manufacturing sector.

- 12.17 BTVLEP has a location quotient of 2 with respect to the national sector³¹ in terms of this type of manufacturing employment, and a location quotient of 2.89 for Upstream Space Innovation investment as a further specialism within that³². A LQ of over 1.5 is classified as significant at a national scale. A £26.3bn expansion in upstream to reach £40bn by 2035 will yield £250bn in downstream value chains, generating an annual £47.5bn return to the exchequer.

Proposition

- 12.18 To maximise the economic benefit of the investment in the National Propulsion Test Facility, 5G Catapult centre and Innovation/Incubation Centre at Westcott with potential for cross-over with other sectoral strengths including future mobility technologies. The national centre and business facilities should act as a catalyst for inward investment, innovation and research collaboration with universities and other centres of research excellence across the Oxford – Cambridge Arc.

Importantly, this links directly to all 4 Grand Challenge areas:

- The AI and data economy is supported and enabled
- Future Mobility and connected autonomous vehicles (CAV's) will rely on satellite enabled 5G networks to reach a market ready stage
- Ageing Society challenges can be addressed through digital enablement and secure connected health data
- Clean growth objectives are supported through the creation of infrastructure that can support Low Carbon and Electric CAV rollout; and fuel cell development as an alternative energy technology that can be used in transport and the built environment are supported.

- 12.19 This proposition will develop Westcott's role as the strategic location to facilitate cross over and new business models (integrate up and downstream) and translate into commercial value providing a formal network link between downstream entrepreneurs and upstream capabilities.

³¹ This also captures aviation supply chains. Not all areas with an aviation sector have developed upstream space capabilities; however, all areas with upstream space capability have skills and technical supply chain requirements that draw on specialist aviation capabilities.

³² That is to say – the proportion of innovation activity directed at space as a percentage of overall aviation and space activity is around three times higher in BTVLEP than average.

Creative and Digital

Action to maximise Pinewood and the National Film and Television School's potential as a catalyst for new and highly innovative creative content and technology companies. This would support an internationally significant cluster of companies attracting inward investment and increasing exporting.

The Asset

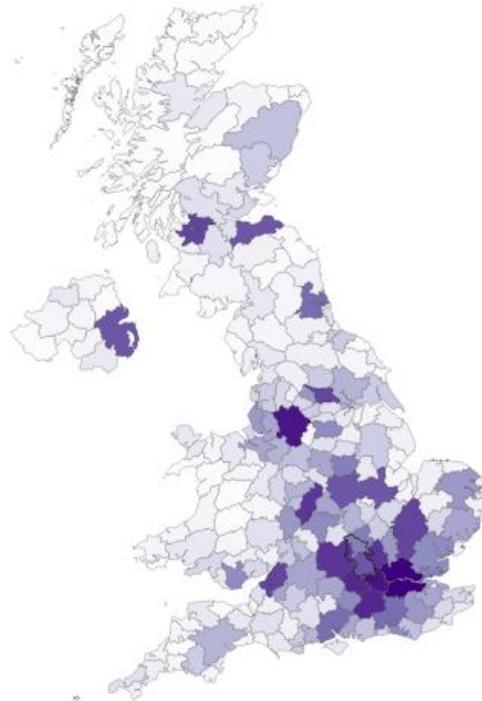
- 12.20 Pinewood Studios is renowned across the globe for excellence in state-of-the-art film and TV production. The Pinewood brand has itself been exported internationally including to studios in the United States and Malaysia. Pinewood offers the creative industries a unique complement of world-class facilities, services and expertise and is home to established international brands driving the UK's fast growing £46bn creative exports market. With £1.7bn of current services exports, BTV is in a strong position to contribute further to this.
- 12.21 The current 50-acre site is managed by Pinewood Studios who directly employ around 300 people. It also houses a wide range of on-site creative services to support a range of production and post-production needs of studio clients. Around 250 additional businesses exist on site to provide these services including global brands such as Avid and Kodak.
- 12.22 Pinewood Studios group has also acquired an additional site of around 100 acres to the north east of the current studio lot, with 5 planned phases of development.
- 12.23 The new site is currently at an early stage of development, and there is the opportunity to embed supportive assets such as a facility to support vocational post-13 creative skills and SME incubation and support facilities that will support future organic sector growth for BTVLEP entrepreneurs and learners.
- 12.24 The National Film and TV Centre School (NFTS) is also of national significance with the country's only 4K television studio and film studios. The NFTS, based in Beaconsfield, is the only institution of its type in the UK, boasting alumni such as Oscar winning animator Nick Park (Wallace & Gromit), directors Lynne Ramsay (You Were Never Really Here, We Need to Talk About Kevin) and David Yates (the Harry Potter series) to name a few. Buckinghamshire also has a high concentration of people working in the creative sector, with southern Buckinghamshire recognised as a creative conurbation.
- 12.25 A further asset is the institutional capabilities brought together by the StoryFutures project, led by Royal Holloway University and including Brunel University and the NFTS. This project explores new markets for experiential 'augmented, virtual, mixed and extended reality' (AR, VR, MR, and XR) platforms, and how they will be used across a range of industries in the future – re-imagining the relationship between technology and storytelling to create new revenue streams for commercial brands and products by developing new advertising techniques.

BTVLEP Capabilities

12.26 BTVLEP is in a particularly advantageous position to build on its existing cluster strengths and capabilities relating to a number of timely external factors:

- The 100-acre expansion of Pinewood as a major national industry asset.
- New town centre and station infrastructure potential at Chesham, High Wycombe Creative Quarter plans, Crossrail at Iver, including late night fast services into central London and planned infrastructure investments that can unlock market failures in the area around rural broadband.
- Planned garden town developments and garden village developments at Halton as settings for new creative clusters, and digitally enabled living labs.
- Digital is the fastest growing 'major' employment sector since 2010 in BTVLEP [+59%; +6,850 jobs].
- Coding and programming are the number one in demand skill: in terms of job adverts globally, local BTVLEP growth sectors; and, an identified strategic skills gap across all sectors [not just digital].
- Applied Coding and programming – we argue, also supported by recent government experimental findings – is the single most important driver of 'horizontal innovation': it literally codifies the relationships between previously or otherwise unrelated and isolated sectors and fields.
- This capability to join fields of data together fundamentally underpins the ability of an information economy to develop and draw value from 'Big Data' using AI algorithms to analyse otherwise unmanageable uploads of information.

Figure 31: Creative employment intensity by TTWA



12.27 The map opposite highlights a clear stronghold of creative sector employment in and around Buckinghamshire. There are also higher concentrations of creative employment and creative businesses in Buckinghamshire compared to the national level.

12.28 London has the strongest cluster of creative industries, but recent research and industry consultation has highlighted that cost pressures, space availability and the expiry of temporary supportive planning measures (meanwhile leases) have caused businesses, employees, the self-employed and entrepreneurs to consider other locations more strongly.

12.29 At a national level, there has been an explosion of creative industries with the number of jobs in the sector having grown 4.5 percent more than the overall economy between 2011 and 2016, while contribution to value added growth grew twice as fast between 2010 and 2015³³.

Evidence Context: The potential to drive value growth and impact from the proposition: Creative and Digital economies can bring forward value to the economy

12.30 The UK's booming creative industries made a record contribution to the economy in 2016³⁴.

12.31 Industries including advertising and marketing, arts and film, TV and radio, and museums and galleries are all part of this thriving economic sector, which is now worth almost £92bn, according to the figures published today by the Department for Digital, Media, Culture and Sport.

12.32 The creative industries' contribution to the UK is up from £85bn in 2015 and it is growing at twice the rate of the economy. The sector now makes up more than five per cent of the UK economy's GVA. Much of the increase has been driven by a boom in the computer services sub-sector. While this includes video games, it also covers wider digital industries.

12.33 DCMS sectors' contribution to the UK economy overall continues to rise, with GVA at £248.5 billion in 2016, up 3.6 per cent year-on-year and up 29 per cent since 2010. DCMS sectors now account for 14.2 per cent of the UK's GVA.

12.34 The Government continues to back the creative industries sector. For example, dedicated tax relief to support high-end television productions, such as Game of Thrones and The Crown have seen a production boom worth £1.5 billion since the scheme was introduced in 2013. There was also £1 billion of inward investment in the film industry last year as a result of tax relief.

12.35 The government's UK Games Fund, which helps video game companies grow with grants to support new projects and talent, has just been extended until 2020. The government has also recently announced the opening of a £80 million Creative Industries Clusters Programme competition, which will boost innovation in the sector by part-funding research partnerships between universities and industry.

12.36 The Bazalgette Review highlights how creative industries can gain traction in the National Industrial Strategy and outlines key recommendations for how the Creative Industries can underpin the UK's future economic growth. It highlights how the sector is continuing to outperform other sectors in terms of employment, having already grown 300,000 jobs between 2011 and 2015.

12.37 The review makes a number of recommendations on how government and the Creative Industries can work together to remove barriers to growth. It spans issues from access to finance, intellectual property, trade and creative clusters – areas with high concentrations of ambitious companies who will drive regional growth.

³³ DCMS, 2017. DCMS Sectors Economic Estimates 2017: Employment and Trade <https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2017-employment-and-trade> DCMS, 2016. DCMS Sectors Economic Estimates. August 2016. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/544103/DCMS_Sectors_Economic_Estimates_-_August_2016.pdf

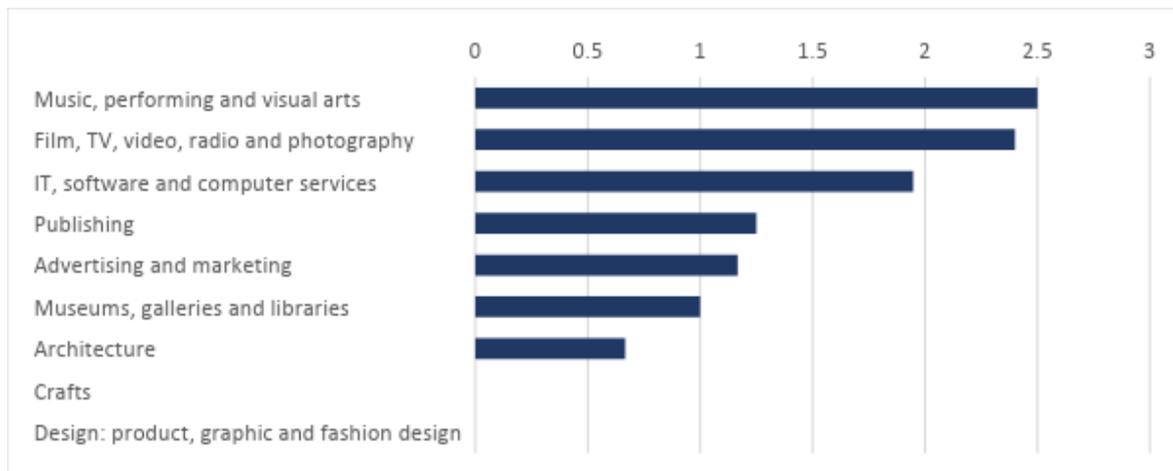
³⁴ <https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2016-gva>

- 12.38 Other asks include a strategy to attract and develop young talent to make the Creative Industries more accessible, including a careers programme for secondary schools and expanding the UK’s network of Saturday Clubs.
- 12.39 The review’s recommendations will now be considered carefully by the Government as part of its National Industrial Strategy and used to inform work towards a sector deal in the coming months. In response, the Government has already announced the opening of the £80 million Creative Industries Clusters Programme competition, led by the Arts and Humanities Research Council (AHRC).
- 12.40 The Arts and Humanities Research Council (AHRC), with support from the Government’s Industrial Strategy Challenge Fund, has introduced a Creative Clusters Programme to strengthen creative clusters across the UK³⁵. This clearly sets out the value of the sector to UKPIc.

At a BTVLEP level

- 12.41 BTVLEP’s share of employment in the creative industry is more than twice that of the LEP average and BTVLEP ranks 3rd/ 38 LEPs for proportion employed. Buckinghamshire is also more specialised in certain sub-sectors of the creative sector compared to the national level: music, performing and visual arts; film, TV, video, radio and photography; IT, software and computer services; publishing; and advertising and marketing.
- 12.42 Buckinghamshire is more specialised in certain DCMS sub-sectors compared to the national level: music, performing and visual arts; film, TV, video, radio and photography; IT, software and computer services; publishing; and advertising and marketing all represent strengths and capabilities in the BTVLEP area.

Figure 32: Concentration of DCMS sub-sectors in BTVLEP



Source: International Business Register using NESTA 2018 methodology.

- 12.43 While ‘IT and software services’ (often ‘computer consultancy’) are not the most relatively concentrated sector, this element of the DCMS creative industries contains more employees than all other DCMS sectors combined and is driving both volume and value employment in BTVLEP and across the UK.

³⁵ <https://ahrc.ukri.org/funding/apply-for-funding/archived-opportunities/creative-industries-clusters-programme/>

- 12.44 Computer consultancy (by 5-digit SIC in the creative industry) has the largest portion of employees across BTVLEP. This sub-sector also appears in the high-tech sector classification. Digital technology is driving creative growth, and the performance and growth of digital in Wycombe, Chiltern and South Bucks since 2010 is three times that of Aylesbury (28%, 29%, 33% compared to 10%), highlighting the need for infrastructure to enable the otherwise similar populations of skills and entrepreneurs to deliver sustainable growth across the BTVLEP area.
- 12.45 The following table highlights that the performance of the creative sector varies between districts – both in terms of the scale and the rate of growth of the sector.
- 12.46 Wycombe has the largest creative cluster of the four BTVLEP districts, but South Bucks – the location of Pinewood – has created the highest contribution since 2010.
- 12.47 Chiltern district - significant growth and potential around Chesham and High Wycombe to capitalise on strong connectivity to London - has also benefitted from disproportionate creative sector growth with the sector delivering 31% of all new jobs from an initial base representing less than 10% of employment.

Figure 33: Overview of Buckinghamshire’s creative sector

BTVLEP district	Total employees by district 2016		Creative Employees by district 2016		District level contribution to Creative Growth 2010 – 2016		Creative as a percentage of all growth 2010 – 2016
	number	percent	number	percent	number	percent	
Aylesbury Vale	75,500	32%	4,000	24%	370	10%	4%
Chiltern	34,500	15%	3,000	18%	1070	28%	31%
South Bucks	37,500	16%	3,000	18%	1255	33%	23%
Wycombe	87,000	37%	7,000	41%	1110	29%	12%
Column Total	234,500	100%	17,000	100%	3805	100%	14%

Source: BRES 2016

- 12.48 Aylesbury however has performed poorly, contributing just 10% of creative jobs from an initial base that contained 24% of BTVLEP’s creative employees in 2010. Specific market failures have caused this poor performance in Aylesbury, which is strongly related to digital infrastructure. However, given the projected growth in housing proposed for the area it is likely that this sector offers significant growth opportunities in the longer-term.

Proposition

- 12.49 To maximise Pinewood’s potential as a catalyst for new and growing highly innovative creative content and technology companies. This would support a cluster of national and international importance, well connected with other local and Oxford – Cambridge Arc strengths, including in high technology, with a particular focus on attracting international investment and driving up exports, building on the £1.7bn currently exported in services.
- 12.50 As a key link to the international film and TV industry, gaming and other new-media sectors, Pinewood is in a key position to translate this greater enablement of digital and creative sectors onto a number of global industry stages, linking domestic innovation more closely to global demand

markets. The ability to have closer proximity to higher numbers of creative innovators also helps secure and sustain the business environment for a key national industry asset.

In order to unlock and address

- Latent growth potential of the sector across the whole of the BTVLEP geography.
- Skills bottlenecks in specialist creative fields, including digital and VR / AR that unlock the next-generation of UK media export success.
- Bandwidth limitations that prevent more 'creative' cross sector knowledge transfer facilitated by digital.
- Digital infrastructure needs of existing and planned rural and garden town settings.

Silverstone Park and Technology Cluster

Action to develop a high technology cluster by exploiting Silverstone’s international brand and the existing world-leading motorsport and technology cluster. This will attract international investment and drive the growth of the super high technology sector across the wider Oxford – Cambridge Arc and nationally

Asset

- 12.51 The Silverstone Park and Technology Cluster, with the Silverstone Park Innovation Centre at its heart, is a world-leading cluster of high-tech engineering businesses which has grown significantly in recent years. Over 4,000 companies operating in precision engineering are based within a one-hour radius of Silverstone bringing benefits of co-location, networking and a specialist skills pool with strong local roots. While the Silverstone site is a sub-regional asset which straddles more than one LEP, the strategic investment enabled by BTVLEP through government funding, is driving investment and innovation which would not have ordinarily happened.
- 12.52 Notable sector strengths include the cluster of Formula 1 and other motorsport businesses and the concentration of talent serves a wide variety of sectors reliant on state-of-the-art technologies, cutting edge design and manufacturing.
- 12.53 Further sectors making active use of SHT’s technologies include aerospace, automotive, defence, electronic sensors, marine medical devices and motorsport. The Silverstone University Technical College is a centre of excellence for young people seeking a career in high performance engineering.
- 12.54 The circuit itself is located just south of Towcester and North of Buckingham, housing two business parks and a rapidly expanding Enterprise Zone with strong links and proximity to the F1 supply chain and wider motorsport cluster. Through locally brokered institutional investment, the EZ has secured investment in Buckinghamshire. Silverstone is currently leading a bid to draw together key Oxford – Cambridge Arc tech capabilities with a focus on enabling entrepreneurs to pursue technologically driven business models. This involves sub-regional partners including:
- AI, computing and battery development capability from the University of Buckingham.
 - Engineering capability at Cranfield.
 - The Harwell Satellite Applications Catapult at Harwell and UK Atomic Energy Agency (AEA) at Culham.
 - Pinewood Studios.
 - Cambridge Cleantech.

- Major technology businesses such as Bosch, KWSP, RedBull, Delta Motorsports and TotalSim.

BVT Capabilities

- 12.55 Crucially, the UK has a poor history of commercialising some of our best ideas and the Silverstone proposition is designed to create commercialisation and routes to market for successful innovation across a sub-regional corridor with world leading innovation assets. This is a powerful new approach representing a shift away from the UK's history of failing to capitalise on the benefits of our innovations.
- 12.56 BTVLEP and the motorsport industry more generally has a legacy of commercially driven (rather than government research³⁶ driven) approaches to new technologies, which positions it to complement the innovation strengths of neighbours. The ERC report 'Benchmarking local innovation -- the innovation geography of England 2017' identifies that the percentage of Oxford – Cambridge Arc firms introducing new practices is variable: Buckinghamshire is second only to Cheshire and Warrington with 36%. However, SE Midlands is 32%, Cambridgeshire and Peterborough 31%, Oxfordshire 30% and Northamptonshire 28%.
- 12.57 High technology in the broadest – Eurostat compiled definition – places BTVLEP fourth on a list of LEPs for higher concentrations³⁷ employed in high-tech industries at a national level and above neighbouring Oxford – Cambridge Arc LEPs. Buckinghamshire's high-tech sector employs 24,545 people, which accounts for 10.2% of total employment.

The types of capabilities that Bucks has in HT's include:

- 'Top-tier' engineering in Aviation, Motorsport and Aerodynamics.
- Additive manufacturing and 3D Printing, other 'digital' manufacturing, data logging and GPS.
- Lightweight composites and carbon fibre.
- Engineering for Olympic sport and cycling (and Paralympic heritage).
- Energy, electronics and photonics.

Evidence Context

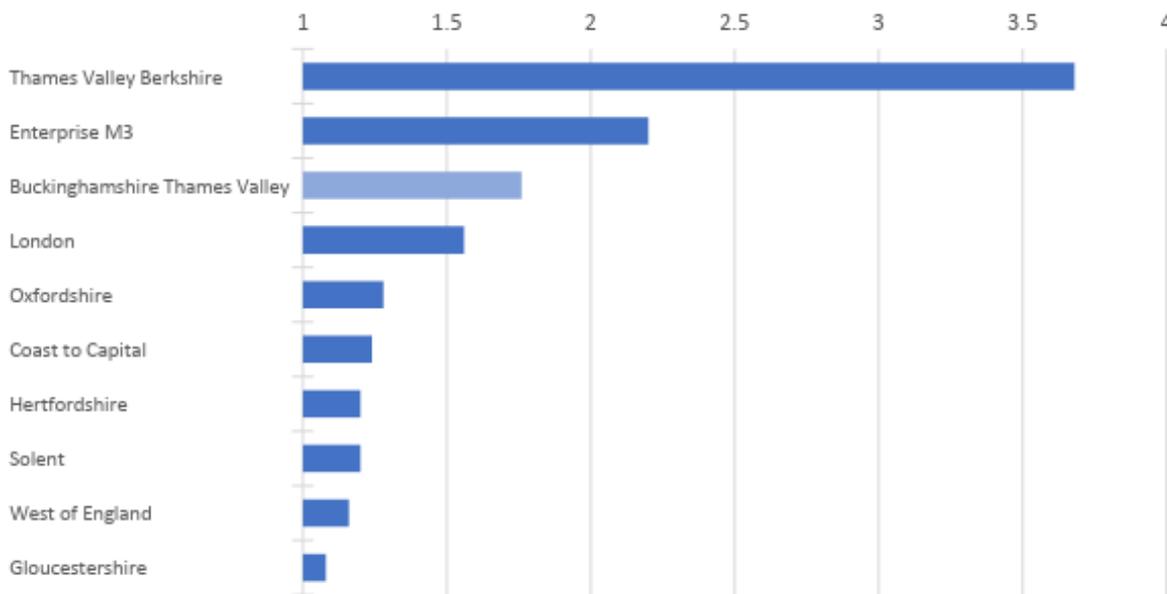
- 12.58 Disaggregating the sector (see figure 32), we can see that the largest portion of this local specialisation is made up by computer consultancy activities (6,500 employees), followed by engineering activities and related technical consultancy (3,000 employees), computer programming activities (2,125 employees), and other telecommunications activities (1,750 employees) and other information technology and computer service activities (1,625 employees). This suggests that a large part of BTVLEPs high-tech locational advantage is service-based.

³⁶ For example, central government supports Oxford University with >£500m in annual research grant, which the University can also use to leverage additional VC through networks. Of all LEP areas, BTVLEP has the lowest level of government investment in HE led R&D. It has several 'mature' companies with capabilities in HT's that 'grow more slowly, are stable, and are less likely to have a legacy of dependence on FDI or quick return VC than 'high growth start-ups'.

³⁷ Concentration/ specialisation is measured using location quotients whereby a value greater than 1 indicates that there is a higher concentration (proportionally) of that industry compared to the national level.

12.59 Computer consultancy activities (the largest sub-sector of the high-tech sector) falls into the broader sectoral grouping of computer programming, consultancy and related activities. The graph below maps concentration levels compared to the national level. Bucks ranks 3rd behind EM3LEP and Thames Valley Berkshire but above Oxfordshire and Hertfordshire for the proportion employed in computer consultancy activities.

Figure 34: All LEPs with concentrations (Location Quotients) >1 for those employed in computer programming, consultancy and related activities relative to the national level



Source: BRES 2016

12.60 The evidence also indicates that Buckinghamshire has a locational advantage in service-based high-technology industries and certain aspects of more knowledge-intensive manufacturing. It has a strong track record of growth in this sector having achieved the 6th highest proportional increase across all 38 LEPs and it is 4th best performing LEP in terms of the concentration of employment in high tech industries. This strength can be built on and there are major opportunities to draw together top global capabilities to deliver this ambition.

12.61 While the manufacturing sector in Buckinghamshire has seen negative output growth (measured by GVA) since 1998, BTVLEP scores higher in some of the more knowledge-intensive parts of the sector. For example, BTVLEP ranks 6th out of 39 LEPs for employment in the Space Sector and 11th in Aerospace, which further supports the linkages between the two propositions.

12.62 The advanced manufacturing and engineering sectors provide 10,895 jobs with the top sub-sectors engineering activities and related technical consultancy (3,000 employees), manufacture of air and spacecraft and related machinery (1,375 employees), manufacturing of instruments and appliances for measuring, testing and navigation (1,250 employees), and manufacture of pharmaceutical preparations (700 employees).

- 12.63 With regard to the High-Performance Engineering (HPE)³⁸ sector, there are currently 16,420 employees, which is a 12% increase from the 2015 level. This is the 6th highest proportional increase amongst all 38 LEPs. In the wider Oxford – Cambridge Arc area, the OxLEP HPE sector has marginally increased (+3%) over this period whilst the Greater Cambridge and Greater Peterborough (GCGP) HPE sector marginally decreased (-3%). In absolute terms, the size of the sector in OxLEP and GCGPLEP is far larger, 32,105 and 72,290 employees respectively. 6.8% of employees in BTVLEP are employed in the HPE sector (29th/38 LEPs), compared to 9.3% in GCGPs (8th highest), and 8.6% in OxLEP (12th highest).
- 12.64 BTVLEPs sub-sector of the manufacture of computer, electronic and optical products comprise 1% (2,250 employees) of the Buckinghamshire labour force and has the second highest concentration of this sector of all 38 LEPs. The sub-sector with the largest number of employees is engineering activities and related technical consultancy (3,000 employees and 1.3% of the labour market). GCGPLEP has 1.4% employed in this sub-sector (11,000) and OxLEP has 1.7% employed in this sector (6,000).
- 12.65 Buckinghamshire is more specialised in 5 sub-sectors of HPE than the national level (and Oxfordshire and Greater Cambridge and Greater Peterborough): manufacture of basic pharmaceutical products and pharmaceutical preparations; manufacture of computer, electronic and optical products; treatment and disposal of non-hazardous waste; manufacture of other transport equipment; and civil engineering.

Proposition

- 12.66 To develop this emerging global high-tech super cluster by exploiting Silverstone’s international brand and the existing world-leading motorsport and technology cluster. This will attract international investment and drive the growth of the wider high technologies sector across the Oxford – Cambridge Arc and nationally.
- 12.67 It will position the current cluster and future entrepreneurs to take advantage of opportunities presented by the further development of Silverstone to build a manufacturing base with linkages across the automotive and advanced engineering sectors and diversification into aerospace, space, clean-tech, healthcare, materials and electronic sectors. This will include identifying and exploiting opportunities for innovation transfer and collaboration with other sectors that underpin the Grand Challenges including Future Mobility and Artificial Intelligence.
- 12.68 Enabling the growth of high value manufacturing, including enabling cross-sector applications for additive and digital manufacturing is key to delivering the government’s Industrial Strategy. There is potential to enable the further growth of this sector in Buckinghamshire, with a particular focus on exploring the potential of High-Technology crossovers. Current examples of multi-market activities to support the Grand Challenges include:
- Bespoke additive manufacturing applied to medical splints and braces to aid more effective recovery, reducing time between diagnosis and treatment critical to enable successful rehabilitation and physiotherapy.

³⁸ Uses definition developed by Northamptonshire Enterprise Partnership: High Performance Engineering in Northamptonshire 2011.

- 3D printed Braille using machines that can be coded to translate and print any text into a Braille format.
- Approaches made to the UK Space Agency from the motorsport sector to explore production-line approaches to manufacturing next-generation swarm satellites.
- The development of lightweight and high-performance new materials that underpin future growth clean tech growth markets in Solar, Wind, Low Carbon vehicles, Aviation and Space.
- The application of adapted low-cost motorsport technology to design and test bicycles.

Growing a MedTech Sector and Advanced AI

To develop and build on the assets and capabilities in Buckinghamshire and the forecast growth across the Oxford – Cambridge Arc to support the growth of the MedTech sector to enable it to make a bigger contribution to the economy locally and nationally, and to help secure health and care integration locally delivering more care in or near to people’s homes.

Assets

- 12.69 The Buckinghamshire Life Sciences Partnership is leading the development of The Buckinghamshire Life Sciences Innovation Centre. The partnership brings together five organisations committed to encouraging innovators across industry, university and the NHS. These include Buckinghamshire Healthcare NHS Trust, Buckingham New University, Buckinghamshire County Council, Chiltern Clinical Commissioning Group and Oxford Academic Health Science Network (Oxford AHSN).
- 12.70 Buckinghamshire is home to a number of global industry leaders in healthcare including Janssen/Johnson & Johnson and GE Healthcare who have supported the bid. Stoke Mandeville is the UK’s national spinal centre. Buckinghamshire is in the first wave of 8 Integrated Care Systems which will pioneer new approaches to health and care integration locally. The planned major housing growth, in the area around Stoke Mandeville at Aylesbury Vale Garden Town, provides massive living lab opportunities to test the application of new technologies.
- 12.71 The two locations of the Life Sciences Innovation Campus located at Stoke Mandeville and High Wycombe are in a position to draw in capability from distinct strengths in each location:
- Stoke Mandeville is located in proximity to the Silverstone and Cranfield advanced materials and performance technologies cluster in the north of BTVLEP.
 - High Wycombe is home to a developed software and digital consultancy cluster in the South of BTVLEP.
- 12.72 The forecast future housing growth likely to come to Buckinghamshire provides the locality with an opportunity to improve the connectivity between MedTech firms, housebuilders and the health and social care providers to deliver a new approach to create healthy new towns.

Capabilities

- 12.73 BTVLEP lies at the heart of a regional level World Leading Life Sciences cluster of over 700 businesses supported by key research institutions. Our key evidence on the MedTech sector within BTVLEP suggests that while it has some key strengths in pharmaceuticals, it has not achieved the same overall level of momentum in sector development as for example OxLEP or GCGP LEP. The conditions which have supported the sector in these locations – such as strong strategically directed

research partnerships have in the past been lacking in BTVLEP, but this is not the case moving forwards and there is a strategic opportunity to promote the location as a key future growth node in the UK's world famous 'Golden Triangle' for Life Sciences.

12.74 This proposition is underpinned by five potential capabilities in Buckinghamshire:

- A model of self-funding care delivered through the private sector that is generating innovations in the market place.
- The ability to deliver innovation supporting MedTech applications through the horizontal application of technology already developed in the motorsport industry, digital-AI (for example current AVDC work with Alexa), and bespoke additive manufacturing.
- The potential for the commissioning of innovation at scale to address ageing population and other growing population needs. Stoke Mandeville has a heritage legacy of pioneering innovative and technology-based approaches and the Buckinghamshire Research and Innovation Partnership has the institutional capability to draw together these multiple strands.
- The potential for improved approaches to skills delivery at scale to create a productivity revolution in the delivery of health and social care (i.e. utilising new skills and technologies in combination).
- Proximity to Heathrow providing a speedy route to market for healthcare products that can be transported across the globe as seen with GE Healthcare innovations in cancer detection.

Evidence context

12.75 The UK, in common with most other countries, faces a major challenge in putting the health and care system on a sustainable footing. Existing new technologies have a proven capacity to make a major contribution to meeting this challenge, but the health and care system is poor at adopting these technologies at the speed that is required.

12.76 The successful development of medical technologies represents a large global scale export opportunity for those companies bringing useful innovations to market. Supporting these companies through networking and improved funding will be key to promoting high-growth, high-productivity export focussed businesses³⁹. These businesses may in some cases generate very high revenues for UK Plc and the exchequer, supporting national productivity growth.

12.77 The Ageing Society is one of the four grand challenges in the National Industrial Strategy linked to a commitment from government to "harness the power of innovation to help meet the needs of an ageing society." The Industrial Strategy notes that by 2046 24.8 per cent of the UK population will be aged 65 and over.

12.78 The residential care and social work is forecast to have strongest growth in absolute terms and relative terms in Bucks and UK. In Bucks, the sector's work force is expected to increase by 32% by 2030. Health is forecast to see the next highest growth in the number of jobs by 2030. As a sector

³⁹ <http://www.ncub.co.uk/reports/witty-review.html>

with low wages and low levels of real productivity growth, Residential care and Social Work represents a significant 'long tail' acting as a drag on productivity – both in BTVLEP and across the UK.

The proposition

- 12.79 To develop and build on the assets and capabilities in Buckinghamshire and across the Oxford – Cambridge Arc to support the growth of the MedTech sector to enable it to make a bigger contribution to the economy locally and nationally, and to help secure health and care integration locally delivering more care in or near to people's homes.
- 12.80 In Buckinghamshire, a combination of developments creates the opportunity to accelerate the adoption of these technologies and commercialise to international levels. The county is at the forefront of the development of integrated care systems. Stoke Mandeville is committed to developing a more entrepreneurial approach and the Buckinghamshire Research and Innovation Partnership is well placed to bring these strands together with local businesses and exploit the expertise across the Arc.
- 12.81 The proposition to underpin future growth in the MedTech sector therefore has two components:
- Unlocking the 'short-tail' potential – i.e. increasing the scale of employment in high-value activities by creating opportunities through stronger links to an emerging 'high-tech super-cluster' and directing innovation more strategically at a 'grand challenge' scale.
 - Addressing the 'long tail' – current scale employment in the health and social care sectors is expected to grow significantly, and the productivity per-worker in social care sectors can be unlocked through commissioning more technology-oriented approaches and promoting associated skills and training pathways that utilise UTC and T-Level routes to deliver step-change approaches.
- 12.82 However, left unattended future growth will not develop in such a way to suit the needs of the elderly population. As Buckinghamshire has historically not benefitted from significant support from UKRI and central government to create additional capacity to strengthen supply chain linkages between housing developers, tech solution providers and health and social care organisations, there is a danger that future developments will not adapt to suit the needs of the ageing population.

13 How programme drivers will help triangulate Propositions to directly address Grand Challenges

The cross-cutting themes and how they act as an economic stimulus and 'glue' to the propositions

- 13.1 The development of the Industrial Strategy requires a coherent approach, based on sound evidence, benchmarking and realistic, but ambitious propositions. We are clear of the current challenges and those ahead of us, but our proposals are designed to acknowledge them and define the way forward.
- 13.2 We have also identified the following cross cutting themes, which will run across the propositions and our work in order to drive the LEP towards achieving growth. These are:
- Education Revolution (an improved technical education system)
 - Digital Infrastructure
 - Living Lab
 - Commercialisation
 - Business Competitiveness

The skills and inspiration revolution: Creating a new technical education and training system – inspiring more young people into tech careers

- 13.3 To satisfy the demands of the current and future economy of BTVLEP, an education revolution is required to ensure a radical new approach to technical and vocational education can be adopted. The Local Industrial Strategy will need to be delivered in such a way as to ensure that the planned interventions around enterprise advice, careers networks and improvements to STEM and technical skills needs are met effectively through private sector relationships.
- 13.4 The NIS identifies the continuing challenges of meeting our business needs for talent, skills and labour. It acknowledges that insufficient attention has been paid to technical education and proposes the establishment of “a technical education system that rivals the best in the world, to stand alongside our world-class higher education system”. It emphasises the importance of closer involvement of employers in the education system, including delivering the commitment three million apprenticeship starts by 2020 and address particular shortages of STEM skills. This is particularly pertinent to the local BTVLEP capabilities and need to support higher levels of productivity across assets. The new Institutes of Technology are seen as a key initiative to increase the provision of higher-level technical education.

Actions and Interventions

- 13.5 In partnership with government departments (DfE and BEIS) as well as business and education, BTVLEP area provides an ideal test-bed for embedding selected key features of the University Technical College, the planned Institute of Technology programmes and other innovative approaches into mainstream secondary and further education provision.
- 13.6 The initiative should be developed by a strong countywide partnership of employers and education providers that builds on the Buckinghamshire Skills Hub approach and include taking engagement with the key sector action groups to a new level. Drawing from the UTC and IoT models, the new approach should provide a test-bed for innovative, collaborative and shared ownership approaches between employers and education providers. The features to be considered should include:
- Strong employer engagement in governance and leadership as well as the design and delivery of the curriculum.
 - Creating a prestigious identity, with structured career guidance, that cuts through the perception that vocational routes are second-best to academic qualifications.
 - Harnessing the assets, resources and expertise of employers for “mandatory” and well-supported work experience embedded within the curriculum, potentially within new sandwich courses.
 - Developing a culture of innovation and team-working by embedding real problem solving as part of work experience.
 - Sharing resources across a network of providers and employers to produce an integrated county-wide system that makes the best use of assets and expertise and is informed by a shared evidence base. This approach will, for example, support a collaborative approach to apprenticeships that addresses the difficulties face by individual, particularly smaller, employers.

BTVLEP evidence to support the drivers

- 13.7 At secondary school level, Buckinghamshire has a selective 11+ system. Grammar schools provide some 32% of secondary places but about 80% of the county’s children do not attend these schools. This disparity impacts particularly on poorer communities where the proportion of children attending a Grammar school can be as low as 18%⁴⁰. Student numbers in the sixth forms of upper schools (secondary modern etc.) are dwindling with the more academic students being tempted by the Grammar Schools.
- 13.8 This pattern of secondary education, coupled with the people needs of local employers, places a huge emphasis on the quantity and quality of technical and vocational education and the route it provides into good-quality jobs. Concern has been expressed about the almost complete erosion of meaningful work experience particularly for children from poorer, less well-connected families – as too many young people are leaving education with little or no work experience.
- 13.9 Established programmes such as Young Enterprise and the activities of the Buckinghamshire Skills Hub are doing good work in making connections between school and the world of work but suffer

⁴⁰ [NB these figure are cited by stakeholders and still need to be verified].

from limited resources which do not match the challenge. Other issues relate to the availability of quality IAG (Independent Advice and Guidance on careers), the challenge of attracting teachers of technical subjects, and the difficulties employers are experiencing, despite the support available, with the new apprenticeships system.

Relationship of the driver to the assets

- 13.10 This crosscutting education and skills intervention would support all of the assets identified in the emerging LIS. It would also support the Oxford – Cambridge Arc contribution to all Grand Challenges. Creating human capital that is skilled and ambitious is also fundamental to transforming the economy by addressing the five foundations of productivity.
- 13.11 The evidence and contributions from consultees have highlighted the need for a radical approach to integrate work that could include:
- “mainstreaming” successful UTC practices on employer involvement;
 - a much stronger collaborative approaches between employers and providers, including on apprenticeships;
 - “mandatory” work experience at Year 10 and a work experience gap year between GCSE and 6th Form, potentially as part of new sandwich course approach.
- 13.12 It is important to recognise existing strengths in technical/vocational education and support provided to bring employers and providers together, including:
- Bucks University Technical College specialises in developing education and skills with relevance to the construction computing sectors. Its industry partners, which included Taylor Wimpey, Cisco and McAfee, ensure students gain the right skills and motivation and are given a genuine work-related learning experience that will improve their employability within the sectors.
 - Silverstone University Technical College (UTC), based in neighbouring Northamptonshire, provides a centre of excellence for young people wanting to break into the specialist fields of High-Performance Engineering and Business & Technical Events Management.
 - University Campus Aylesbury Vale provides HE and FE courses with a strong emphasis on working with employers.
 - Buckinghamshire Education, Skills and Training (BEST) partnership between Buckinghamshire College Group, Buckinghamshire New University and Buckinghamshire University Technical College, works across educational boundaries to bring a new approach to working with employers and individuals to provide flexible and creative education and training solutions.
 - Buckinghamshire Skills HUB was established by BTVLEPELP to address the challenges identified above in partnership with Buckinghamshire Business First (BBF). The Hub participates in national programmes as well as developing local solutions. The under 19 Skills Programme promotes links between employers and educators, delivering through a range of national and local programmes. Participation has been growing

significantly but the HUB's latest progress report recognises a continuing disconnect between local business and the future workforce.

Digital infrastructure: Delivering improved digital connectivity to enable a transition to a digital economy

- 13.13 The requirements for faster and faster speeds of internet from consumers and businesses are increasing year-on-year. New 'apps' and innovative service platforms drive increasing demand for bandwidth, and this is recognised in the national Industrial Strategy as both a key infrastructure issue (a pillar of productivity) and a national Grand Challenge to be addressed that can unlock future UK prosperity (AI and the data economy).
- 13.14 The provision of commercially viable broadband to rural areas is also a problem recognised by government in the recent Future Infrastructure Telecoms Review 2018 (FITR) – which proposes a national fund of up to £5bn to address this rural market failure.
- 13.15 Across BTVLEP districts, the percentage of premises that are able to receive 'superfast' broadband (24-30mbps download) is low across much of the rural geography, despite investment through Connected Counties⁴¹. As demand from digitally oriented businesses for faster broadband speeds increases towards 'ultrafast' 100mbps, the imperative to solve this market failure is of strategic importance to BTVLEP, and across wider rural settings, to the national agenda.

Actions and interventions

- 13.16 There are two clear directions of travel for Bucks in this regard.
- With opportunities for new housing and commercial development, Next Generation Access (NGA) is required to reduce the current level of white postcodes that are not currently supported through any commercial infrastructure or government backed plans. Creating an opportunity to use new settlements to advance the growth of 5G capacity to help overcome the current deficit in fibre to the premises broadband.
 - The effective current headroom (digital bandwidth capacity), and planned headroom in terms of fibre capacity acts as either an enabler or a constraint on business investment, growth and scaling. Further, as the digital sector is cross-cutting with many horizontal applications constraints on the sector also act as a constraint on innovation potential in other strategic growth sectors.

BTVLEP evidence to support the drivers

- 13.17 Bucks remain behind national levels of FTTP coverage with a current coverage in the county of 3.61% compared to 4%. While investment in access will come over time, the current opportunity is live. Bucks has an opportunity with wider investment in large-scale infrastructure, be that Crossrail, Aylesbury Vale Garden Town or the proposed east/west Expressway, to build in NGA to advance beyond the current investment pipeline.
- 13.18 The UK's approach to date has been to invest in market failure to address the lack of provision and not take advantage of opportunities through the planning framework or use new technology to accelerate full coverage. National government has set priorities to deliver nationwide full fibre coverage by 2033, with a milestone target of 15m premises with Fibre to the Premises (FTTP) by

⁴¹ <http://www.connectedcounties.org/>

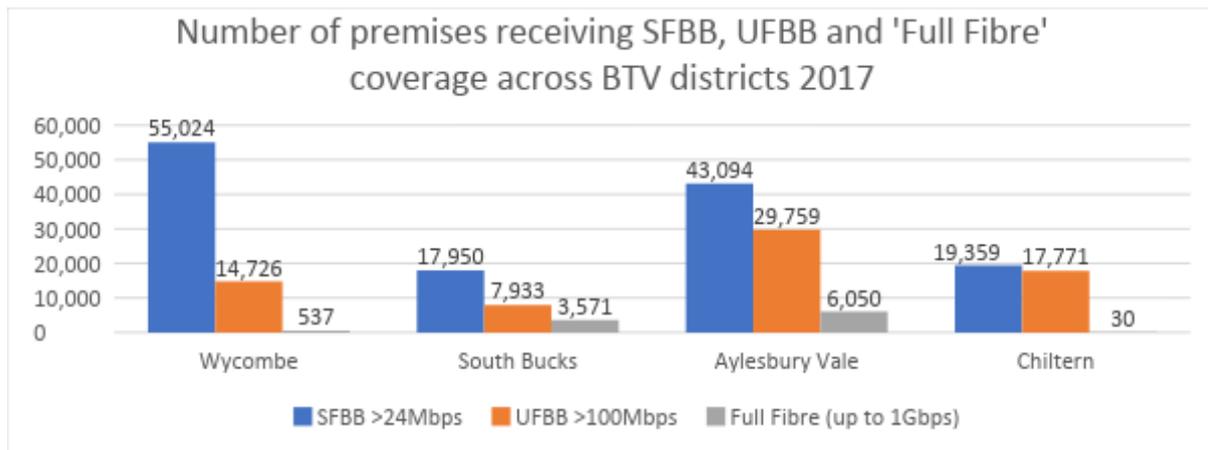
2025 and ensure 95% geographic mobile coverage. Current levels of FTTP coverage is 4%, compared to world leaders such as Japan and South Korea, with minimum levels of 97% and 99% respectively. At a BTVLEP level, FTTP coverage is below average at 3.61%.

- 13.19 Policy drivers to deliver greater coverage and close the market failure come from two main sources. The government's recent Future Telecoms Infrastructure Review and the 5G Strategy which reference the intended outcomes of the national Industrial Strategy. Both reviews recognise the potential of investment to drive productivity and encourage innovation.
- 13.20 In 2010, Aylesbury Vale contained 32% of the employees across BTVLEP, and High Wycombe 37%. In the subsequent period to 2016, Aylesbury hosted just 16% of the digital growth in BTVLEP, and High Wycombe 58%.
- 13.21 We therefore have two 'Digital growth quotients' for the period 2010-2016, showing the opportunity cost of a lack of connectivity to Aylesbury Vale over time:
- Digital Growth LQ of 0.5 for Aylesbury Vale
 - Digital Growth LQ of 1.57 for High Wycombe
- 13.22 In effect, equalising the LQ digital growth to 1 for Aylesbury Vale through infrastructure enablement would have resulted in 1,125 additional digital employee jobs over the period.⁴²
- 13.23 This is however potentially a very conservative estimate, capturing only the effect from foregone digital business employment. Digital connectivity also enables or impedes business productivity across all sectors, and constrained bandwidth capacity holds back innovation and horizontal crossovers between sectors acting as a drag on future growth potential and new business models.
- 13.24 One estimate is that the current lack of connectivity across the UK costs an average of £3,125 per - business per-year⁴³ - with an average employee losing 38 hours of productivity (1 week) per year from slow internet speeds.
- 13.25 Our key evidence highlights that while high numbers of premises in Aylesbury are digitally enabled, and it has the highest number of premises in BTVLEP receiving 100mbps speeds, it also has by far the highest number of premises unable to receive threshold download speeds.

⁴² These jobs are typically above average in terms of productivity but using the average GVA per worker for the area these hypothetical lost jobs equate to £61,114 x 1,125 = £68,753,250 in foregone annual GVA, on an ongoing basis.

⁴³ <https://www.duocall.co.uk/blog/internet-down-time-costs-each-business-3-125-per-year-can-your-business-afford-this>

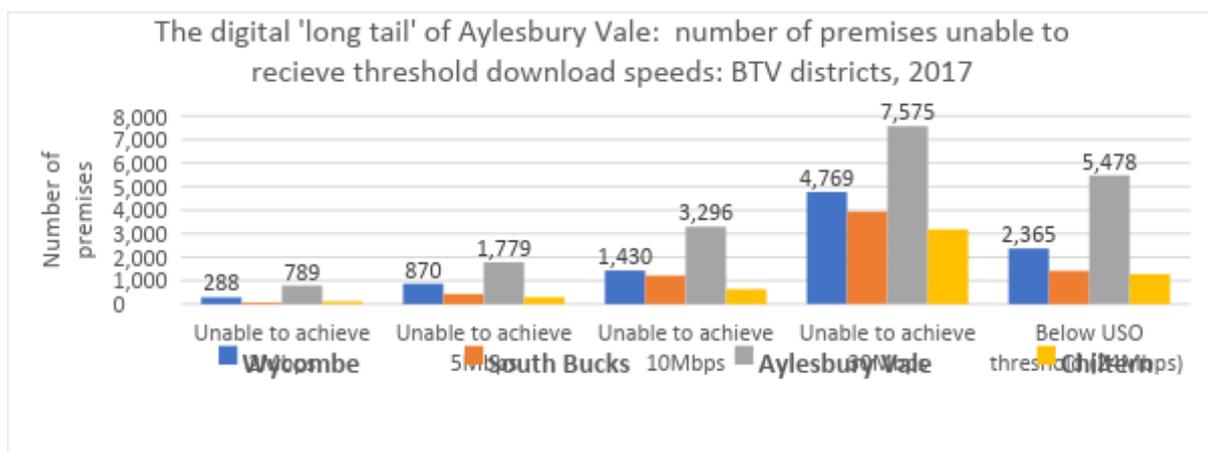
Figure 35: Broadband coverage in BTVLEP districts



Source: Ofcom

13.26 The number of businesses unable to receive 30Mbps suggests that the true cost in Aylesbury alone from a lack of connectivity could be almost seven times higher than the foregone 1,125 jobs / £68.8m annual GVA⁴⁴. With exceptionally high levels of home working in Bucks, domestic connectivity is vital to sustained growth and the need for business flexibility.

Figure 36: Extent of premises unable to receive key download speeds



Source: Ofcom

Relationship of the drivers to the Assets

13.27 The relationship of digital connectivity to the key assets is front and centre. Full fibre broadband could potentially allow:

- Med-tech to improve diagnosis speeds by allowing hospitals to share HD quality graphics of medical scans in seconds.
- The education system to reach more students through virtual reality and the ability to improve access for adult education.

⁴⁴ The figures above do not tell us about demand from these premises

- Advances in digital simulation that can support ambitions around in-orbit space demonstrators.
- Businesses in BTVLEP to access international consumer base and improve transactional processing time.

The living lab: Establishing a formal living lab framework to enable rapid testing and deployment of innovative new products and technologies

- 13.28 The ability of organisations to bring solutions to market faster is a challenge that needs to go beyond research and into practical application and testing of new products and ideas on ready-made audiences. Not by creating a test environment that's representative of real-life scenarios but by delivering innovations in a real-life situation and characterised by situated experimentation, diversity and participation, learning, and evaluation⁴⁵.
- 13.29 BTVLEP has an ideal opportunity to place humans at the centre of their concept, drawing on existing experience of the Westcott Catapult Centre and work of Stoke Mandeville relating to patient trials. The new generation of living lab for Buckinghamshire should not be about retrofitting SMART technology in existing communities but leading with the technology that can design and deliver new communities at scale, for example, through the emerging Aylesbury Vale Garden Town masterplan.
- 13.30 BCC has already put forward a compelling case for a Live Lab in AGT to create a Smart Connected Community. BCC is seeking £4.5M funding with an additional £2.2M of matched funding for the SMART Connected Community project at Fairford Leys, Buckinghamshire. The project illustrates the appetite for the public sector to trial SMART materials, communications, energy solutions, and mobility. In parallel, BCC is working with AMEY and other public/private organisations to assess the commercial viability of Autonomous Vehicle services in AGT. This Smart Connected Community encapsulates Buckinghamshire's ambition and capability to deliver future transport, energy and ways of living.
- 13.31 The level of housing growth across Buckinghamshire⁴⁶ and Cambridge presents an opportunity to test new ideas. This could include AGT as a testbed for high energy performance standards en masse.
- 13.32 By using a real-life environment, application of new ideas and technologies can deliver a county-wide difference in the grand challenges. The opportunities are countless, and the applications are yet to be imagined.
- 13.33 A Living Lab (LL) is defined as an institutional environment for open innovation that supports experimentation with real users in real contexts⁴⁷. It offers the chance to co-create value for all partners. BTVLEP has a new requirement that goes beyond research and needs to focus on application and commercialisation of new products and services, creating a formal living lab framework to enable more rapid testing and introduction of ideas, products and services. This will give UK advantage (e.g. automotive vehicles, preventative healthcare at home) and put people and business central to the solutions while enabling an open exchange of ideas and development of

⁴⁵ <https://www.scribd.com/document/386099304/Conference-Proceedings-OLLD18#>

⁴⁶ The local plan indicates some 50,000 additional homes by 2033 – on top of over 200,000 homes at present.

⁴⁷ Folstad 2008; Hillgren 2013

Grand Challenge that address at a local level and influence solutions at a national and international level.

Specific actions and interventions

- 13.34 Building this capacity into emerging infrastructure to enable businesses and institutions to genuinely test, learn and apply in an on the ground way supporting by academics, technicians etc. Beyond a SMART City concept. Living labs as co-creation opportunities, bringing together the network of new ideas and using existing trial infrastructure.
- 13.35 Action is required to position Buckinghamshire, in collaboration with Oxford – Cambridge Arc partners, as a leading centre for the innovation, testing and trialling of technologies, infrastructure and regulation for the development and implementation of approaches to future mobility.

Evidence to support the actions

- 13.36 By testing concepts in a living environment, organisations can understand how their technology is perceived and how it tackles real-world challenges, speeding up research and development processes and demonstrating commercial viability by bringing solutions to market faster. The environment can also be used by policy makers to design experience and refine new policies and regulations in real-life scenarios and evaluate potential impacts before approval.
- 13.37 Another benefit of the Living Lab concept is greater collaboration. It provides a safe environment for groups of innovators to model the impact of change, enabling organisations to expose solutions to the 4 Grand Challenges set out by government. This requires strong leadership to enable decision-making when the future is uncertain.
- 13.38 The UK is uniquely positioned to become a premium global location for the development of autonomous vehicles and their associated technologies. Driverless vehicles can already legally be tested on public roads and the UK Government is actively supporting research, development and demonstration of connected and autonomous vehicles.
- 13.39 Emerging testbeds at Greenwich and Milton Keynes will enable testing of a very wide range of technologies to enable future mobility solutions. Through advances in connected and autonomous vehicles, entire transport systems are being developed to include sensors to enable smart infrastructure; digital worlds for virtual validation; communications systems such as 5G (learning from Westcott); environmental sensing; mobility as a service; and use of data to support the next generation of products.
- 13.40 Common traits of internationally successful or newly establishing living labs from across the world and which are relevant to the opportunity at Aylesbury Vale include:
- Layout, size and scale.
 - High levels of strategic cooperation between national and local government, university and the private sector.
 - Open access to ultra-fast communications as well as data platforms.
 - A network of leading businesses at the forefront of their own sectors.

- A well-coordinated ecosystem of support and an appetite to help innovators and entrepreneurs⁴⁸.

Relationship of the driver to the assets

13.41 International examples that have transferability to a new BTVLEP model at Aylesbury Vale Garden Town include:

- Botnic Living Lab in Lulea, Sweden where the tech sector works closely with the public sector and academia to accelerate new ICT innovations and are reported to have sped up the innovation process from idea to market launch. This has been done through a process of co-creation and improvement of ideas to address challenges and through the creation of new business opportunities for small businesses. This example has crossover challenges with the Super High Technology cluster.
- iMinds in Antwerp, which is a digital research, and entrepreneurship hub seeking to address fragmentation in the creative industries. A similar example to the challenges within the creative and digital economy of BTVLEP.
- MIT's Wellness and Health Lab which uses the campus as a test bed to identify patterns in the spread of the flu and can apply learning to challenges at Stoke Mandeville.

Commercialising innovation: Building a network of centres to accelerate the commercialisation of innovation in Bucks

13.42 The national Industrial Strategy identifies key factors that need to be addressed to improve our productivity and catch-up with better performing countries. It identifies that Britain is not as good as it should be in spreading best practice or in the availability of advice and mentoring for growing businesses. It calls for more to support the development and commercialisation of new smart technologies, infrastructure and ideas with a focus on the “ambitious, high potential small and medium sized businesses that are so critical to jobs and productivity”.

13.43 BTVLEP has a strong record of start-ups but more needs to be done to support scale-up so that more businesses achieve their potential including: better use of data to target growing businesses; enhanced leadership and access to talent; access to and take-up of finance; improved access to markets through international trade and government procurement, better supply chain support. There is also more scope for universities to support the development of innovative businesses through spin out businesses and, more importantly, knowledge transfer and support for other innovative businesses with potential and ambition to grow.

13.44 Buckinghamshire has the benefit of nationally significant business clusters supported by a developing network of innovation centres and activities that are nurturing the start-up and growth of innovative businesses. Our consultation with businesses, and other partners within these clusters, has identified the need for a more integrated approach that works across the clusters to provide a coherent “innovation eco-system” with a strong focus on the commercialisation of ideas, access to markets and collaboration to promote “cross-over” innovation.

⁴⁸ <https://www.adelaidemartcitystudio.com/about/adelaide-living-lab/>

Specific Actions and Interventions

- 13.45 Establish a Buckinghamshire Innovation Hub as a cross-cutting approach to supporting innovation and commercialisation *[and specialist skills provision]* embracing existing and potential business strengths that play strongly to the Government’s Grand Challenges.
- 13.46 Whilst having a primarily Buckinghamshire focus, the Hub should be charged with working closely with partners and other neighbouring areas to identify opportunities for collaboration and to draw in wider expertise from universities and other organisations that support business innovation. The role played by Royal Holloway in leading the StoryFutures programme is a good example of the type of collaboration that the Hub should facilitate.

Evidence to support the actions

- 13.47 Insights into innovation from the available data suggest that:
 - 2nd of 38 for the percentage of firms introducing ‘new business processes’ (36%)
 - 20th the proportion of firms undertaking product or service innovation (22%)
- 13.48 The very high proportion of micro firms in the area (84.4%) are likely to drive these results to a great extent: local entrepreneurs tend to be highly skilled and new business models and processes are driving business formation.
- 13.49 The lack of HE presence or larger SME R&D investment mean that many micro-firms, despite exploring new processes are not commercialising this innovation to the extent they might with more institutional and network support.

Relationship of the drivers to the assets

- 13.50 To get maximum business growth and productivity gain through a joined-up approach to supporting innovation and commercialisation that works across, and brings together, the area’s key business and research assets both established and potential, in particular:

- Space – Westcott Innovation & 5G centres.
- Creative & Digital – Pinewood, NFTS, StoryFutures
- High-tech super cluster – the Silverstone Technology cluster and Centre of Innovation
- Med-tech - Stoke Mandeville National Spinal Injuries Centre. Link with Med-tech Accelerator

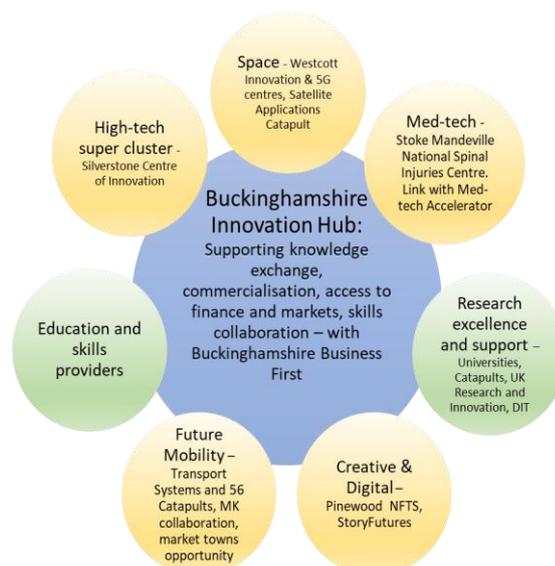


Figure 37: Organisational structure of the innovation hub

Stimulating Business Productivity: Supporting businesses to compete in an increasingly competitive environment

- 13.51 Inflationary pressures can create uncertainty for investors, and rising input and overhead costs lower the overall commercial viability of enterprises. This is true across the UK economy, globally and across Buckinghamshire.
- 13.52 Therefore - there is a fundamental need to actively promote measures to reduce the costs of doing business and support global, national and local supply chains that are resilient to - and actively mitigate - this pressure. Brexit, energy costs and a lack of investment in innovation are also likely to increase transaction and input costs for many UK businesses, both domestic and foreign owned, creating further need to explore cost-mitigating approaches.
- 13.53 Our 5 core propositions strongly reflect the Grand Challenges identified by government, and the potential for the BTVLEP economy to contribute significantly towards them. However, developing the suite of local propositions to meet local ambition will entail significant levels of investment, in many cases in 'disruptive' technologies. Some disruption by definition carry a cost.
- 13.54 To maximise net-positive impacts, propositions to increase the value output (GVA) of firms in Bucks (**value-in**) should also be complimented by measures that also impact on the unit efficiency costs for firms (**cost-down**).
- 13.55 The National Industrial Strategy highlights:

"As [these] transformational changes take place, we will remain committed to minimising costs for households and businesses"
- 13.56 The result that can be delivered at a local level will reduce input costs for businesses over time and form 'local comparative advantages' that support the strong sustainable growth of industry clusters, creating future value.
- 13.57 Reducing costs to business also has implications for addressing national Grand Challenges, which are also strongly linked to BTVLEP's proposition sectors and assets.

Specific Actions and Interventions

- 13.58 In order to secure the conditions that support growing and sustainable levels of investment, entrepreneurialism and local supply-chain resilience: BTVLEP is committed to approaches that develop and utilise local capabilities to deliver against Grand Challenges. Within this, BTVLEP will actively seek to minimise costs to local business from technology driven disruption, and simultaneously support businesses to access new value markets that disruptive technologies, investment in innovation and routes to commercialisation are creating.
- 13.59 Move away from a transactional (IDB) model to invest in stimulating ambition and business confidence and more specialist support for the 'vital 6%' of high growth businesses. Improved access to finance. Simplified connections to 'funds of funds'.
- 13.60 Enhance support to stimulate resilience in supply chains and onshore vital supply chain 'gaps'.

13.61 In summary:

- Existing businesses will be supported in taking measures to reduce and minimise their operating costs, in some cases with capital investment to support transitioning where there is a public value argument
- Start-ups and entrepreneurs will benefit from low cost-space, improved infrastructure, and technology brokerage in emerging AI, tech or engineering capability
- Investors will be increasingly attracted to low-cost, high-value ‘world-city’ locations with bespoke digital and clean infrastructure, and access to talent – the latter supported by a focus on reducing indirect costs
- Opportunities to ‘plug’ key parts of local supply chain’s suffering from uncompetitive prices will be maximised

Evidence to support the actions

13.62 A broad range of objectives are required when considering programmes of intervention, as too narrow an assessment of costs and benefits can preclude important opportunities to address a strategic issue holistically⁴⁹. Being careful not to narrow the opportunities, these categories of ‘local’ costs factor in locational choices relate to common and direct costs and indirect costs as below:

Common & direct costs

13.63 Businesses face the following challenges to keeping costs down and their ability to innovate as a result:

- Energy & utilities
- Rent (incl business rates tied to RV and derived from psf rental costs)
- Transport costs of goods and materials, and business travel
- Recruitment (including the cost of non-retention i.e. additional recruitment cost)

Other & indirect costs to business

- Housing price and availability: this is important as it may affect the cost of recruitment and the ability to retain workers. London businesses must pay ‘London Weighting’ relative to other UK locations or risk not retaining staff. In other areas housing is not an explicit element of recruitment, but still plays an important role.
- Public & private transport journey times and costs. The flip-side of the housing cost dynamic is that workers will need to commute further if housing costs are high relative to wages in the area they work.
- Networking: membership and time costs. Some professional networks have significant annual membership fees that represent a large element of business cost. Informal and cross-cutting industry networks.

⁴⁹ National Industrial Strategy

Relationship of the driver to the assets

Supply chain cost pressures are an important consideration for businesses in all sectors. Inflation creates uncertainty for investors and consumers. Therefore, reducing business costs is entirely cross-cutting in terms of supporting greater certainty and future planning for activities in BTVLEP:

- Reducing the cost of launching domestic satellites incentivises data-economy investment helping realise ‘downstream value’ – here market failures and planning can also create unhelpful cost pressures.
- Reducing the cost of key energy inputs for vehicles and Future Transport supports viability for innovative new mobility models, with commercial success generating further public value.
- AI-diagnostics and similar approaches utilised in med-tech sectors can reduce drug-discovery times and the costs of bringing new treatments to market, as well as augmenting the productivity and efficiency of care approaches using biometrics and smart devices.
- Reducing the cost of specialist inputs to high-technology sectors supports technologies to reach the stage where impacts are broad and public, with mass-demand further supporting commercial viability.
- Bringing new-media-platforms to market is particularly important in terms of creating new value and revenue streams in the creative film, TV and games sectors.

Commercialising Innovation

13.64 The cost of getting innovation to market is high, and many products or services that could be commercially viable *if input costs were reduced* may not currently be receiving investment.

- Reducing any cost to a business supports the potential ability to deliver products to market.
- Several priorities for commercialisation involve activities that address aspects of the Grand Challenges relating to reducing medium and longer-term cost-inflation (thereby creating a virtuous circle).

13.65 Central to its success, strategic co-ordination will be key in terms of creating targeted market access for BTVLEP businesses and entrepreneurs through improved procurement channels that support various elements of our propositions.

Digital Infrastructure as cost-down

13.66 Our digital proposition has the potential to reduce specific business costs across all seven of these areas of direct and indirect costs. Examples of direct effects would include:

- Digital smart systems create improved resource efficiency in energy and utility markets; and the internet is a utility in itself – there is a high cost to business from a lack of access and this also suppresses investment and entrepreneurial activity.
- Connectivity can reduce the need for fixed office costs and support more mobile, agile and home-working reducing space pressures and the marginal on-cost of new hires.

- Online distribution and e-commerce have played a huge role in reducing logistical distribution costs and online conferencing has played a large role in reducing business travel costs for business.
- Online platforms have provided significantly reduced recruitment costs, and when combined with smart algorithms are able to draw from significantly larger pools of candidates to create a best-match for a job.

How propositions link to the Grand Challenges

Space

- **AI and data** - the AI and data economy is supported and enabled
- **Ageing Society** - challenges can be addressed through digital enablement and secure connected health data.
- **Clean growth** - Clean growth objectives are supported through the creation of infrastructure that can support Low Carbon and Electric CAV rollout; and fuel cell development as an alternative energy technology that can be used in transport and the built environment are supported.
- **Future transport** - future mobility and connected autonomous vehicles (CAV's) will rely on satellite enabled 5G networks to reach a market ready stage.

Super high tech

- **Ageing society** – aspects of collaborative R&D in high value manufacturing have core investments in engaging older populations and paediatric R&D (e.g. Bristol-Myers Squibb Pharmaceutical Limited).
- **AI and data** – disruptive tech, impacting on a whole range of sectors. University of Buckingham have interest in this area and are working with the Satellite Applications Catapult on a proposition. Space and satellite capabilities need High Technology approaches to bolster UK's space offer.
- **Clean growth** – already over £100k invested by Innovate UK in advanced materials which includes the development of materials for solar power generators.
- **Future Transport** – areas of advanced manufacturing and advanced materials already promote automated delivery through testing of lower cost ways to establish green hydrogen infrastructure (e.g. Fuel Cell Markets Limited).

Revolutionising healthcare

- **Ageing Society** – opportunity exists for growth of a connected (smart) home appliance market, built on growth of strong, electronics, electrical and digital tech sector in Bucks and development of emerging Garden Towns/New Settlements. Potential exists to connect entire value chain from Local Authorities; Garden Town; Development Community; Smart Infrastructure; 'End of pipe' technologies to stimulate demand and supply sides of the 'smart' connected digital tech market. Links to AI, Machine Learning and Home Automation. Potential exists to bypass the slow change processes in the Health & Social Care Sector by stimulating the growth of the self-funded

'connected digital home' care sector. As big an issue in Bucks as anywhere else. BCC is keen to explore this and has an innovative heritage.

- **AI and data** – real opportunity to start thinking about how to make adult social care more technology and AI intensive e.g. Bicester is proposing a healthy town. There is an opportunity to utilise technology, minimise cost and create great lives for other people.

Such a strategy could potentially have linkages to:

- AVDC's work with AI & Machine Learning (see AVDCs pioneering work on Amazon Alexa) and their interest in using the technology they have developed to expand into the health and social care sector.
- BCC would have an interest, in their role as Social Care Provider. They are one of 8 pilots around the country for developing an integrated health and social care pilot.
- Garden Town partners are talking about innovation and smart city investment but are not particularly advanced in implementation terms.
- Satellite Applications Catapult are active in the digital health market, nationally and have expressed an interest in expanding this work locally.
- Businesses can apply for a share of up to £8 million to improve healthcare or reduce costs for health services, under the Industrial Strategy Challenge Fund. Innovate UK has up to £8 million to invest in new technologies through the digital health technology catalyst.

14 Measuring Impact

- 14.1 We can therefore make a strong link from our existing analysis of business, employment, and occupations to ‘digital’ and ‘[big]data’ as future sources of value growth in terms of future wages and productivity.
- 14.2 Skills are a further area where a strong focus on STEM, digital and technical-analytical areas has emerged.
- 14.3 National Audits of UK capabilities in data-technology intensive areas⁵⁰ have estimated that the current £250bn data economy will double to reach £500bn by 2035. Importantly, many of the activities driving this value growth will be novel innovations and, in some cases represent entirely new sectors of activity.
- 14.4 Our approach to evidencing potential impacts cannot therefore project forwards from the existing sector base to create a bottom-up-estimate of BTVLEP’s or the wider Oxford – Cambridge Arc potential contribution to these new value chains. To overcome this issue we have built a proxy for ‘downstream data capabilities’ that helps create an estimate of an areas ability to harness emergent economic value chains based on the existing alignment of capabilities.
- 14.5 Our Proxy for the ‘downstream data economy’ uses key data on three critical sub-sectors that provides further supporting evidence of our proposition impacts:
 - Business and domestic software development – is the core sector innovating the back-end technology-services that will underpin future value growth in the data economy.
 - Computer consultancy – is the sector containing the skills and capabilities to integrate software and other IT sector innovation (importantly including that occurring outside of BTVLEP) into new and existing business models.
 - Data processing and hosting – ‘hardware’ serves as a key proxy for the capabilities of local computing infrastructure and is a necessary consideration alongside local ‘software’ and ‘innovation-knowledge-transfer’ commercial capabilities.

Core data economy sector 2016	Buckinghamshire Thames Valley	Greater Cambridge and Greater Peterborough	Hertfordshire	Oxfordshire	South East Midlands	Thames Valley Berkshire	Unweighted corridor average
Business and domestic software	1.5	1	0.83	1.33	0.83	5	1.75
Computer Consultancy	2.0	0.8	1.4	1.1	1.0	3.4	1.6
Data Processing and hosting	1	2	2	2	2	2	1.833
Weighted data economy LQ	1.87	0.98	1.32	1.23	1.04	3.96	1.73

⁵⁰ Specifically ‘Downstream Space’ – involving Earth based activities reliant on either Human or AI analysis of data and information (often directly or indirectly enabled via satellite).

- 14.6 There are arguably a wide range of sectors that could be said to derive key elements of value streams from the IT and data economy. Our ‘proxy’ sectors represent only a portion of the current £250bn data economy. One estimate has put the total proportion of economic value derived directly or indirectly from the data economy in the US as high as 59%. We do however look at relevant elements of the wider data economy that relate directly to propositions in many cases.
- 14.7 Finally, our propositions are designed to target achieving the NIC’s ‘transformational scenario’. Our analysis suggests that a high level of strategic leadership and sustained targeting of key industries to develop capabilities further will be needed to achieve the £163bn transformational scenario, and we have calculated a £53bn shortfall based on a ‘policy-off’ scenario.
- 14.8 Specifically, we envisage that the final two of our five propositions will be enabled and driven primarily by activities, occupations and sectors which have yet to emerge.
- 14.9 The potential for them to do so is clear however⁵¹, but to directly impact on grand challenge objectives is therefore contingent on strategic leadership and supporting activity to align and enable innovation. Maximising impacts against Grand Challenges to create transformational impacts therefore requires a full and active ‘policy-on’ scenario⁵².
- 14.10 The following section presents the key evidence underpinning our propositions:
- Additionality and displacement considerations:
 - Additionality and displacement considerations have been taken into account when designing propositions.
 - Additionality⁵³ is properly defined as: *the net benefits of an intervention after displacement has been accounted for* - hence the two are often considered together⁵⁴.
- 14.11 The economic value of propositions - their additionality - can therefore be understood as the positive net-difference between a ‘policy off’ and a ‘policy on’ scenario. We consider that the NIC enabled level of housebuilding and development as an external impact on the area that can be complemented by active policy, which will be necessary to achieve an augmented ‘transformational scenario’ of an additional £163bn GVA per-annum by 2050.

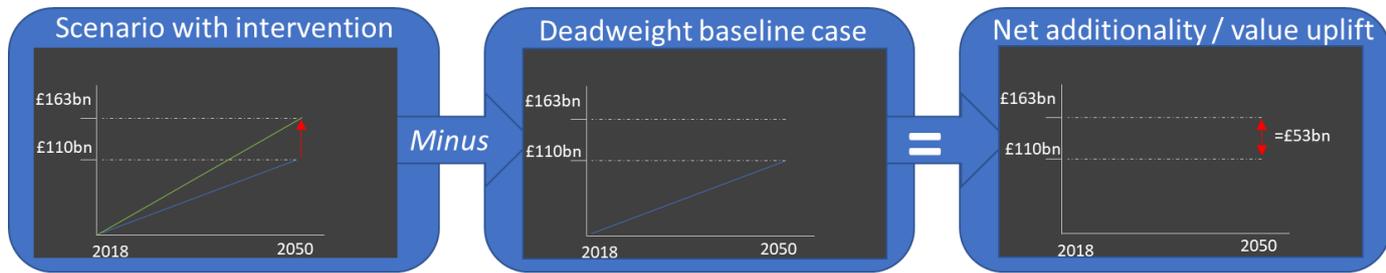
⁵¹ An extensive review of active Innovate UK projects both within BTVLEP and across corridor neighbours has revealed a large number of funded projects with stated objectives to deliver against grand challenges.

⁵² In particular for areas such as ‘clean growth’ which is very closely related to market failure.

⁵³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191511/Additionality_Guide_0.pdf

⁵⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/77592/Displacement_Final_Report.pdf

14.12 The diagram below presents a conceptual outline of this, following government green book guidance:



14.13 Displacement represents a further consideration for Govt in terms of how to allocate funding for initiatives between LEPs efficiently. As a highly productive and successful area, ‘displacement into BTVLEP’, for example based on an identified need for geographic rebalancing, is unlikely to be considered as a policy objective.

14.14 We make a few considerations and assumptions which are important to state:

1. That all propositions have a positive cost-benefit analysis; and therefore, constitute an argument to leverage additional spending and investment (regardless of the balance of public/private match).
2. That in each case except for one: Future Transport - the asset identified as relating to the proposition is unique, and cannot be invested in elsewhere, therefore does not displace activity or create a zero-sum-game for scarce government investment resources.
3. That in the case of Future Transport we make the argument that [near full] displacement of existing modes of activity is the objective of the policy-intervention, and targets improvements in quality, efficiency and equality of use.

14.15 The body of this section discusses the propositions and interventions that we have identified as having the potential to maximise economic additionality due to their nationally significant and unique nature.

14.16 Below we outline displacement concerns that have been taken into account:

14.17 **Westcott:** The Venture Park is a unique national asset. While there is a network of eight Satellite Applications Catapults in the Downstream Space Sector, Westcott is the UK’s only propulsion testing facility in the Upstream Space sector. The proposition compliments and reinforces rather than displaces activity in the sector.

14.18 **Pinewood:** The studios are undertaking an ambitious expansion and investment programme with a value of around £620m across two sites, including Shepperton Studios. Again, these represent unique sites in terms of the ability to support clustering and proximity between film and screen sectors and creative and technology services. Use designations for the sites mean that alternative uses are not displaced, nor can the investment land in other locations.

14.19 **Silverstone High-Technology cluster:** Silverstone is the UK’s only Grade 1 FIA circuit, and as such provides a unique setting. The organic high-technology cluster around the circuit is also unique in its

potential to support 'top-tier' inter and intra-industry knowledge transfer. The proposition supports this ecosystem to develop further organically, rather than displacing it.

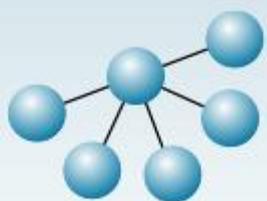
- 14.20 **Stoke Mandeville:** This proposition aims to maximise the potential of the specialist assets contained at Stoke Mandeville, which has already been designated as a pilot. Further, the proposition aims to draw commercial capabilities and skills programmes together to align in terms of delivering a step change in healthcare delivery effectiveness and productivity. The proposition is fundamentally rooted in the logic of addressing market failure and is therefore designed to minimise displacement.

15 Conclusion

- 15.1 This report is part of a set of documents, which outlines the process of gathering data and initial analysis of the emerging evidence base. It provides statistics and research enabling the suggestions of the five propositions to be taken into consideration by the BTVLEP Board, when going forward with developing its Industrial Strategy.
- 15.2 The picture of the economy of the partnership area is complex. It has easily identifiable strengths as there are sectors and assets of national and global significance within the area. At the same time, some of the findings present challenges and potential drawbacks, which can hinder growth. These need to be addressed by the partnership.
- 15.3 It is the right time to take stock and plan for the future. With the imminent approach of BREXIT, the partnership must be prepared to focus on those areas, both in economic and location terms, which will increase productivity, bring the highest growth and enable other sectors to expand as a result.
- 15.4 The BTVLEP is developing a vision, which will be shared and supported by all stakeholders, including those that matter most, the residents and employers of the whole region
- 15.5 Policies surrounding local government finance, the health and care sector, the welfare system and education and skills all impact on local economies and are relevant to our grand challenges. For example, business rate retention incentivises local areas to support the start-up of new businesses in their areas and therefore if we support the development of our space and high technology (HT) sector new businesses and 'spin-outs' from university and business research and development and innovation will positively impact on the amount of money in the local economy.
- 15.6 The Government pledge to increase the numbers of new houses constructed means that the new housing, particularly in the Aylesbury garden town development scenario will both generate finance locally (through, for example New Homes Bonus) and provide the opportunity for digital infrastructure in the home that will support technology led health and care solutions such as GP to patient diagnosis and reducing the more costly face to face appointment and potentially the much more expensive acute care given out ageing society. Our propositions are therefore designed to complement these UK national policies.
- 15.7 Education and skills are similarly critical to improve productivity levels amongst the workforce and businesses in the UK. Our proposition surrounding links between Higher AND Further Education and businesses needs to be underpinned by improving the take up and achievement of STEM subjects in our schools.

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