

Draft Buckinghamshire Local Industrial Strategy

1. Introduction

Buckinghamshire faces a choice. Does it have the ambition to seize the opportunities presented by the Oxford-Milton Keynes-Cambridge corridor and act to ensure that its nationally significant economic assets deliver more for the county, the corridor and the country, responding whatever opportunities and challenges arise from Brexit? Or does it want to accommodate new house building to enable economic growth elsewhere in the corridor with no coherent response to the post-Brexit economic climate?

This draft local industrial strategy sets out the approach needed to pursue the first of those alternatives. It forms part of a family of Local Industrial Strategies being developed for the Oxford - Milton Keynes -Cambridge Growth Corridor; and it is in effect a local chapter of the Government's national industrial strategy. The draft has been developed with significant input from businesses and other stakeholders in Buckinghamshire through a steering group established by the BTVLEP Board and a series of workshops.

We have adopted an assets-led approach to developing this Local Industrial Strategy (LIS). Through a comprehensive evidence review and the stakeholder conversations referred to above, we have identified the five economic assets in Buckinghamshire that are or have the potential to be nationally significant and to contribute to a drive to raise productivity and enable economic growth nationally and locally. The core of the LIS is six programmes of activity that are designed to develop and mobilise the assets to raise productivity and enable growth.

The assets and the programmes we have identified draw on the five foundations of productivity set out in the national industrial strategy. They also contribute to the delivery of the vision for the corridor and address the Industrial Strategy's four grand challenges. These programmes will support a new ecosystem of business innovation to develop fresh commercial opportunities arising from those challenges, finding solutions to current issues and foreseeing future challenges. Our strategy will be delivery focussed, but it will be much more than a bidding document. The LIS is underpinned by an evidence-base to identify and bolster the economic strengths in Buckinghamshire that will contribute to this growth and set the actions needed to address any weaknesses.

The Government intends that the Local Industrial Strategies will take a longer timeframe perspective than Strategic Economic Plans. This LIS therefore concentrates on actions to bring forward growth and enhanced collaboration between businesses, research organisations and the public sector at a BTVLEP and corridor level. This document will inform a deal based programme, incorporating funding opportunities from government and the private sector, and linking with place based strategies and the overall corridor vision. This will lead to a less transactional relationship within our ecosystem, better supply chain developments and a new relationship between business and government.

The Buckinghamshire LIS will not replace the recently refreshed SEP and it will not seek to duplicate the housing growth strategy, corridor strategy or infrastructure plans. A key objective for the LIS will

be to create the conditions in which the other strategies recognise, contribute and exploit Buckinghamshire's key economic assets. Delivering the LIS will require a new culture within Buckinghamshire's business community, education institutions, public service providers and local government. A culture of collaboration and innovation necessary to develop our economic assets, provide a distinctive role at the heart of the corridor and thrive in post-Brexit Britain.

The draft LIS:

- Sets out the evidence gathered to drive higher levels of productivity and economic growth
- sets out a vision for the economy of Buckinghamshire in 2030 and beyond to 2050 that will address current challenge and opportunities;
- summarises the wider strategy context and sets out BTVLEP's strategic position within the Oxford – Milton Keynes – Cambridge Growth Corridor;
- describes each of the proposed economic assets that distinct drivers of growth and productivity in Buckinghamshire and the action required to mobilise them;
- outlines the six proposed programmes of activity that will deliver productivity and growth and respond to the opportunities and challenges that arise from Brexit.

Strategic Growth Corridor Vision

BTVLEP as part of the Oxford - Milton Keynes - Cambridge Growth Corridor has been selected as a national pilot area for the development of a Local Industrial Strategy. The corridor's ambition to become a world-leading innovation corridor with internationally recognised sustainable places and infrastructure that enables growth and investment is complementary to that of the BTVLEP LIS. There are three emerging interdependent themes of this regional strategy include Productivity and Jobs, Place-making and Housing Growth, and Connectivity and Infrastructure.

This vision is complementary to the emerging BTVLEP LIS and will be driven by the development of the Buckinghamshire business ecosystem and the opportunities for developing the international capacity and export potential of businesses from across the Corridor. We see significant potential in the concept of the corridor and in working across wider economic areas such as this. This wider agglomeration of areas will be important for collaborating with central government. A primary task of this LIS is to set an agenda for Buckinghamshire's distinctive role in the corridor as home to the places in which the ideas and innovation developed across the corridor can be applied in a commercial and entrepreneurial environment.

How to get involved

We wish to continue to test these emerging actions with stakeholders to ensure the actions will achieve the overall outcomes of the LIS. We welcome input from wider stakeholders and are inviting comment through this process. To contribute to the development of the Local Industrial Strategy for BTVLEP, please contact Ian Barham at BTVLEP or Lisa McCance at Shared Intelligence.

ian@btvlep.co.uk or

lisa.mccance@sharedintelligence.net

2. Buckinghamshire Economy 2030 and beyond to 2050

Buckinghamshire is home to iconic business brands and locations: Pinewood, Silverstone, Westcott and Stoke Mandeville. Our ambition is to exploit these and our other nationally significant assets to increase the economic output of the county, improve the financial outlook for our business base and contribute to tackling Britain's productivity challenge.

Major planned housing growth, new East-West road and rail connections, the expansion of Heathrow and significant investment across the Cambridge-Milton Keynes-Oxford Growth Corridor create the conditions for sustained economic growth in Buckinghamshire building on our rich entrepreneurial base and promote economic and transport links with London.

In 2030, Buckinghamshire will be a place where:

- the rich tapestry of entrepreneurial businesses benefit from the strength of our iconic brands;
- testing, experimentation and commercialisation of new ideas happen;
- sustained investment in R&D and future technologies drive continuous improvements in productivity.

This will reflect over a decade of concerted action to mobilise our distinctive local capabilities, economic strengths and anchor assets by:

- a revolution in education, training and skills development including action to attract, retain and develop the Buckinghamshire workforce;
- making Buckinghamshire an even better place to live and work, creating the buzz and liveability needed to foster entrepreneurialism and innovation;
- creating the conditions in which Buckinghamshire is a living lab testing new ideas and developing them as commercial applications and products.

Our Local Industrial Strategy will set out the action we need to take to realise this ambition. It will also provide the basis for a new relationship with government and our neighbouring LEAs. It will set out a programme of activity to mobilise our five key economic assets that are nationally or globally significant and have greater potential to contribute further to the delivery of productivity targets across the corridor, amounting to building up to 1 million homes by 2050 and the potential to support around 1.1m new jobs, increasing economic output by £163bn per annum¹.

Delivering this vision will not be without its challenges. New housing delivery will not automatically lead to new inclusive communities or sustainable economic growth without significant investment in local places, human capital and infrastructure – physical and digital. Other factors that must be addressed include:

- The scale of the productivity challenge that requires concerted effort to ensure growth is not stymied or output lost through external factors.

¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/598767/170308_Strategic_Planning_and_Governance_Discussion_paper_prepublication.pdf

- Challenges of Brexit and a potential loss of talent whether that be through lack of attractive employment and housing opportunities for young people or a loss of our non-indigenous workforce will need to be addressed.
- Respect for the scale of the growth potential of the area and the need for continual government and business investment to ensure that communities and places are not left behind.
- Quality housing and tenure options that go beyond quantity and volume and that reflect the employment ambitions of the county and corridor.

Key to the success of this LIS will be business and civic leadership united in creating the opportunities for fresh thinking to address the challenges and opportunities facing Buckinghamshire and the country in ways that enable economic growth and higher productivity.

Powerful and coherent local leadership

A common requirement of these programmes is the need for effective leadership locally. In many cases the programmes require new thinking from private sector and public service providers, collaborating more effectively together to strengthen the internal and external ecosystem. This is particularly relevant in relation to:

- greater collaboration between business, education and training providers to deliver our education revolution;
- ensuring that the people leading health and care integration are open to part that businesses can play in helping to achieve their ambitions;
- an integrated and ambitious approach to transport planning to create the conditions for new future transport;
- enabling collaboration between planners, developers, housebuilders and infrastructure providers to realise the living lab potential.

3. The wider context

The objective of this LIS is to mobilise the action necessary to ensure that Buckinghamshire's nationally significant economic assets play their full part in raising productivity and enabling economic growth locally and nationally. Buckinghamshire's position at the heart of the Oxford-Milton Keynes-Cambridge Growth Corridor is key to exploiting that potential and one of the objectives of this strategy is to ensure that the county contributes to the delivery of the vision for the corridor and secures maximum benefit from it.

The joint vision for the corridor envisages the creation of around 1.1m new jobs by 2050, increasing economic output up to £163bn per annum. Action to support that level of growth includes the construction of up to 1m new homes and improved East-West connectivity through the Expressway and improvements to the East-West rail line alongside international opportunities with the Heathrow expansion.

One of the primary tasks of this LIS is to create the conditions for Buckinghamshire to play a distinctive role at the centre of the corridor. We are not attempting to compete with the assets of Oxford, Cambridge or Milton Keynes. Rather we have the places and spaces in which businesses can apply new technologies and innovations in a distinctively commercial and entrepreneurial environment.

Buckinghamshire has a strong historical relationship with housing growth, with Aylesbury having delivered significant housing growth in the past. Aylesbury, which has gained Garden Town status, is set to grow by 16,000 homes by 2033. This level of housing growth is an important factor in this LIS and the economy must sit central to its development. It has the potential to accommodate employment growth and create opportunities for businesses to test and introduce new products and technologies: our living lab.

The planned investment in transport infrastructure is also critically important to the delivery of this LIS. The Oxford to Cambridge Expressway, including filling the missing link between the M1 at Milton Keynes and the M40 at Oxford is key to the further development of our economic assets. The improved rail links will also improve accessibility: the cross over between HS2 and the East-West rail link will be in Buckinghamshire.

This transport investment also has a potentially wider impact of the future of the Buckinghamshire economy, introducing a strong East-West dynamic to counter-balance the relationship with London, which is significant in many parts of the county.

Finally, it is important to note that this LIS is not intended to replace the LEP's recently refreshed Strategic Economic Plan that has a wider focus on enabling economic growth across the county.

This section will be updated and revised as the work on the corridor vision develops.

4. Delivering the vision

The core of this emerging LIS is a set of actions, interventions and asks of government which are intended to enable us to grow and develop our most significant economic assets and ensure that they contribute as much as possible to the national drive to raise productivity and enable economic growth.

The assets we have identified are those, which the evidence shows, are, or have the potential to be, nationally significant. In deciding which assets to focus on we have also considered two other factors: the extent to which the asset is distinctive to Buckinghamshire; and its contribution to delivering the vision for the Oxford-Milton Keynes-Cambridge Growth Corridor.

As a result of this analysis, and through a series of conversations with local stakeholders, we have identified five key assets. Three of these assets are nationally and internationally significant, are grounded in very strong business capabilities, and have a strong locational focus. They are:

- Upstream Space (Westcott);
- Creative & Digital (Pinewood);
- Super High Technology (Silverstone).

The other two assets do not currently have a single location asset but have significant local capability and economic potential. These assets are also directly relevant to the Grand Challenges set out in the Government's Industrial Strategy. There is potential for business to develop significant capabilities in these areas but the public sector has an important role to play in enabling this to happen through its strategic and commissioning responsibilities. They are:

- Growing MedTech and advanced AI;
- Future Transport and energy.

In thinking about the actions needed to mobilise the potential of these assets we have considered three sets of factors:

- the five foundations of productivity in the Industrial Strategy;
- the specific challenges and opportunities relevant to each of the assets;
- the actions needed to mobilise the underlying economic strengths of Buckinghamshire.

We are proposing four programmes of activity:

- **The Education Revolution: Creating a new post-13 education and training system.** This is key to meeting the skills and workforce requirements of businesses associated with our assets and raising productivity across BTVLEP as well as inspiring employers and young people through a new technically-led system.
- **Digital Infrastructure: Delivering full fibre optic broadband coverage in all new developments.** Action of this front is essential if poor coverage across large parts of Buckinghamshire is not to hamper the exploitation of our assets.

- **The Living Lab: Establishing a formal living lab framework to enable rapid testing and introduction of new products and technologies.** This is not about creating a test environment that's representative of real life, but rather enabling innovations to be delivered in real life situations characterised by situated experimentation, diversity, participation, evaluation and learning.
- **Commercialising Innovation:** Supporting a network of centres to accelerate the commercialisation of innovation in Buckinghamshire. We must enable universities and other research institutions to do more to support innovation in businesses, and help businesses to take more advantage of the innovation support that is available.
- **Improving business prospects:** Action to reduce business costs through the 5 assets and draw on the capabilities of the place... Business services etc. NEEDS TO BE FURTHER EXPLORED
- **Energy supply and demand:** Decarbonised heat energy system; Paris agreement – where is funding going to come from? Advanced infrastructure at Woodlands etc. NEEDS TO BE FURTHER EXPLORED

In this section, we provide a pen portrait of each of the assets, describe the current capabilities, set out our core proposition and outline the actions required to mobilise the asset. In the following section, we outline our proposed programmes of activity to deliver a step change in economic drivers in more detail.

In each section we:

- describe the current asset and capabilities in Buckinghamshire;
- summarise the evidence which substantiates its selection as a net asset;
- set out our core proposition for developing the asset and the actions required to do so;
- set out the potential impact.

The Propositions

Upstream Space

Action to support the growth of the National 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 corridor.

The Asset

- 1.1 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.
- 1.2 The facility will allow UK companies, UK space organisations and academia to test and develop space propulsion engines. Buckinghamshire Thames Valley LEP are investing gvt LGF funding in an Innovation / Incubation Centre and a skills training hub – both of which will support the space sector.
- 1.3 Upstream Space is a strategic nationally significant sector, underpinning national infrastructure security and ‘downstream’ value growth chains across nearly all sectors.
- 1.4 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.
- 1.5 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.

BTV Capabilities

- 1.6 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 BTV 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 actors 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.

1.7 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

1.8 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 2014² 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.
- Lightweight and low cost thermo-structural materials with potential both for game changing reusable launch vehicles, and ultra-low-cost expendable vehicles.

²https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=3&ved=0CCsQFjAC&url=https%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

- Spacecraft platform designs that enable miniaturisation and significant cost savings through in-orbit maintenance.

1.9 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.

1.10 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

1.11 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.

1.12 Productivity per-worker in the upstream sector is around £75,000³. 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.

1.13 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.

1.14 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.

1.15 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 fund⁴. 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

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

³ Upstream Space SIA

⁴ For example if £23bn = 2.4% of GDP and GDP grows by 10% then £23bn → £25.3bn.

1.17 BTVLEP has a location quotient of 2 with respect to the national sector⁵ 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 that⁶. 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

1.18 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 Corridor.

1.19 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.

1.20 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.

Actions required to achieve impacts

Short-term

- BTVLEP and the Catapult to develop a fund through source such as Innovate UK or UKSPF to support revenue costs needed to broker meetings with key players to set-up an in-orbit service demonstration centre at the Westcott site, the first in the country, to harness SME innovation, sector collaboration and international investment.
- Formalise the BTV-Westcott cluster through business development resource as a key link in the UK space supply chain with internationally unique capabilities linked to early stage propulsion testing & drone applications, providing resilience for the UK Space sector in light of increasing international competition, establishing special interest groups to drive opportunities.

⁵ 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.

⁶ 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.

Medium-term

- Create a dedicated education centre supporting corridor level STEM and degree level apprenticeships – a Space Academy – to not only keep pace with ‘augmented’ sector growth rate but also drive talent through specialist PhD programmes such as a research-based Space Propulsion Partnership.
- Extend the boundary of the EZ on the Westcott site to reflect the growing importance of the site, to advance future business growth, attract inward investment, and increase export opportunities while capitalising on the status of the site as the chosen location for the ground-breaking Reaction Engines Sabre Test Facility.

Long-term

- Exploit benefits of 5G Catapult centre for innovative, high-growth SMEs, linking AI and CAV testing, trialling, and capitalising on ‘beyond-line of sight drone testing’ capability for applications within new urban settlements, rural communities and in orbit operations.

Creative and Digital

Action to maximise Pinewood'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

- 1.21 Pinewood 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.
- 1.22 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.
- 1.23 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.
- 1.24 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 BTV entrepreneurs and learners.
- 1.25 The National Film and TV Centre School (NFTS) is also of national significance with the country's only 4K television studio and film studios.
- 1.26 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.

BTV Capabilities

- 1.27 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 BTV [+59%; +6,850 jobs].
- Coding and programming is the number one in demand skill: in terms of job adverts globally, local BTV 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 findings¹ – 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.

1.28 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.

1.29 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.

1.30 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 2015⁷.

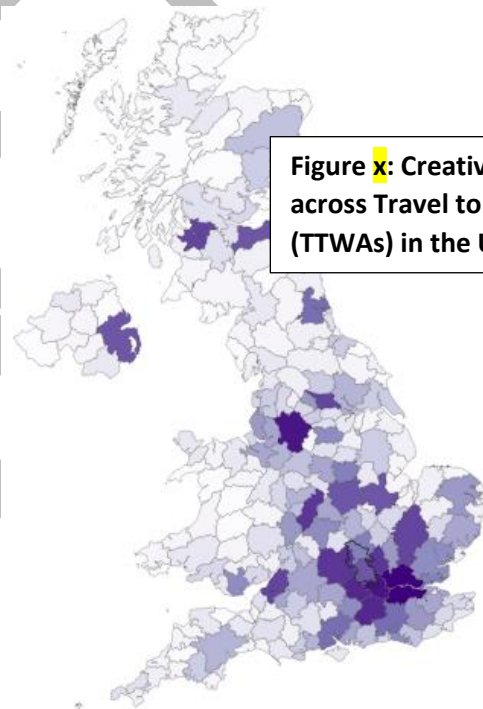


Figure x: Creative employment across Travel to Work Areas (TTWAs) in the UK

Evidence Context

Potential to drive value growth and impact from the proposition: Creative and Digital economies can bring forward value to the economy

⁷ 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

- 1.31 The UK's booming creative industries made a record contribution to the economy in 2016⁸.
- 1.32 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.
- 1.33 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.
- 1.34 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.
- 1.35 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.
- 1.36 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.
- 1.37 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.
- 1.38 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.
- 1.39 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.
- 1.40 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).

⁸ <https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2016-gva>

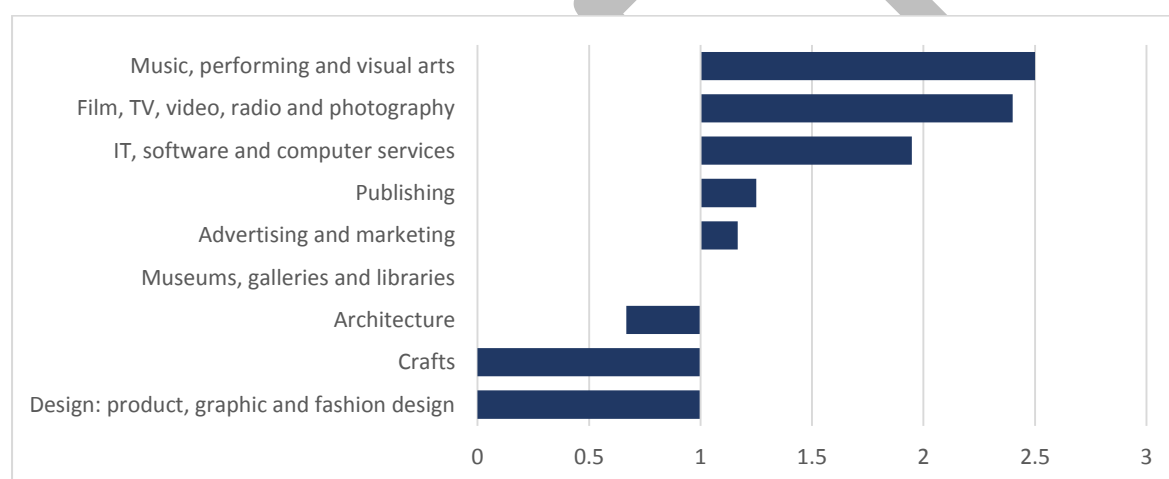
1.41 The Arts and Humanities Research Council (AHRC), with support from the Government’s Industrial Strategy Challenge Fund, has introduced a Creative Clusters Programme to strengthen creative clusters across the UK⁹. This clearly sets out the value of the sector to UKPlc.

At a BTVLEP level

1.42 BTV’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.

1.43 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 BTV area.

Figure x: Concentration of DCMS sub-sectors in BTV



Source: International Business Register using NESTA 2018 methodology.

1.44 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 BTV and across the UK.

1.45 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 BTV area.

1.46 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.

⁹ <https://ahrc.ukri.org/funding/apply-for-funding/archived-opportunities/creative-industries-clusters-programme/>

1.47 Wycombe has the largest creative cluster of the four BTV districts, but South Bucks – the location of Pinewood – has created the highest contribution since 2010.

1.48 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.

Table x: Overview of Buckinghamshire’s creative sector

BTV 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

1.49 Aylesbury however has performed poorly, contributing just 10% of creative jobs from an initial base that contained 24% of BTV’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

1.50 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 Cambridge-Milton Keynes-Oxford Growth Corridor strengths, including in high performance technologies, with a particular focus on attracting international investment and driving up exports.

1.51 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.

We believe action is needed to:

Short-term

- Build on the work done by StoryFutures (SF) project led by Royal Holloway College in collaboration with Pinewood-Shepperton, Sky VR, Heathrow and the National Film and TV School.
- Develop next-generation storytelling, producing compelling content for emerging creative technologies to exploit crossover of the UK's 2nd largest export (television) and the significant rise in Bucks of IT, software and computer services.
- Develop a programme of investment in and around the High Wycombe Station Quarter as hub for creative industries reinterpreting historic industrial buildings and strengthening links with university and industry partners to help capitalise on the burgeoning e-games industry growth to support competition locations.
- Address social infrastructure and improve cultural provision, including a focus on NTE infrastructure. Create 'buzz' through an ambitious approach to culture in South Bucks, Wycombe and Chiltern, focusing on immediate opportunities of Chesham station to deliver a creative hub.

Medium-term

- Exploit connections with other technology strengths including High Performance Technologies where collaborative R&D in high value manufacturing has focused on ways to improve paediatric R&D and engagement with older population. This could include wholesale roll out of digital connectivity (5G and/or ultra/ super-fast broadband).
- Address barriers to growth in the sector identified in the Bazalgette Review: including planning policies and insufficient supply of skilled crews, embedding vocational skills at below FE level. Use a Stanford model approach (an Academic & vocational EBP with elements of sector council approach). Make this a 'skills incubator' to support growth that will remove barriers to inward investment from the major studios.

Long-term

- Skills in immersive technologies (AR, VR and Mixed Reality) is a priority. Open a Centre for Immersive Technologies (C4IT) for skills training; test concepts and prototypes and offer high-end tech services. Happy to work with LEPs to establish a C4IT within the School of Computing at Buckingham.
- Maximise economic and business benefit of Pinewood's existing and future expansion plans with an opportunity for a connected Innovation Park capitalising on the increased access to an expanded Heathrow Airport and Western Rail Access to Heathrow.

Super High Technologies

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 corridor and nationally

Asset

- 1.52 The Silverstone Technology Cluster, with the Silverstone Park Innovation Centre at its heart, is a world-leading cluster of high-tech engineering businesses. 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 have happened.
- 1.53 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.
- 1.54 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.
- 1.55 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 corridor 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

- 1.56 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.
- 1.57 BTV and the motorsport industry more generally has a legacy of commercially driven (rather than government research¹⁰ 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 corridor 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%.
- 1.58 High technology in the broadest – Eurostat compiled definition – places BTVLEP fourth on a list of LEPs for higher concentrations¹¹ employed in high-tech industries at a national level and above neighbouring corridor LEPs. Buckinghamshire's high-tech sector employs 24,545 people, which accounts for 10.2% of total employment.
- 1.59 **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

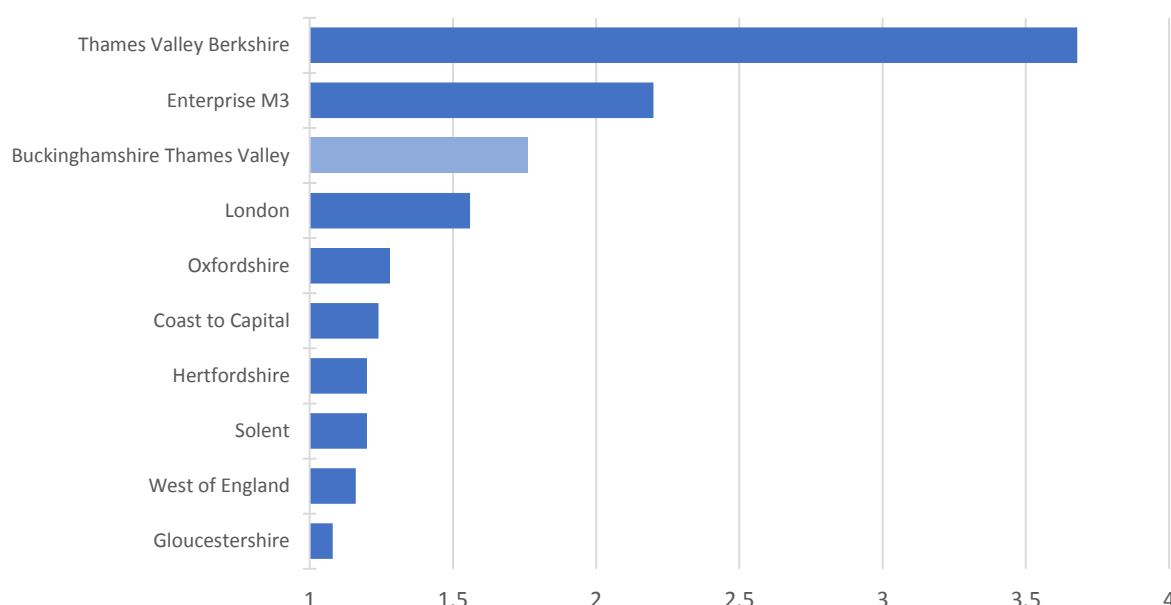
- 1.60 Disaggregating the sector (see figure 2), we can see that the largest portion of this local specialisation is made up by computer consultancy activities (6,500 employees), followed by engineering activities and related technical consultancy (3,000 employees), computer programming activities (2,125 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.
- 1.61 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

¹⁰ 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, BTV 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'.

¹¹ 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.

Thames Valley Berkshire but above Oxfordshire and Hertfordshire for the proportion employed in computer consultancy activities.

Figure x: 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

- 1.62 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.
- 1.63 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.
- 1.64 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).
- 1.65 With regard to the High-Performance Engineering (HPE)¹² 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 corridor area, the OxLEP HPE sector has marginally increased (+3%) over this period whilst the Greater Cambridge and Greater Peterborough (GCGP) HPE sector

¹² Uses definition developed by Northamptonshire Enterprise Partnership: High Performance Engineering in Northamptonshire 2011.

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).

1.66 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).

1.67 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

1.68 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 Corridor and nationally.

1.69 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.

1.70 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.
- 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.

Actions required to achieve impacts

Short-term

- Enable foreign direct investment in new technologies through the creation of a prospectus with DIT to exploit international trade links, capitalising on the strong brand of Silverstone.
- Develop a vehicle for opportunities through a LIS Delivery Board for knowledge sharing and spill overs to support and promote commercialisation of ideas, linked to the BTVLEP LIS drivers.

Medium-term

- Deliver a unique new approach to skills provision in Buckinghamshire that brings all schools, FE and HE providers together with business at scale. This would include new schools and academies focusing on practical tech and STEM skills, majoring on employer involvement, a year in trade, work experience etc. but be imbedded within mainstream provision. This would also support a regional focus on new and flexible Centres of Technology at the heart of the Growth Corridor.
- Develop the role of Aylesbury Vale Enterprise Zone in building sector assets and supply chains including a network of High Tech Super Clusters linked to the capabilities of available at Silverstone Park advancing the development of over 300,000 sq. ft. of development space within the Enterprise Zone site.

Long-term

- Develop the innovation ecosystem to improve B2B connectivity between businesses and universities and other centres of research excellence.

Growing a MedTech Sector and advanced AI

To develop and build on the assets and capabilities in Buckinghamshire and across the corridor 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

- 1.72 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).
- 1.73 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.
- 1.74 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 BTV.
 - High Wycombe is home to a developed software and digital consultancy cluster in the South of BTV.

Capabilities

- 1.75 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 BTV, 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.
- 1.76 This proposition is underpinned by three 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 (HPT) 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

- 1.77 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.
- 1.78 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 businesses. These businesses may in some cases generate very high revenues for UK Plc and the exchequer, supporting national productivity growth.
- 1.79 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.
- 1.80 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 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 BTV and across the UK.

The proposition

- 1.81 To develop and build on the assets and capabilities in Buckinghamshire and across the corridor 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.

1.82 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 corridor.

1.83 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.

Actions required to achieve impacts

Short-term

- Nurture collaboration between businesses and health and care providers to support the operation of the Integrated Care System and the use of technology in adult social care, expanding the capacity to support business spin-offs from the Health Care Trust and the Universities.
- Improve quality HE/research input to develop some 'state of the art' thinking around commercialisation and taking products to market.
- Utilise heritage as the birthplace of the Paralympic Movement to position Buckinghamshire as the "medical tech adoption accelerator" with dedicated pathways for at scale product testing and dedicated medical device regulation degree apprenticeship programmes.

Medium-term

- Exploit the opportunities offered by housing growth in the Aylesbury Garden Town and surrounds to test the application of new technologies to provide care in people's homes.
- Shift activity from telehealth and telecare to connected digital home, adapting the 'public sector' health and social care sector, particularly within the Aylesbury Garden Town Programme and intervening in the vocational skills sector rather than stimulating research into BIM, Smart homes, connected digital home technologies etc.

Long-term

- Expand the UK's first Independent Medical School at the University of Buckingham and develop a cross curricular programme looking at the use of artificial intelligence in healthcare applications.

Future Transport and Energy

Action to position Buckinghamshire, in collaboration with its corridor 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.

THIS PROPOSITION NEEDS MORE WORK. THE OVERALL NARRATIVE RELATES TO:

- New homes coming forward; want sustainability communities
- New infrastructure required but so is now way of living
- Clean air will be a real challenge
- Need to grow the public sector capability; need some investment; future transport provision at Woodlands; AVGT; locational piece
- Investment in infrastructure is not being considered in relation to the new communities and new ways of delivering
- Local partners at Bosch, Ceres Power, Marlow electric energy
- Intersection of 3 DNO's
- Grid at capacity
- Need to think about early investment at the level of the state and new technology delivering fuel cell changes
- How can we pull through the UK technology

Asset

1.84 Buckinghamshire's strengths in high-performance technologies - including the Silverstone Technology Cluster and the motorsport cluster, the 5G Catapult centre at Westcott and proximity to Milton Keynes as a potential centre for 'Smart, Shared, Sustainable Mobility' - mean that it is well-positioned to make a major contribution to the Future Mobility Grand Challenge. Major developments in Aylesbury Vale Garden Town could also provide an ideal opportunity for trialling and rollout of new technology including CAVs in partnership with MK.

1.85 BTV has been identified as having innovation capabilities around Lithium Ion battery development supported by investment through 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 2010 to 2030 is also set to 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).

1.86 Buckinghamshire County Council is directly involved in the two investments in the BTV geography, with a total value of £302,771 – 0.3% of the national total for Government innovation investment in transport. These projects are highlighted within the red circle below:

- OneM2M-based Open Ecosystem for Transport Modal Shift
- oneTRANSPORT: A oneM2M-based Open Ecosystem for Nationwide Transport Integration

1.87 While these two projects are modest in terms of the scale of funding, they demonstrate intent and leadership ambition within BTV to address the challenges of mobility in a peripheral urban setting.

1.88 Looking at the project descriptions (see appendix) it seems possible that there may be useful links to be drawn out in terms of the modal shift (away from cars) that Bucks is targeting, and the integration into wider systems (by far the larger of the two funded initiatives) that can link to the scale of work being undertaken in Milton Keynes.

1.89 We recommend exploring how links with MK can address transport integration and modal shifts more comprehensively by working at a ‘corridor’ level of scale.

1.90 OxLEP also demonstrate significant innovation leadership in Future Transport and Energy sectors. We recommend exploring how innovation capacity can be brought together with the ambitions of BTV and the capacity for infrastructure co-ordination that the MK Transport Catapult offers.

BTVLEP Capabilities

1.91 Innovation capabilities around Hydrogen fuel Cell testing and development have also been identified within the Westcott Business Plan – making BTVLEP one of the only locations in the UK where the final stages of development and pre-market safety testing can be done for this technology. This in turn cross supports the viability of the Upstream space business plan.

1.92 The 5G centre further support the potential for drone testing, and supportive planning uses are in place to enable this. The commercial viability of final mile drone delivery increases as population density lowers for single package deliveries, meaning that BTV has the place, infrastructure people and ideas to pioneer this innovation sector. In turn, this can create productivity impacts and a step change in growth for logistics, home care, pharmaceuticals and potentially a range of other sectors.

1.93 Finally, the design-test-and-build capabilities that exist at Silverstone Motorsport cluster, and the proximity to the national Transport Catapult mean that the BTV area has the potential to lead the trialling and exploration, with several current BTV innovation activities also relating to developing advanced lightweight materials and composites, integration of transport systems, and promotion of electric charging points.

Evidence to support ambition

1.94 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.

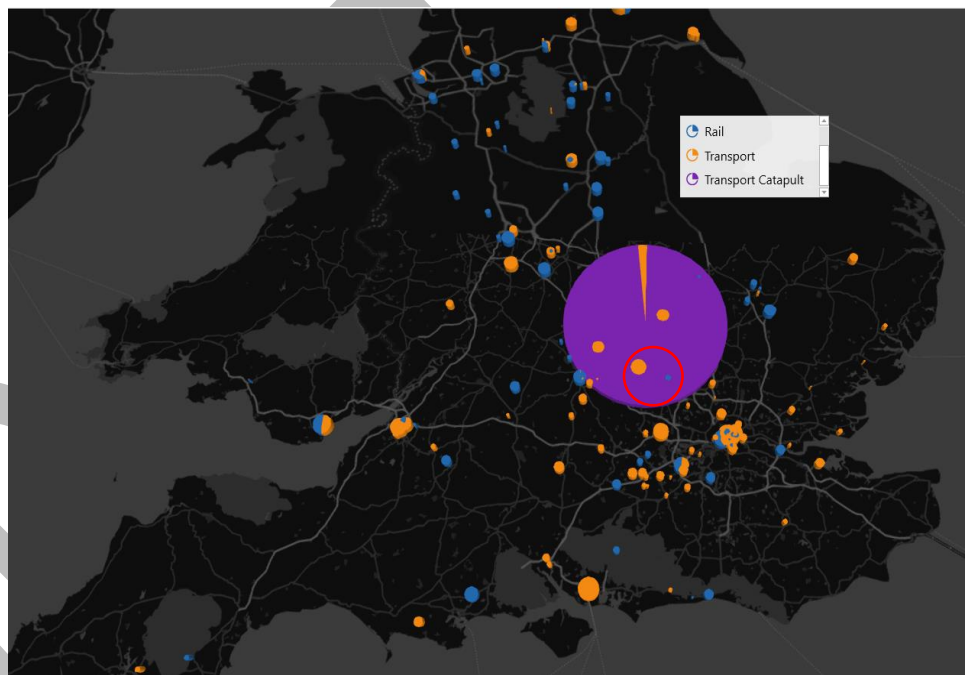
1.95 Emerging testbeds are enabling a wide range of technologies to enable future mobility solutions. Through advances in connected and autonomous vehicles, entire transport systems are being developed to include sensors to enable smart infrastructure; digital worlds for virtual validation; communications systems such as 5G (learning from Westcott); mobility as a service; and use of data to support the next generation of products.

1.96 A total of 306 'transport-related' investments¹³ have been made by Innovate UK, formerly the Technology Strategy Board (TSB). These have been classified into 'Rail'; 'Transport'; and 'Transport Catapult' investments.

1.97 These investment types represent 1.4% of 22,093 investments made in terms of the total number; and, the total 'offer granted' value¹⁴ for transport projects of £108,131,992 represents 2.6% of the total investments across all projects since 2010 (£4,165,029,279). Investment at a sub-regional level is comparably high in Milton Keynes, home of the National Transport Catapult.

1.98 To put this in perspective – the investment in the National Transport Catapult totals £71,039,303 across 8 core catapult initiatives, and a further £1,288,114 across 5 more projects.

1.99 This £72,327,417 of total investment is therefore 66.9% or >2/3 of the total national investment to bolster future transport and innovation capability.



Relative innovation capabilities: number and scale of Innovate UK grants made

1.100 The table overleaf highlights that 156 innovation grants have been awarded in BTVLEP since 2010/11, with a total value of 14.5m.

1.101 OxLEP, by comparison, has received 715 innovation grants, with a total value of >£195m in the same period. This is four-and-a-half times the number and thirteen times the total value. The value of innovation investment in Future Transport in OxLEP (£14.3m) is equivalent to the total of innovation grants across all sectors in BTV.

¹³ In fact, there are further supply chain elements which may be captured under other headings, however to avoid double counting these have been counted separately. For example: super-lightweight and advanced alloys (primarily for use in transport) would fall under 'advanced materials'.

¹⁴ Innovate UK in some cases funds the total cost of a project but typically the investment represents around 50% [this varies significantly however]. We are capture external gvt investment in innovation here, rather than total project costs.

1.102 The opportunity to combine the scale of innovation approaching market in OxLEP, ambitions for Future Mobility in BTV and the capacity to co-ordinate across corridor locations based at Milton Keynes should not be overlooked.

Year	TSB grant value	Number	Average Value
2010/11	£541,004	9	£60,111.56
2011/12	£1,143,246	20	£57,162.30
2012/13	£1,612,534	24	£67,188.92
2013/14	£1,869,202	18	£103,844.56
2014/15	£4,350,416	27	£161,126.52
2015/16	£2,090,624	30	£69,687.47
2016/17	£2,703,741	25	£108,149.64
2017/18*	£271,972	3	£90,657.33
TOTAL	£14,582,739	156	£93,479.10

1.103 Furthermore, the BTVLEP relationship with Transport for London which operates several services in BTV, as Amersham and Chesham stations fall within the top north-westerly geography of TfL's remit. In this sense, part of BTV is already integrated with London's wider Oyster network. This brings significant capability in terms of transport management and integration from TfL into the BTVLEP area, and TfL are actively exploring the potential across three markets that represent specific opportunities for BTV:

- Connected Autonomous Vehicles – to embed sustainable transport options before CAV's are deployed at scale across London, with the potential to reduce walking and cycling through displacement (for example if there is a choice between a smart vehicle lane or a cycle lane); and or reduce traditional use of public mass-transit options leading to rising fares for remaining users.

1.104 The primary benefits of CAV's are understood to stem from the additional safety features, however when surveyed – a majority of drivers would 'retain the option to override the AI system' for example in an emergency.

1.105 Autonomous Buses are an area where potential is being explored by TfL and is of interest to Buckinghamshire in relation to mobility as a service in new Garden Town developments.

- App based services – offering disruptive technology that can provide new services away from traditional modes of transport.

1.106 App based services include:

- Dockless cycle hire schemes
- City mapper services
- Uber (etc)
- The potential to explore a TfL-led Demand responsive bus service.

1.107 To drive recent decisions, TfL have made use of OpenData approaches facilitated by apps such as CityMapper. This kind of sharing of anonymised user data is seen as key to creating innovation and competition – as well as contributing to improving the overall service. Promoting competition while maximising the efficiency of services is a challenge where TfL recognise some key trade-offs exist; and commissioners must take a ‘whole system’ approach to the implications of introducing new services.

- Drones – offering the potential to substitute van-based final mile delivery (which has increased by 18% in London 2012-17, exacerbating congestion) – with drone-based approaches of interest to both transport policy-makers and the logistics sector.

1.108 A key point that TfL note however is the increased safety restrictions that [sensibly] exist in dense urban areas. TfL further note that ***“drone’s comparative advantage against vans tends to increase as the density of the population diminishes... so there is a role for drones in more remote areas.”***

1.109 Use of airborne drones is regulated to some extent by the CAA, which restricts any beyond line of sight flights, with further special restrictions over urban, commercial and population centres. The use of ground based-drones is by comparison not strongly regulated, and one commercial operator has already signed ‘MOU’s with several boroughs.

1.110 A draft bill from the Mayor and TfL exploring further potential of drone use in London is expected in Spring 2018.

1.111 Cranfield University is also currently exploring the potential for ‘beyond line of sight’ trials for drones (these are currently heavily regulated and for the most part prohibited). This trial will explore the potential of 5G technology to support key tests around performance and safety by combining remote sensor and AI approaches to facilitating safe and efficient use of drones.

An international (US) perspective on technology road-mapping

“Many automotive manufacturers are developing vehicles with automated driving systems, and several have pledged to introduce conditional automation (SAE J3016 Level 3), such as automated highway operation, within the next year or two.

Other automakers indicate that such conditionally-automated systems are too complicated from a human-factors perspective and intend to skip to higher levels of automation that do not require a human driver at all. There is no consensus in terms of strategy among automakers and suppliers on this point.

Finally, it is too soon to predict whether it will be possible to produce fully automated vehicles (SAE Level 5), capable of operating anywhere and in all situations¹.”

Source: Cargroup Technology Roadmaps 2017

Proposition

- 1.112 With significant investment in transformational infrastructure across BTVLEP area, local capabilities have the ability to use this opportunity to create a step change in future mobility and transport solutions. Innovation capabilities around Lithium Ion battery development supported by investment through Innovate UK exist in the BTVLEP area. 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 2010 to 2030 is also set to 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).
- 1.113 Position Buckinghamshire, with Corridor partners, as a main centre for innovation, testing and trialling of technologies, infrastructure and the regulation for the development and roll-out of approaches to future mobility. Maximising economic, social and business benefits from being at the forefront of these developments will be central to plans.

We believe action is needed to:

In the short-run:

- Establish the will and appetite for Bucks to take a leadership role - to draw interests together, commission and market make.
- Develop a blueprint across local capabilities to explore convergence between future transport and future energy systems, use of data to drive innovation, mobility as a service in new housing developments through sub-regional corridor partners.
- Bring together capabilities including Silverstone and Westcott (potential for spin-off – e.g. Formula E and hydrogen technology).
- HS2-EW crossover should be more of a national focus. Discussions have focused on each separately and should be integrated.
- 'Plan-in' the fact that the social entrepreneurs of tomorrow need entrepreneurial infrastructure. SME's just getting going in more rural areas. Digital Blackspots= low start-up rates. Comms technologies enable mobility AND shift dependence on mobility i.e. commuting behaviours.
- Recognise that technology drives behaviour change and lead by enablement.

In the medium-run

- LA's need to actively state and re-state updates to their technology investment-roadmap to line up SME's, wider commercial capabilities.
- Recognise potential for how AI driverless cars can be 'productive places' - this has huge significance for productivity impact (recall 97% productivity of those working on trains).
- Explore specifics of demand for bespoke engineering space (in northern Aylesbury triangle) from e.g. BMW-MINI; Nissan; key engineering R&D across the corridor; battery technology/ knowledge sharing; and Maas.

- Recognise the potential of OPE one public estate to generate revenue income from mobility and energy.
- Address feedback that SME's largest problem is local authority risk aversion.

In the long-run

- Utilise the corridors linking new rail and road national infrastructure schemes (HS2/East West Rail/Expressway) together with 5G capabilities to develop future transport corridors for freight and wider commuter use.
- Link SME innovative capabilities with universities and larger businesses such as BMW.
- Draw in capabilities from MK, Ox, Cambs, et al into Bucks Living Labs (or similar) 'de-risks' these investments for Bucks.
- Recognise the potential for better data / BigData to optimise existing infrastructure use much better. Also new infrastructure can enable the digital / comms capacity to do this. Digital-comms is the third point in the mobility-energy triangle.

5. Measuring overall impact

Building on current strengths, maximising future potential

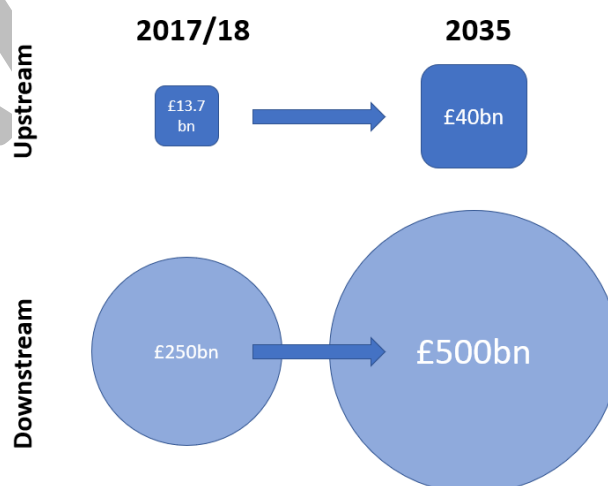
- 1.114 5 propositions have been selected that highlight areas where BTVLEP can make significant contributions to the UK's Grand Challenges identified in the Government's National Industrial Strategy. These are based on analysis of trends and data, the dynamics of recent growth in Buckinghamshire and contextual insights from stakeholders. In several cases, these have identified links between the market-sector areas and capabilities to which the propositions relate.
- 1.115 Our estimate of the impacts from enabling capabilities and technology potential within these sectors has attempted to avoid 'double-counting' which may stem from a failure to acknowledge this interdependence between the propositions.
- 1.116 This inter-dependence between the propositions gives rise to the need to understand the stages involved in enabling a technology roadmap involving multiple sectors. We have set out our broad methodology and assumptions in this section to ensure a robust measurement of value can be derived. As the actions contained within the LIS are agreed, we will continue to determine value added.

Measuring multiple impacts, looking beyond the short-run

- 1.117 The first useful distinction we have made is between present and future impacts. The potential impacts from our final two propositions: **MedTech, AI & the Healthcare Productivity Revolution;** and **Future Mobility & Energy** relate to *future and medium-term* impacts.
- 1.118 The first three propositions can therefore be usefully separated to look at the potential to build on current economic impact:

- Upstream Space
- Creative & Digital
- Super Hi-Tech

- 1.119 Starting with Upstream Space we have developed an initial impact estimate about the extent to which Upstream Space can enable value growth in downstream economy sectors, using figures from the Upstream Space SIA and figures from the UKSA's Prosperity from Space 2017.



- 1.120 The diagram opposite highlights the conceptual relationships between upstream and downstream value, highlighting that there is a roughly 10 to 1 scale relationship between the £26.3bn expansion in the upstream sector and a £250bn expansion in the downstream sector.
- 1.121 The impacts that have been calculated - both at a local level, and at a corridor level – directly derived from this relationship are contingent on local activity to enable upstream expansion being realised in wider economic terms via downstream sector value growth.

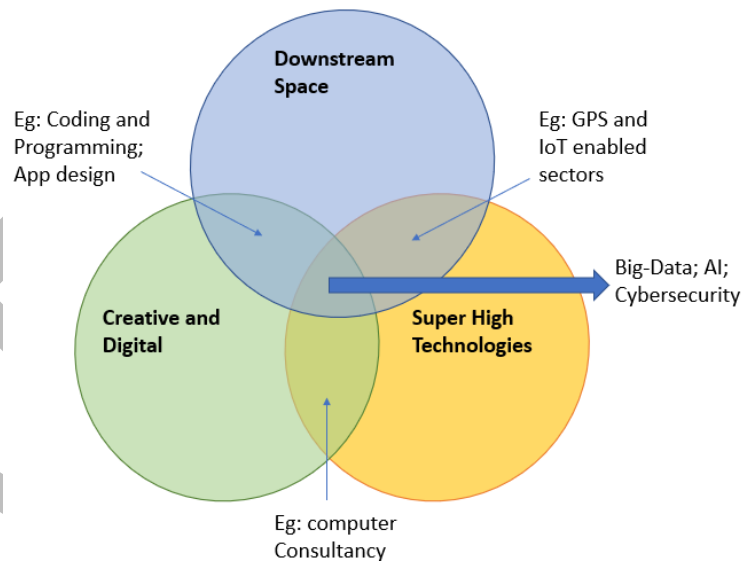
1.122 These impacts are:

- By 2035 an additional £2.275bn GVA p/a at a BTV level, equivalent to 14.4% growth on BTV LEP GVA at current prices.
- An additional £36bn by 2035 across England's economic heartland.¹⁵

1.123 Defining 'downstream' is not straightforward, however, in its broadest sense it is value derived from upstream space infrastructure and, in particular, the information and data platform that it provides. In total, this downstream segment of economic value is worth around 14.3% of total UK output using 2016 GVA.

1.124 Importantly, we can identify areas of potential crossover into two of our propositions in terms of their current impact and value. (Also looking forwards in terms of value streams that can be supported across digitally enabled elements of MedTech and Future Mobility propositions).

1.125 It is therefore important to avoid overstating expected impacts of activities and interventions through potential double-counting of the areas of overlap. The examples in the diagram above highlight these areas, though we do not necessarily know the precise extent and value of the areas of overlap.



1.126 Areas of partial overlap represent current areas of shared value streams: computer consultancy is for example both a creative and a high technology sector. What is important to highlight is that it is from the central overlap that we expect to see future growth areas emerge. Of central focus is the way that investment in upstream underpins future growth potential in these areas.

1.127 Note: The current 'digital headroom constraint' on Creative & Digital sector growth has been estimated to cost 1,125 direct jobs across the sector in Aylesbury since 2010. This impact can be viewed as a separate estimate of the cost of a market failure, which if addressed would allow greater impact to be realised moving forwards.

1.128 Towards the medium-term horizon of 2035, MedTech enabled Healthcare and Future Mobility market sectors will also draw supply-chain element from Super High-Tech and Creative & Digital supply chains.

1.129 Therefore, our initial high-level impact estimate for Upstream-Downstream space in BTVLEP of £2.275bn is likely to contain portions of value derived from all four subsequent proposition areas. We will use this as the start point for impact measurement, bringing in other propositions and drivers to calculate the overall impact. This will also need to consider further additionality (including multiplier effects) being created across these proposition areas – which will be drawn out in subsequent analysis.

¹⁵ (we are defining this as) BTV, OxLEP, GCGP, Herts SEMLEP, and TVB LEP.

6. Enabling growth and raising productivity: our priority programmes

In this section we set out four programmes of activity which are necessary in order to mobilise the key drivers of the Buckinghamshire economy, to deliver our vision for Buckinghamshire in 2030 and beyond and to mobilise the potential of the five distinctive economic assets we have identified.

The six programme are:

- **The education revolution:** Creating a new post-13 education and training system – the education revolution and inspiring business and young people
- **Digital infrastructure:** Delivering digital connectivity in all new developments and retrofit existing communities with the newest technology available
- **The living lab:** Establishing a formal living lab framework to enable rapid testing and introduction of new products and technologies
- **Commercialising innovation:** Building a network of centres to accelerate the commercialisation of innovation in Bucks
- **Improving business prospects:** Action to reduce business costs through the 5 assets and draw on the capabilities of the place... Business services etc. NEEDS TO BE FURTHER EXPLORED
- **Energy supply and demand:** Decarbonised heat energy system; Paris agreement – where is funding going to come from? Advanced infrastructure at Woodlands etc. NEEDS TO BE FURTHER EXPLORED

These programmes were identified through discussions with stakeholders informed by our evidence base and the actions required to grow and exploit our economic assets. They also draw on the five foundations of productivity set out in the National Industrial Strategy.

In this section, we describe each programme in detail setting out:

- the focus of the each programme;
- the specific actions proposed in the short, medium and long-term;
- the relevant evidence base;
- the contribution to mobilising the five assets;
- the wider impact.

The education revolution: Creating a new post-13 education and training system – the education revolution

To satisfy the demands of the current and future economy of BTVLEP, an education revolution is required to ensure a radical new approach to post 13 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.

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

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.

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.

The partnership should be ideally placed to pursue further opportunities to establish an Institute of Technology as an integral element of the new approach.

Short-term

- The LEP and County Council to use the existing partnership arrangements, including the Skills HUB, Buckinghamshire Education, Skills and Training and key sector groups to develop the concept and assess what is needed to make it happen and to develop and trial new approaches where practicable.

Medium-term

- Based on an agreed LSI, hold discussions with the DfE to seek support for the test-bed approach and to identify potential sources of investment to make it happen.
- Prepare and submit an IoT bid developing a full implementation plan.

Long-term

- Deliver phased implementation of the education revolution.

BTVLEP evidence to support the drivers

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 is the result of "Grammar School tourism" from neighbouring counties, which impacts particularly on poorer communities where the proportion of children attending a Grammar school can be as low as 18%¹⁶. Student numbers in the sixth forms of upper schools (secondary modern etc.) are dwindling with the more academic students being creamed off at this stage by the Grammar Schools.

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.

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 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

This crosscutting education and skills intervention would support all of the assets identified in the emerging LIS. It would also support the Oxford – Milton Keynes – Cambridge Growth Corridor's 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.

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.

¹⁶ [NB these figure are cited by stakeholders and still need to be verified].

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 BTVELP 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.
- The BEST partnership led a bid for an **Institute of Technology**, to be based at University Campus Aylesbury Vale, with a proposed specialism in assisted technologies for health and social. This would link with the UK Space Agency's Satellite Applications Catapult in the Westcott Enterprise Zone with a cross-boundary approach to include Oxford's nuclear and Berkshire's digital specialisms for medical technologies and potential employer partners. Unfortunately, the bid was unsuccessful. The Milton Keynes IoT proposal is through to the next stage of the selection process. Its specialisms will be Cyber Security, Digital Sector, FinTech, IT delivered by the MK Institute of Technology in partnership with Milton Keynes College, Cranfield University, Microsoft Ltd, KPMG, Evidence Talks, McAfee, VWFS. Final selection expected in March 2019.

Impact

- Growth of productivity through improvements in human capital and talent.
- Retention of younger generation of entrepreneurs and intrapreneurs.
- Reduction of outcommuting and pressure on transport networks.

Digital infrastructure: Delivering full fibre optic broadband coverage in all new developments

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).

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.

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 Counties¹⁷. 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

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.

In order to deliver 100% Fibre to the Premises / Next Generation Access (NGA) (residential and commercial) in every new development and redevelopment to close the gap in the digital divide and drive up productivity and enabling digital nomads and entrepreneurs action is required to:

Short-term

- Create a developer forum to engage on NGA requirements to link Garden Town and new future settlements alongside other opportunity sites (housing and commercial).
- The potential to address this market failure is underscored by the scale of new development planned across the northern area. In order to secure the success of new garden town developments and unlock existing productivity potential, BTVLEP should propose an 'inside out' approach that targets currently underserved areas upgrading to the fastest speeds first.

Medium-term

- Alongside investment in the physical infrastructure of the Oxford to Cambridge Expressway, East West Rail and HS2, ask government to ensure a follow through on

¹⁷ <http://www.connectedcounties.org/>

initial commitments to deliver full fibre infrastructure and 5G connectivity that can be connected to the spines, nodes and their surrounding communities.

- With new communities being planned, embed the principle to greatly exceed the Universal Service Obligation, which is a minimum standard for areas; thereby enabling both catalytic investment and maximising the potential for digital social value to be created.
- Build on the 5G testbed to build on the Westcott hub across a larger geography.

Long-term

- Amend local plan policy making to ensure it considers NGA as the '4th utility' and regulates within the development and infrastructure provider community.

BTVLEP evidence to support the drivers

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.

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 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%.

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.

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 BTV, and High Wycombe 58%.

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:

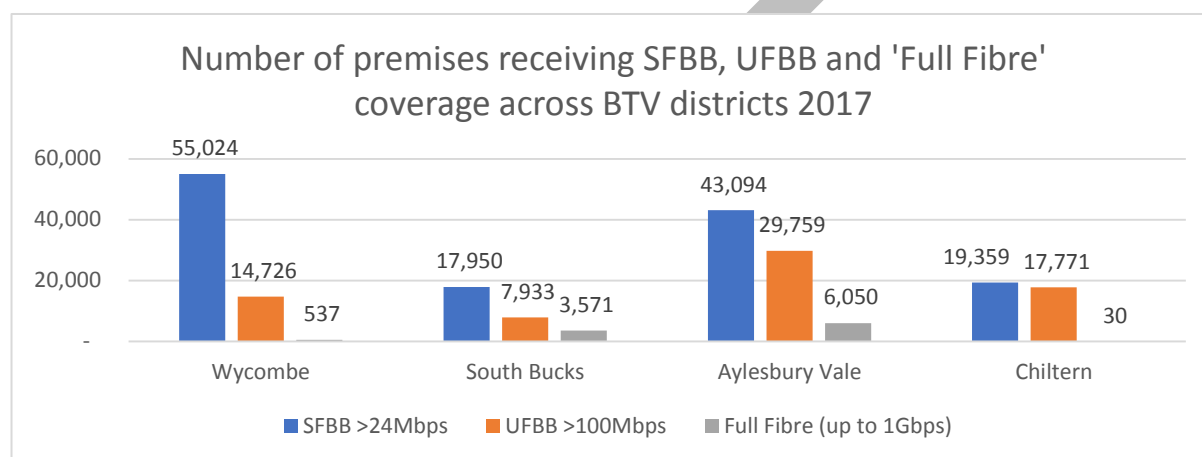
- Digital Growth LQ of 0.5 for Aylesbury Vale
- Digital Growth LQ of 1.57 for High Wycombe

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.¹⁸

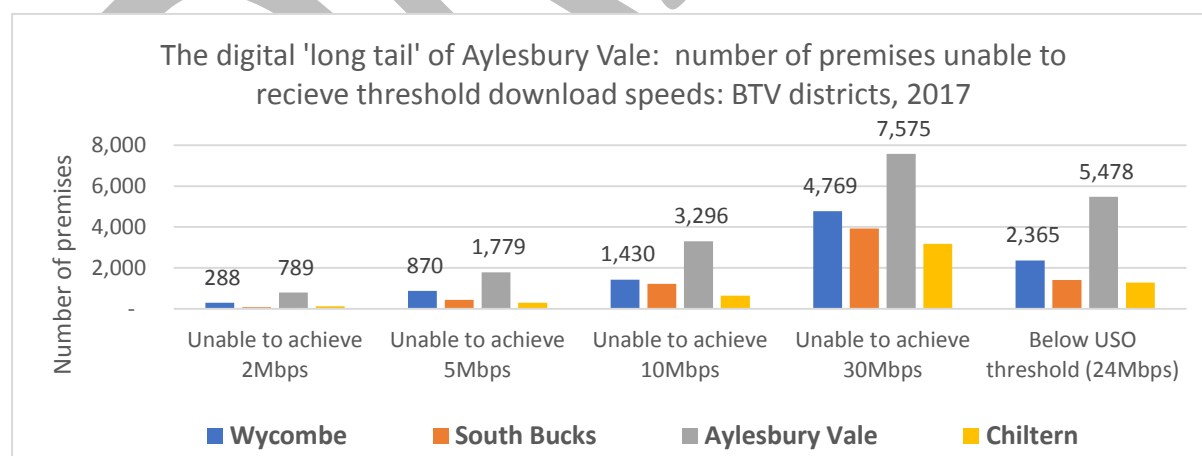
¹⁸ These jobs are typically above average in terms of productivity but using the average GVA per worker for the area these hypothetical lost jobs equate to £61,114 x 1,125 = £68,753,250 in foregone annual GVA, on an ongoing basis.

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. One estimate is that the current lack of connectivity across the UK costs an average of £3,125 per - business per-year¹⁹ - with an average employee losing 38 hours of productivity (1 week) per year from slow internet speeds.

Our key evidence highlights that while high numbers of premises in Aylesbury are digitally enabled, and it has the highest number of premises in BTV receiving 100mbps speeds, it also has by far the highest number of premises unable to receive threshold download speeds.



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 GVA²⁰. With exceptionally high levels of home working in Bucks, domestic



connectivity is vital to sustained growth and the need for business flexibility.

Relationship of the drivers to the Assets

¹⁹ <https://www.duocall.co.uk/blog/internet-down-time-costs-each-business-3-125-per-year-can-your-business-afford-this>

²⁰ The figures above do not tell us about demand from these premises

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
- 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

Impact of the driver

Impacts on investment in connectivity are proven to feed through to a range of local and national economic impacts including:

- Impact on the performance of local firms – extending to a rise in employment
- Raising productivity gains – with studies showing that investment can lead to raised turnover per worker of these firms by 0.38 percent, broadly consistent with other estimates of the impact of faster broadband in the UK, equivalent to £1,390²¹ in GVA per firm per annum
- Supporting adoption of complementary technology by enabling the adoption of complementary data intensive technologies that would not have been viable at lower speeds
- Ability to support international Inward Investment at the heart of the Oxford – Milton Keynes – Cambridge Growth Corridor.

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

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 evaluation²².

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.

²¹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/734857/BDUK_SF_EVAL_ANNEX_B_ECONOMIC_IMPACTS.pdf

²² <https://www.scribd.com/document/386099304/Conference-Proceedings-OLLD18#>

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.

A Living Lab (LL) is defined as an institutional environment for open innovation that supports experimentation with real users in real contexts²³. 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 Grand Challenge that address at a local level and influence solutions at a national and international level.

Specific actions and interventions

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.

Short-term

- To work with BEIS and HMCLG to create a new designation for Aylesbury Garden Town as a 'County of things' / 'living commerce' zone with fiscal drivers to enable greater risk taking for start-ups and accelerated routes to market
- Host co-creative session to explore sustainability and energy related challenges
- Develop programmes such as 'entrepreneur in residence' to progress strong entrepreneurship beyond micro status and connect new ideas, products and services to take to market that leverage rich data assets

Medium-term

- Negotiate with developers involved in Garden Town planning to gain a formal agreement around concepts and ensuring designs can enable the 'City of things' infrastructure by using gamification tools to explore planning challenges and agree master planning delivery targets
- Set up a network of collaborators specifically to drive collaboration space among the asset leaders to develop new solutions to the grand challenges

Long-term

- Create an investment fund to reward risk in innovations that can support commercialisation and crowd funding opportunities from big business

Evidence to support the actions

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

²³ Folstad 2008; Hillgren 2013

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.

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.

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.

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.

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 entrepreneurs²⁴.

Relationship of the driver to the assets

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.

²⁴ <https://www.adelaidesmartcitystudio.com/about/adelaide-living-lab/>

- 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.

Impact of the driver

Impact will only be possible in scenarios involving constant and consistent leadership at a municipal and business level. The measurement of impact will depend on the nature of focus for the Garden Town, whether that be environmental, commercialisation or use of data to drive innovations.

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

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".

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.

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.

Actions and Interventions

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.

Whilst having a primarily Buckinghamshire focus, the Hub should be charged with working closely with partners across the Corridor 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.

Short-term

- The need to identify and provide early stage and industry specific support and mentoring to ensure that the large SME base in Bucks are investment ready is

paramount. National investment into the Silverstone Technology Cluster ecosystem (and wider high tech super cluster) would provide the most efficient route to providing this support.

- Establish a Hub through a partnership model to build on existing cluster and innovation support facilities and services. The partnership should be business-led, and include representatives from existing cluster groups and centres, universities and other centres of excellence, skills providers and key public sector organisations that provide important markets for innovative new products and services. Buckinghamshire Business First should be integral to the Hub.
- Approach Innovate UK for investment to deliver seed funding to deliver the Hub, which will also set out its move towards a commercial model that limits the need for on-going subsidy and enables flexible development that responds to business needs and opportunities.
- Develop a partnership to determine how the Innovation Hub will operate and the mix of services it will provide, but the broad aim should be to promote business growth by directly addressing or influencing the government's 5 foundations of productivity. Direct services should embrace technology transfer/knowledge exchange, open innovation, commercialisation (including accessing finance and markets) and enabling partnership approaches to skills provision. The Hub could also have a strong role in promoting the area to attract investment, domestic and overseas.

Medium-term

- Promote cross-sector collaboration between businesses, and between businesses and universities and other centres of research excellence. In this way it should have a central role in supporting innovation that contributes to the achievement of the Grand Challenges - for example, by identifying and supporting collaboration that exploit strengths in 5G and creative digital to deliver innovation that addresses the Aging Society and Future of Mobility challenges.

Long-term

- The Hub should also develop a high national profile that reflects the importance of the contribution that the area's innovative businesses make to the national economy. It should be seen by national government and its agencies, including Innovate UK and the DIT, as a natural partner to develop and test new initiatives in line with the Living Laboratory concept.

EVIDENCE SECTION REQUIRED

Relationship of the driver to the assets

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.

- High-tech super cluster – the Silverstone Technology cluster and Centre of Innovation
- Creative & Digital – Pinewood, NFTS, StoryFutures
- Future Mobility – Transport Systems and 5G Catapults, MK collaboration, market towns opportunity
- Med-tech - Stoke Mandeville National Spinal Injuries Centre. Link with Med-tech Accelerator



7. Appendix – the wider economic and policy settings

Please see separate document

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