HATCH REGENERIS

GLOUCESTERSHIRE CYBER AND DIGITAL SECTOR IMPACT STUDY

CHELTENHAM BOROUGH COUNCIL

A REPORT BY HATCH REGENERIS

MAY 2020

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Executive Summary

Study Rationale

i. This study has been commissioned by **Cheltenham Borough Council, with support from the Gloucestershire Economic Growth Joint Committee (GEGJC)**, to build a fuller and more definitive view of cyber and digital sector activity across Cheltenham, Gloucestershire and a wider study area.

ii. With the nationally important **Government Communications Headquarters (GCHQ) and National Centre for Cyber Security (NCSC)** at its core and a growing base of businesses locating within the local area, Gloucestershire has established itself as a natural home for cyber-related activity.

iii. The LEP and local authorities have exceptionally strong growth ambitions to develop these sectors, with a particular emphasis on establishing Gloucestershire as primary UK hub and as one of the most prominent clusters globally. A new development – **Cyber Central UK** – lies at the heart of this agenda.

Study Focus and Approach

iv. The commission's research drivers inform the need for a robust and timely assessment of cyber and digital sector characteristics and the wider ecosystem that has underpinned success to date.

v. Given the complexity of defining businesses operating within these sectors, an innovative research approach has been adopted, harnessing the power of **Artificial Intelligence (AI)**.

vi. The approach employed as part of this study seeks to balance the need for a depth of insight on existing sector characteristics and the prospects for a sustained growth trajectory. It also looks at the role that Cyber Central UK will play in delivering the county's exceptional cyber ambitions.

vii. The approach draws cues from other studies, underpinned by robust sector definitions that best describe genuine cyber and digital activity, to develop a confident understanding of:

- **Sector scale, value and identified clusters**
- **The characteristics of the business base**
- **Relative specialisation and distinctiveness**
- **The strength of the local ecosystem and asset base**
- **Sector weaknesses and key barriers to growth**
- **The role of Cyber Central UK in sustained growth**
- **Understanding Gloucestershire's competitors**

The Case for Cyber and Digital

viii. The cyber sector and industries which are orientated around the commercial use of digital technologies are increasingly important and make a valuable economic contribution. **They are at the heart of what drives the UK's international competitiveness** and offer a platform from which to develop solutions to some of the most pressing existential challenges.

ix. The same is true at a sub-regional level, where these businesses have led the way in unlocking innovation and economic output, helping Gloucestershire to establish a future-facing identity.

x. The far-reaching and cross-cutting importance of cyber and digital technologies can be crystallised as:

1) **An exceptional strategic Imperative…**
2) **Significant and growing economic Impact…**
3) **A key measure of global competitiveness…** .
4) **Optimising online security and safety…**
5) **Unlocking environmental sustainability solutions…** .
6) **A societal leveller and driver of equality…**
7) **A cross-cutting enabler across all industries…**
8) **Propelling more efficient public services…**

xi. The development of Gloucestershire's base of cyber and tech-focused industries has not occurred in isolation and is **reflective of broader trends, nationally and on a global level**. The growing influence of digital technologies and threat of cybercrime is increasingly omnipresent and provides the basis for Gloucestershire's progressive growth agenda.

xii. Key reasons to accelerate the pursuit of tech-led growth are seen throughout a variety of compelling trends and signals:

- **Tech-led growth is the cornerstone to productivity.**
- **The economy is rapidly becoming 'digital by default'.**
- **The UK is a global cyber and digital player.**
- **Government support is a key foundation for growth.**
- **The UK cyber sector has experienced rapid growth.**
- **Gloucestershire's cyber ambitions are unique.**

Study Research Headlines

xiii. **The research has uncovered a series of original and significant insights** which showcase the capabilities and value of Gloucestershire's cyber and technology-orientated businesses. The most impactful of these are illustrated below, which combine to articulate the compelling cyber offer and provide hooks from which to anchor growth ambitions.

Gloucestershire's economy is anchored by digitally dependent businesses which are embedded and growing…

Digital Tech Foundations

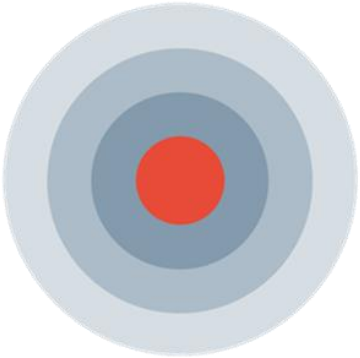
- 2,315 digital tech businesses across Gloucestershire
- Employing approximately 11,000 people
- 34% growth in digital tech jobs over 5 years
- Cheltenham a digital tech hub employing 3,000+
- Wider Study Area is a major digital tech centre
- Home to 17,000+ businesses and 97,000 jobs

The UK's is a global cyber powerhouse, with Gloucestershire and Cheltenham at the core of these capabilities…

Cyber Excellence

- The UK is home to nearly 2,050 cyber businesses
- 123 cyber business are located in Gloucestershire
- This density is 6 times more concentrated than the UK
- GFirst LEP is the most specialised cyber economy
- Cheltenham is the undoubted core of cyber activity
- The Borough hosts 59 active cyber businesses
- Cyber concentration is 11 times the UK average

The UK's Cyber Central



	Total Businesses	Cyber Businesses	Total of England	% of Total Businesses	LQ
Cheltenham	2,999	59	4%	2.0%	11.2
Gfirst LEP	11,637	123	8%	1.1%	6.0
Wider Study Area	102,364	278	18%	0.3%	1.5
England	886,026	1,558	100%	0.2%	1.0

Cyber activity is characterised by the clustering of businesses and the presence of sub-sectors which define distinctiveness…

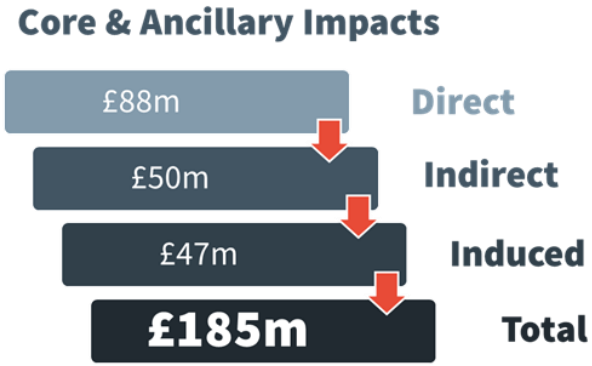
Cyber Characteristics

- The magnetic effect of GCHQ/NCSC is apparent
- Cheltenham has a prominent town centre cluster
- Gloucester and Tewkesbury are key cyber centres too
- Information and Technology Services predominate
- Computing Networking and Security also prominent
- 7 sub-sectors are more specialised than the UK
- Clear links to local assets and other industries

Sector and sub-sector headlines are underpinned by the diversity of cyber businesses, large, small, locally-rooted and globally significant…

Raytheon
SUREVINE
TrustStamp
RIPJAR
CISCO

This scale of cyber activity translates into significant direct and indirect economic value and employment, such that cyber activity is a key driver of productivity…



Economic Value and Impact

- Cyber businesses generate £185m annually
- Supply chain and indirect benefits are significant
- The sector employs more than 1,100 people
- GCHQ/NCSC hosts more than 6,000 further jobs
- Cyber jobs are more productive in Gloucestershire
- Cyber sits within a sizeable and valuable digital sector
- 600+ digital firms generate ~£350m of GVA annually

Sector performance and future growth prospects are founded upon an exceptional cyber ecosystem…

A Leading Cyber Ecosystem

- Good access to a pool of skilled and capable labour
- Notable enterprise and innovation strengths
- A home of enterprise and scaling businesses
- Digital connectivity provide a foundation for cyber
- Quality of life characteristics are outstanding
- But demographics and skills remain risks to growth
- Cultural offer and affordability are limiting factors

As well as an outstanding base of assets, which at different levels are nuanced and complementary…

World-Class Asset Base

- Defined by asset scale, dynamics and density
- Density of education institutions with cyber capabilities
- Unique industrial partnerships and collaborations
- A base for world-leading research and innovation
- A growing flexible and secure workspace footprint
- Unique strategic ambition mirrored in investment
- But asset deficits need to be addressed

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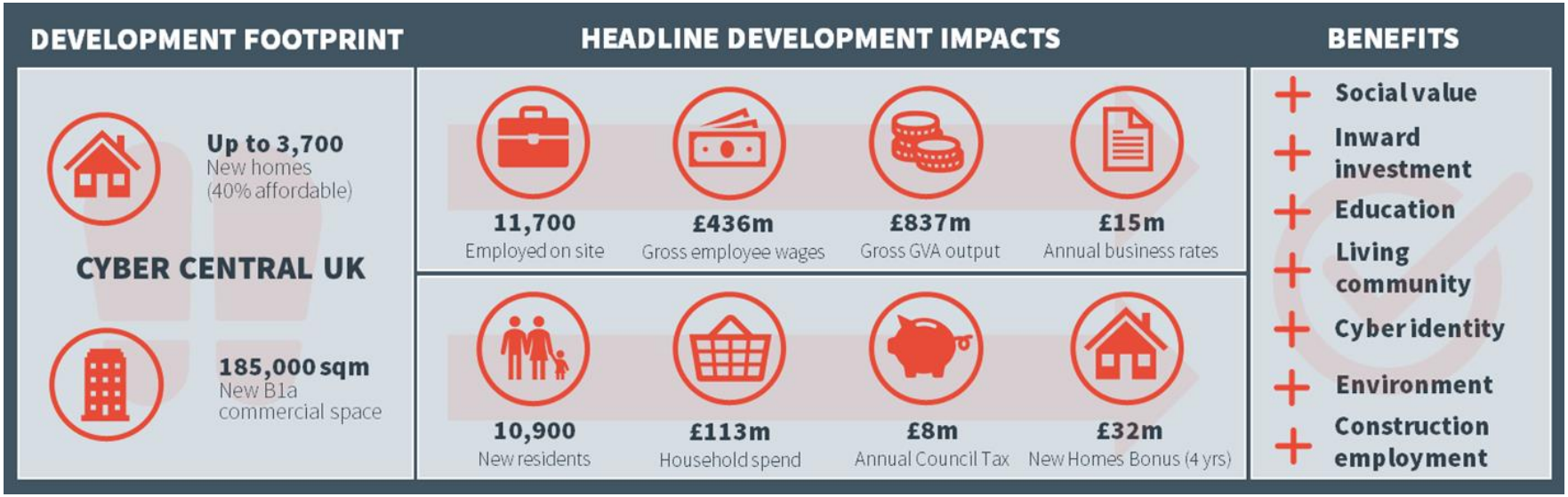
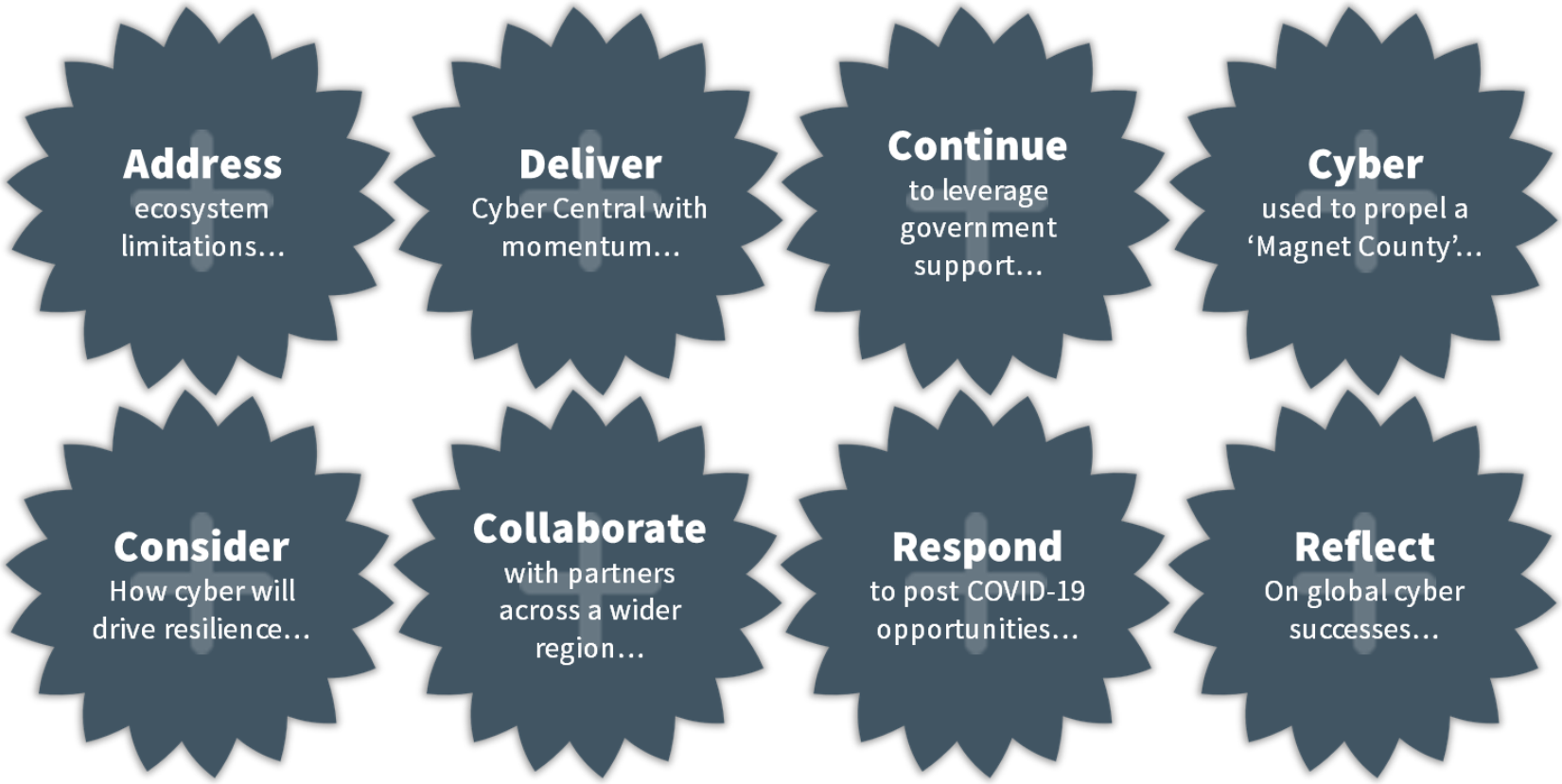
Cyber Central UK has the potential to secure Gloucestershire's cyber future as well as generate significant economic and social value in its own right, as a landmark development which is defined by its scale, quality, location and the backing of industry and government…



The prospects for continued and accelerated cyber and tech-led growth across Cheltenham and Gloucestershire are promising and are driven by a series of key factors, but there are risks too, which need to be acknowledged and mitigated…

Prevailing Research Messages

The research has shown that Gloucestershire has the opportunity to reinforce its cyber identity and credentials as the UK's natural home for cyber activity, anchored by a large, diverse and valuable base of digital businesses. With a unique ecosystem, an embedded spirit of cooperation and absolute focus on growth and specialisation, the foundations are in place for sustained success. The opportunities and weaknesses identified within the evidence base provide the basis for action and rapid delivery of Cyber Central UK…



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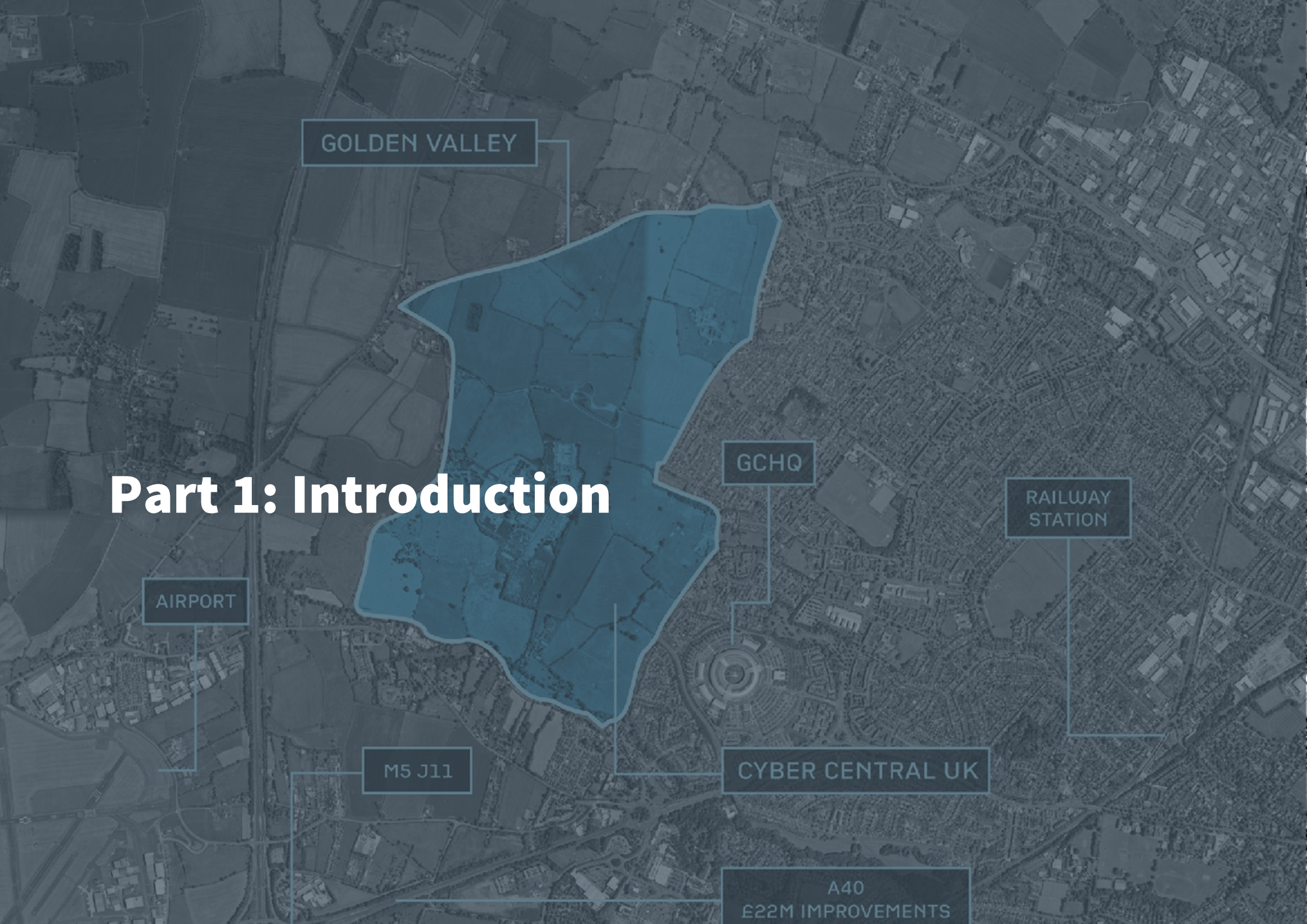


Part 1: Introduction

1. Study Introduction

This section outlines the rationale for the study and sets the scene for the research within. The overarching thrust of this report is to determine Gloucestershire's cyber and digital credentials, framing these in a new way and to position Cheltenham at the core of these capabilities.

Background to the Study

1.1 This study has been commissioned by **Cheltenham Borough Council, with support from the Gloucestershire Economic Growth Joint Committee (GEGJC)**, to build a fuller and more definitive view of cyber and digital sector activity across Gloucestershire and a wider study area which forms a key part of the cross-border Western Gateway[1].

1.2 With the nationally important **Government Communications Headquarters (GCHQ)** at its core and a growing base of businesses locating within the local area, Gloucestershire has established itself as a natural home for cyber-related activity. This proposition is set to expand as part of proposals for **Cyber Central UK UK**, which promises to be a one-of-a-kind development and anchor for cyber businesses, assets and innovation, adjacent to GCHQ.

1.3 **The LEP and local authorities have exceptionally strong growth ambitions to develop and grow these sectors**, with a particular emphasis on establishing Gloucestershire as primary UK hub and as one of the most prominent clusters globally. In order to do this, a robust evidence base and narrative around characteristics, distinctiveness and competitiveness is required and thereby presented within this report.

1.4 The study responds to this context and seeks to provide the depth and granularity that will enable local partners to speak confidently and factually about these sectors, their prospects for future growth and the wider base of assets and factors that make the area a first-class investment location and primed for expansion.

1.5 With these tools in place and building on work undertaken to date, the Borough Council and its partners will be well-placed to secure investment, cultivate an ecosystem that will support sustained sector growth and ensure that Cyber Central UK is shaped to maximise its attractiveness and viability.

1.6 The following report offers an accessible and visual summary of the sectors and factors that underpin their vitality. It draws on a variety of research sources and harnesses the power of artificial intelligence (AI) to get under the skin of local conditions, which are used to depict the scale and variety of activity and relative specialisms observed in Gloucestershire.

[1]The Western Gateway is a strategic partnership promoting and maximising economic growth across south Wales and the west of England.

Why is a Focus on Cyber and Digital Important?

1.7 **The cyber sector and industries which are orientated around the commercial use of digital technologies are increasingly important and make a valuable economic contribution, in employment and productivity terms**. They are at the heart of what drives the UK's international competitiveness and offer a platform from which to develop solutions to some of the most pressing challenges affecting the world today.

1.8 The same is true at a sub-regional level, where these businesses have led the way in unlocking innovation and economic output, helping Gloucestershire to establish a future-facing identity, whilst also acting as a magnetic draw for investment, from both the private and public sectors. The inherent and far-reaching importance of cyber and digital technologies is crystallised below:

1) **Strategic Imperative:** policy acknowledges the importance of cyber and digital businesses and the scope they have to support national economic growth, as evidenced within the UK Industrial Strategy, National Cyber Security Strategy and the LEP's emerging Local Industrial Strategy.

2) **Economic Impact:** the 2018 Tech Nation report estimated the value of the UK's Digital Tech economy to be worth £184 billion, growing at a rate nearly 3 times faster than the rest of the UK economy, with strong prospects envisaged.

3) **Global Competitiveness:** the 2019 Tech Nation report highlighted the global race to be digital and the pace of growth internationally, with the UK in close competition with the likes of the United States, Japan, South Korea, China and Germany.

Figure 1.1 Reach and Value of Cyber/Digital Technologies

Source: Hatch Regeneris, 2020

1) **Online Security:** cyber threats are very real and have proven to be disruptive and challenging to economies and democracies globally, reinforcing the need for cyber resilience to be in place and innovation to be driving the next wave of safeguards.

2) **Environmental Sustainability:** digital technology is propelling a new wave of innovation and research, developing solutions for the world's most prominent environmental challenges in an integrated and smart way.

3) **A Societal Leveller:** digital technologies have helped to increase the democratisation of societies, providing new and innovative ways for citizens to contribute, irrespective of locational and geographic limitations.

4) **A Cross-Cutting Enabler:** increasingly identified as an economic enabler, digital technology is embedded within a broad cross-section of industries, and so-called development of the fourth industrial revolution (Industry 4.0).

5) **Efficient Public Services:** government, central and local, is undergoing a continued programme of digital transformation, aimed at service delivery improvement, greater efficiency, responsiveness and democratisation.

1.9 The continued prospects for digitally-led growth appear to be exceptionally strong, with cyber security and associated technologies anchoring commerce, the environment and social ecosystems that are both safe and resilient.

1.10 Gloucestershire and Cheltenham have a unique opportunity to capitalise on its reputation as one of the world's premier cyber hubs and digitalised economies.

The Research Focus

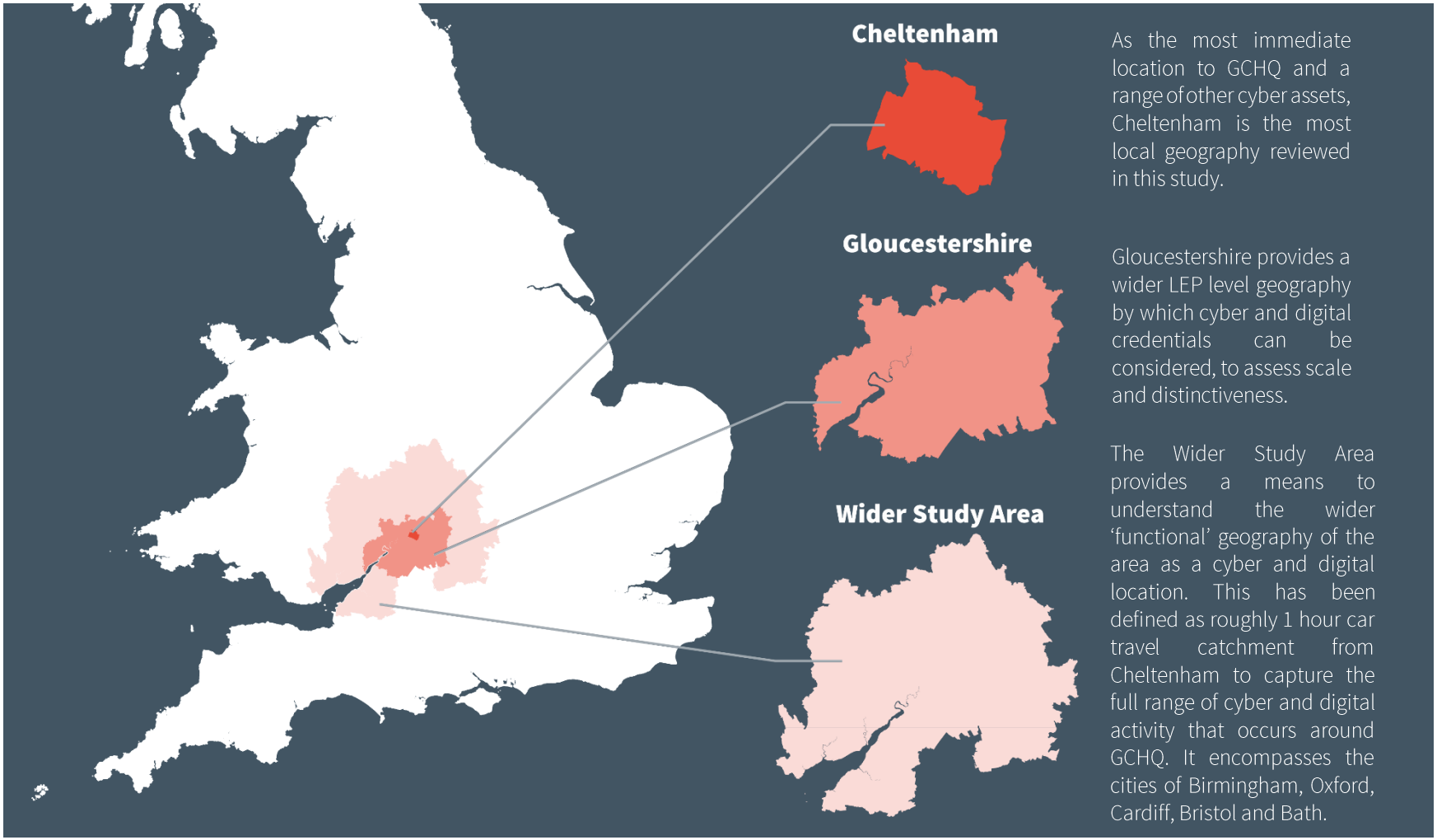
1.11 The study is broken down into a series of focal research areas. Collectively, these combine to form a full and timely picture of cyber and digital sector activity across Gloucestershire.

1.12 The research focus is framed by a need to have a confident understanding of the following cyber and digital sector dynamics:

- **Sector scale and identified clusters/hot spots…**
- **The characteristics of the business base…**
- **Relative specialisation and distinctiveness…**
- **Noteworthy businesses trading in Gloucestershire…**
- **The strength of the local ecosystem and assets found within the wider study area…**
- **Ecosystem weaknesses and key barriers to growth…**
- **The role of Cyber Central UK in sustained future growth…**
- **The economic value of cyber and digital activity…**
- **Understanding who Gloucestershire's competitors are – both nationally and globally…**

Study Geography

1.13 The research within this report is focused on exploring the cyber and digital capabilities of three geographies of interest – **Cheltenham, Gloucestershire and a defined wider study area**. These are illustrated in the map below and form the basis for the detailed sector review within.



1.14 The wider study area is broadly orientated around a 'functional' geography, centred on Cheltenham. As such, there is some overlap with the **Western Gateway**, which is a recognised strategic construct and increasingly important in developing and progressing a shared economic development agenda. However, by differentiating, the wider study area is able to capture key cyber assets that exist beyond the Gateway, including the full extent of the Cyber Valley and assets that lie to the east of Gloucestershire.

1.15 To supplement the focal geographies set out above, a series of wider comparator locations have been selected. These provide a valuable reference point to understand relative scale, concentration and distinctiveness of cyber and digital activity. They are also a benchmark which help to contextualise the performance of cyber and digital industries locally.

1.16 The comparator locations are:

- **England**
- **London**
- **Greater Manchester Combined Authority**
- **West Midlands Combined Authority**
- **Cambridgeshire & Peterborough CA**
- **Cambridge**
- **Swindon**

1.17 In addition to the statistical analysis presented within, qualitative consideration of international comparators and known cyber hubs and the factors underpinning their success, is given in section 7.

Figure 1.2 Wider Comparator Locations

Source: Hatch Regeneris, 2020

Part 2: Research Approach

2. Sector Assessment Approach Summary

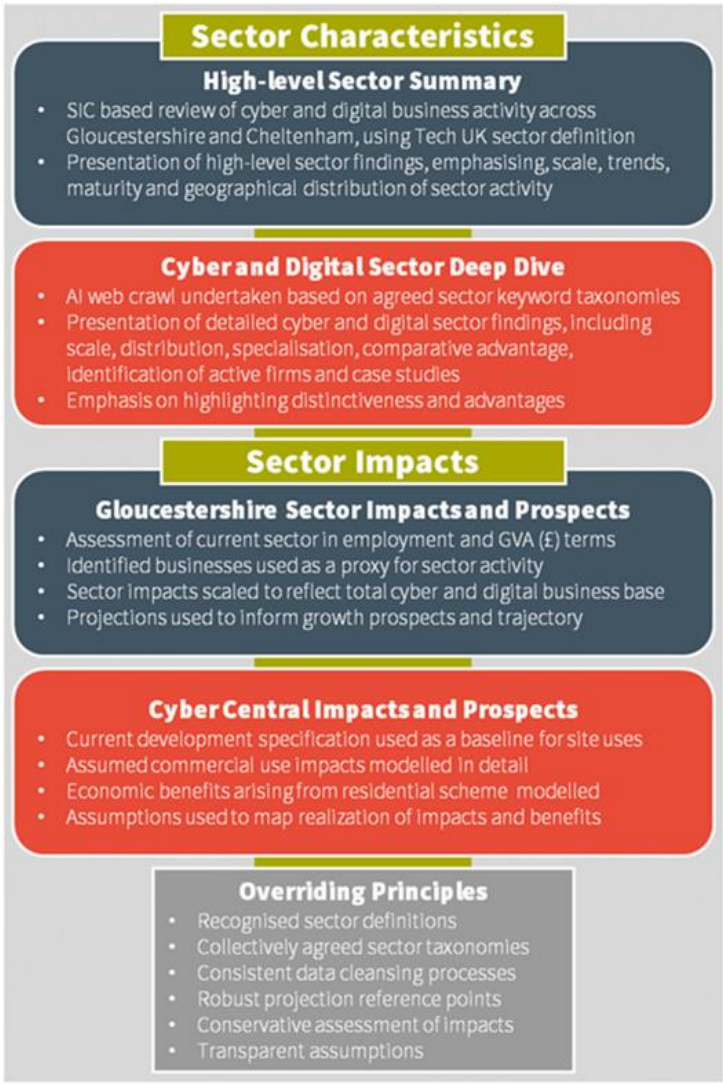
2.1 **The approach employed as part of this study seeks to balance the need for a depth of insight on existing sector characteristics and the prospects for a sustained growth trajectory**. The research looks to assess the impacts of cyber and digital activity at a LEP level, whilst examining the potential contribution and benefit of the Cyber Central UK development as a new anchor asset.

2.2 At the core of the research methodology **is a need to delve deeper** and mitigate against the limitations of approaches that are unable to specify the scale and distinctiveness of cyber activity in a comprehensive way. As such, the research employs techniques that move beyond Standardised Industrial Classification (SIC) codes, harnessing the power of AI to develop a forensic view of activity.

2.3 A further hallmark of the methodological approach is that of relativity and the benchmarking of performance against comparator locations. Where possible, this is employed to provide context, support the case for competitiveness and showcase what makes the presence of cyber and digital businesses and assets in Gloucestershire different and unique.

2.4 The research approach is summarised diagrammatically, with **prudence and conservatism applied where necessary and appropriate**. Importantly, the approach draws cues from studies commissioned by the UK Government and Lancaster University, underpinned by robust sector definitions and keyword taxonomies that best describe genuine cyber activity and businesses which have digital technologies at the core of their operations.

2.5 More information on the methodology employed within the sector assessments contained within this report is located in **Appendix A**.



Part 3: The Digital Opportunity

3. Digital Revolution and Cyber Tech Opportunity

The key messages arising in the section are:

- **The economy is rapidly becoming 'digital by default' with most sectors influenced by technology.**
- **Driven by trends, demand and use cases, the value of the UK and global digital economy is large and growing.**
- **The UK is a global player in terms of its digital and technology credentials and is a major investment hub.**
- **Government support for the digital sector and cyber security is exceptional and a key foundation for growth.**
- **The UK cyber sector has experienced rapid growth, is resilient and in high demand as cyber threats increase.**
- **Government is backing cyber through its strategic approach and package of investment commitments.**
- **Gloucestershire's cyber credentials are being propelled by local ambition and building on its unique assets.**
- **The county lies at the heart of a large and growing digital tech region, employing nearly 100,000 people.**
- **Gloucestershire's burgeoning digital tech businesses have created 34% more jobs over a 5-year period.**
- **Digital tech businesses are embedded within the local economy, with a significant number of mature firms.**
- **Sector performance sets the scene for cyber growth.**

The Digital Imperative

3.1 **The digital revolution has been underway for some time, disrupting and shaping many facets of daily life in business, community and domestic settings**. This shows no sign of abating, as digital technologies continue to enhance business performance, improve productivity, drive efficiency, trigger innovation and stimulate new forms of economic output.

3.2 Signals exemplifying this and the continued rapid shift to digital platforms are seen across a broad spectrum of measures:

- **The growth of sectors and industries that have digital technology and cyber at their core.**
- **The widespread adoption of digital technologies across a broader base of sectors.**
- **The rapid increase in data consumption and adoption of mobile digital devices.**
- **The wider availability of next generation fixed and mobile infrastructure and subsequent take-up.**
- **The continued rise in online transactions and e-commerce for products and services.**
- **The commercialisation of open and 'big' data which serve as smarter sources of information.**

3.3 In parallel, the cyber security industry has grown rapidly too, as national and commercial security threats have become more prominent. Indeed, the threat of cyber-attacks to democracy, economic stability and personal information are well observed and increasingly omnipresent.

Digital Sector Headlines

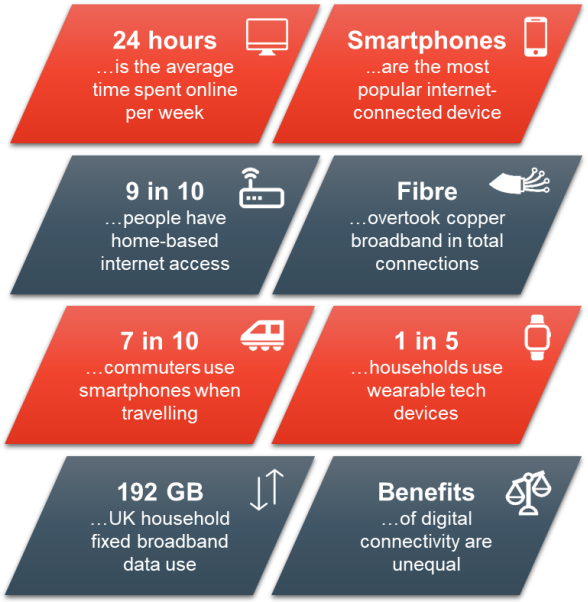
3.4 The global effects of digital technologies are clear to see. Moving beyond a narrow base of core sectors, technology is influencing and shaping economies globally. Indeed, The World Economic Forum (WEF) predicts that as much as **60% of global GDP** will be created through digital mediums in the near future[2].

3.5 **Digital sectors are an engine for productivity too** and key to national ambitions, which seek to raise job quality. This is reflected within statistics, which illustrate the high contribution that each digital job makes (£87,000 per employee) and the relative strength of tech-focused jobs versus other sectors[3].

3.6 Tech UK, as a leading think-tank, publishes an annual report which sets out the performance and trajectory of the country's digital sector and highlights industries that are propelling its growth. **The Tech Nation Report 2020** outlines a series of compelling indicators that showcase the strength of digital technology competencies and how these have translated into economic success, rapid growth and international standing:

- The digital sector GVA grew **six times** as fast as the UK economy as a whole (2010-18 period).
- Sector employment has grown by **40%** in the past two years, accounting for 9% of the total UK workforce.
- The UK is Europe's **number one** scaling nation (rapidly growing start-ups).
- Some **£10.1bn** of investment was channelled into UK tech start-ups in 2019.
- Nearly **100 companies** were valued at $250-800m in the UK in 2019.
- The UK **ranks 3rd globally** in terms of digital business unicorns, behind only the USA and China.

Figure 3.1 Summary of UK Digital Technology Trends



Source: Ofcom Communications Market Report, 2018

3.7 Digital industries are pivotal to the UK's future prosperity and the pursuit of more inclusive growth. Equally, a technologically-advanced economy will be well-placed to embrace and exploit this pace of change and to tackle the most existential challenges facing the environment and global economy.

[2] WEF, Shaping the Future of Digital Economy and New Value Creation, 2020

[3] Perspective Economics, Ipsos MORI, Centre for Secure Information Technologies, University of Plymouth, UK Cyber Security Sectoral Analysis, 2020

3.8 Particular emphasis is placed on the purpose-driven nature of digital businesses and the role of technology in addressing the **United Nation's Sustainable Development Goals (SDGs)**. Digital industries have sparked innovation and attracted the investment necessary to build momentum and raise ambitions to work towards sustainable and positive change.

3.9 Tech UK also notes the areas that are driving investment and research and the extent to which the UK is a leader. Key emerging technologies that are attracting increasing levels of commercial interest and investment include:

- **Artificial Intelligence (AI)**
- **Robotics**
- **Cybersecurity**
- **Blockchain**
- **Internet of Things (IoT)**
- **Augmented/Virtual Reality**

3.10 Cyber related activities have seen significant spikes in investment, in particular, as a result of geopolitical tensions and the growing threat of cyber-attacks, directed at governments, public institutions and business.

3.11 Looking ahead, the application of digital technologies is being propelled forward by a series of emerging sectors, which will be at the forefront of technological development. In a UK context, this includes **Healthtech**, **Agritech** and **Cleantech**, which are harnessing cutting edge digital technologies to address public health, land management and environmental challenges.

3.12 This picture of national performance and competitiveness provides a **clear anchor point from which national policy can be attached**. From an economic development standpoint, the **UK Industrial Strategy** is the government's flagship policy document, which stresses the need to pursue an agenda that drives up productivity, embraces local specialisation and seeks to channel the benefits of the digitalisation of the economy.

3.13 Taking its cue directly from the Industrial Strategy – **the Digital Strategy** sets out a framework to secure maximum impact from embracing a digital revolution and building an economy that works for everyone. The strategy is founded on seven strands:

1) **Building world-class digital infrastructure for the UK**
2) **Giving everyone access to the digital skills they need**
3) **Making the UK the best place to start and grow a digital business**
4) **Helping every British business become a digital business**
5) **Making the UK the safest place in the world to live and work online**
6) **Maintaining the UK government as a world leader in serving its citizens online**
7) **Unlocking the power of data in the UK economy and improving public confidence in its use**

3.14 Gloucestershire has an opportunity to deliver against these objectives, as a leader in cyber technology, delivering inclusive growth, securing inward investment and embedding safety within all online activity.

Cyber Tech Credentials

3.15 Whilst difficult to define and often characterised as being a sub-set of the digital sector, **cyber related businesses are growing in importance and prominence,** domestically and internationally. Cyber security and the protection of national interests is most commonly associated with the sector, but cyber-related activity is increasingly diffuse, specialised and extends beyond government to a broader base of businesses.

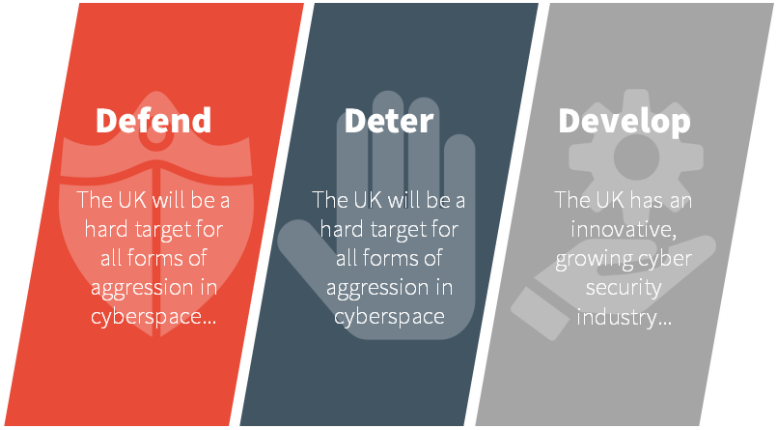
3.16 Indeed, any business with an online presence, that is actively using digital processes and systems and is leveraging the power of data and IoT, has a clear interest in being cyber aware. The motivation for this is increasingly transparent – from protection of intellectual property, managing sensitive data to accessing customer information and financial transactions.

3.17 Like the digital sector, there is a growing and compelling evidence base to demonstrate scale and the value of cyber activity across the UK. The government's **Cyber Security Sectoral Analysis 2020** report summarises the national sector structure, size and distribution, with this setting out a strong narrative about sector growth and economic value:

- **Over 1,200 cyber firms** active within the UK, providing a variety of products and services
- A growing base of firms, **increasing by 44% since 2017**, with a new cyber security business every week.
- Approaching **45,000 people employed** in full time cyber-related jobs.
- Revenue **in excess of £8.5bn**, growing by 46% since 2017.
- Cyber economic output equating to **£3.8bn of GVA.**
- Cyber activities are spread across **a variety of sectors and industries**, reflecting its growing prominence.
- 2019 was a record year for cyber investment, with **£350m raised by cyber companies**.

3.18 These figures point towards a sector which is **buoyant, increasingly relevant and whose growth is underpinned by sustained demand and a stable policy environment**. Whilst the Digital Strategy recognises the importance of cyber safety, the government has also prepared a **National Cyber Security Strategy (2016-21)**, which reinforces an intention to make Britain secure and resilient in cyberspace.

Figure 3.2 UK Cyber Security Strategy – Objectives

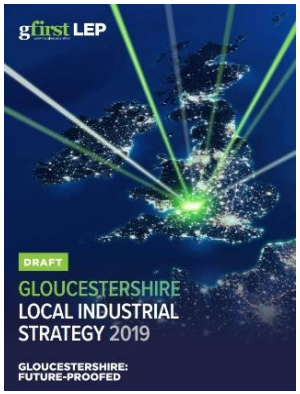


Source: UK National Cyber Security Strategy, 2016

3.19 The Strategy sets the foundations for a flourishing cyber industry, with a strong pipeline of skilled labour, vibrant start-up community and innovation driving new solutions to the most pressing cyber threats, at a national and business level. **It also challenges all firms, large and small, to accept their cyber responsibilities**.

3.20 The Strategy makes a clear and bold commitment to support the cyber sector, with **£1.9bn** to be invested in defence measures, deterrents and the development of whole-society capability. The Strategy showcases the importance of NCSC, both through its role as a national asset, as well the value it offers as a commissioner, attractor of talent and its ability to act as a direct investor in skills, Intellectual Property (IP) and cyber start-ups.

Backing Gloucestershire's Cyber Cluster



3.21 Taking cues from sector trends, drivers and the performance of cyber and digital sectors nationally, the LEP and its partners, including Local Authorities, further and higher education institutions and business, **are backing the expansion of Gloucestershire's cyber cluster**. This commitment is reflected in a variety of areas but most prominent within economic development policies showcased in the **Draft Local Industrial Strategy (LIS)**.

3.22 The LIS positions **Cyber-tech** as a key economic opportunity, exemplifying the area's distinctiveness. The sector is also positioned as being a key attractor for young people, investment and a centrepiece to the **'Magnet County'** initiative. The sector also has much to contribute in delivering against the five foundations of productivity.

3.23 The LIS sets out an ambition to build on the success of cyber-related growth to date, **making Gloucestershire the UK's natural home for cyber-tech innovation**, anchored by the presence of NCSC and with the planned development of Cyber Central UK. With investments made in cyber skills and digital infrastructure, the LIS articulates an ambitious roadmap towards sustained growth and international cyber prominence.

3.24 Complementing the LIS, emerging proposals for **Cyber Central UK** are a further reflection of the support and ambitions within Gloucestershire. The development is pitched as being the UK's premier cyber hub, with business space complemented by an active residential community and proximity to NCSC.

3.25 Feeding into the LIS and providing a an exceptionally deep feedstock of insight, the **South West England and South East Wales Science and Innovation Audit (SIA)** identifies world-leading assets and research capabilities within Gloucestershire. The SIA provides a forensic review of activity and assets across the area, which tell a stronger story about economic capability and the scope for specialisation.

3.26 Of particular note within the SIA is evidence that positions the area at the heart of a region which has exceptional strengths in **digital technology innovation, commercialisation and also cyber security**. Collectively these are underpinned by a large and diverse base of assets, including the labour market, educational institutions and firms who are at the forefront of digital technology deployment. These are already building blocks to underpin Industry 4.0, but also digital health, creative industries, smart cities and environmental resilience.

The Global Picture – Cyber Growth

3.27 As digital technologies become embedded within industry and economies globally**, so cyber security has risen in prominence too**. As a demonstration of the global significance of cyber and associated activity, the United Nations (UN) has sought to focus on it as an area of specific interest, as both an opportunity and threat to global prosperity and security.

3.28 Evidence of this is seen within the **UN's Office of Information and Communications Technology (OICT)** which leads efforts to build capacity, strengthen coordination and foster collaboration to enhance cybersecurity preparedness, resilience and response. The **Digital Blue Helmets (DBH)** programme amplifies the cyber expertise and perspectives of the United Nations, as a common platform for rapid information exchange and better coordination against cyber threats.

3.29 The WEF has also been active in showcasing the importance of cyber security and its potential as a driver of tech growth. It cites the **threat of disinformation** as being a growing challenge, in the context of more data being created and collected, with response difficult in the face of rapidly evolving technology.

3.30 The WEF observes 2020 as being a pivotal year for the global cyber agenda. As technology evolves it opens up the basis for innovation and cyber solutions, but also introduces risks, as connected devices become even more commonplace. With enhanced fibre and 5G connectivity, new use cases are expected to emerge, with more rapid deployment of AI and augmented/virtual reality. All will consume significant amounts of new and complex data.

3.31 As a result, it is anticipated that business strategy and commercial advantages will be shaped by progressive cyber strategy and the harnessing of technologies to defend against cyber threats. Trust will also be a key theme, in the context of commercial transactions and political relationships, as data becomes increasingly commoditised.

3.32 With a global imperative in place, **cyber centres of excellence have emerged internationally**, tying closely to government institutions, business clusters and universities. Leaders in the field of cyber have emerged across the world, with their growth driven by a supportive policy environment and catalysed by a more general thrust towards digital and tech-led growth.

Table 3.1 Prominent Cyber 'Hot Spots'

Location	Characteristics
USA 	The **United States** is the preeminent leader in cyber security in terms of scale, presence of large cyber firms and the degree of interface with federal government agencies. It is a centre for investment, innovation and exporter of IP. Key cyber centres include Silicon Valley, Washington, Maryland, Boston, San Diego and New York City.
Israel 	**Israel** has become a global cyber leader, driven by a powerful domestic security agenda and an exceptional innovation and investment ecosystem. Increasingly attractive to multinationals, cyber activity is focused on Tel-Aviv and Be'er Sheva which is being promoted as Israel's 'Cyber Capital' due to its assets and tri-sector ecosystem.
South Korea 	**South Korea** has developed advanced cyber security capabilities and ambitious policies, as a victim of threats and relationship with near neighbours. With an economy at the forefront of digital technology development and manufacturing, South Korea is adopting a proactive and holistic cyber agenda backed by its technical prowess.

3.33 Each of these countries offer a useful reference point from which to understand the factors underpinning their success, the elements that make them distinct and how they relate to the

Gloucestershire cluster. They also introduce the potential for greater and deeper collaboration on cyber matters.

Introducing Gloucestershire's Digital Tech Sector

3.34 Before undertaking a deep dive into the cyber sector, **it is helpful to set out the Digital Tech sector**, of which the majority of cyber activity sits within. This uses a standard government-recognised approach predicated on SIC codes, that is a broad reflection of cyber and digital related business activities across the wider study area, GFirst LEP and Cheltenham. From this, headline messages begin to emerge.

3.35 It is also important to underscore that this provides an **initial snapshot of employment and business activity** which is derived within industries that have a digital focus and are utilising technology on a day-to-day basis. It does not showcase the cyber sector specifically, but provides an understanding of the wider digital economy in which cyber technologies are embedded and flourishing.

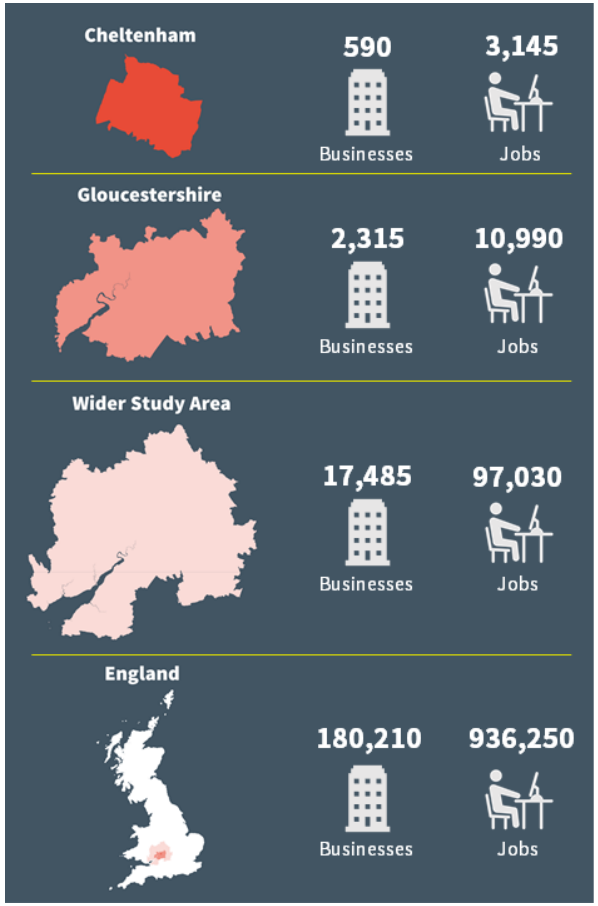
Broad Digital Tech – Scale

3.36 **Cheltenham sits at the core of a wider cyber and digital region** – one the UK's most important tech centres and digitalised economies, stretching from Oxford, Bath, Bristol to Cardiff and Birmingham. Across this **wider study area**, there are some **17,500** active digital tech businesses, employing circa **97,000** people in digital tech jobs.

3.37 In Cheltenham, which lies at the heart of this wider region, there are **590** digital tech businesses employing over **3,140** people across the authority area. This sits within Gloucestershire's digital tech economy, which comprises over **2,300** businesses and employees nearly **11,000** people.

3.38 Despite the scale of employment and business footprint, this does not fully expose the level of cyber activity that we know exists locally and emphasises the need for deeper interrogation.

Figure 3.3 Digital Tech – Scale

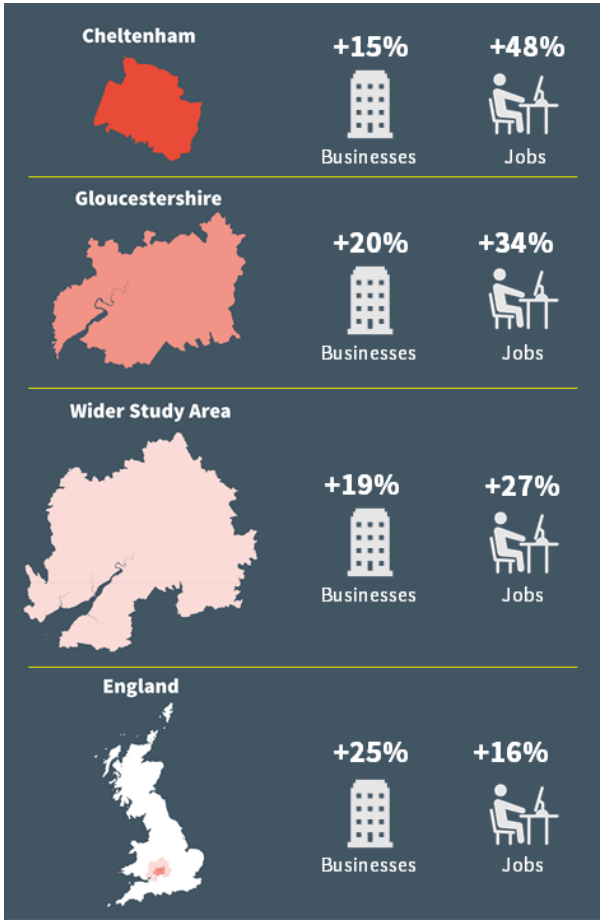


Source: ONS BRES, 2018; ONS UK Business Counts, 2019

Broad Digital & Cyber Sector – Growth

3.39 Historical trends also offer insights into the trajectory of growth and how each area has performed over a 5 year period.

Figure 3.4 Digital Tech Sector – Five Year Growth



Source: ONS BRES, 2013 and 2018; ONS UK Business Counts, 2014 and 2019

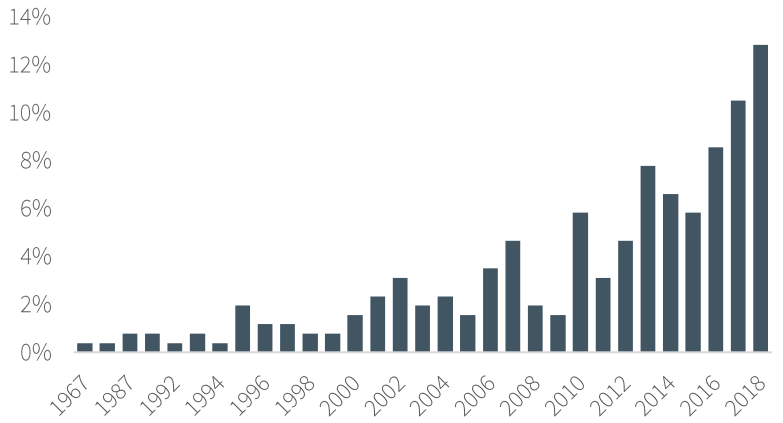
3.40 Across the wider study area, the sector has grown considerably - by **19%** in business terms and job growth of around **27%**, driving considerable additional economic output as a result.

3.41 By comparison, the digital tech sector has grown by **15%** in business terms and the number of jobs by **48%** in Cheltenham over the past 5 years – evidence of the growing importance of tech industries, with cyber at the core of this trajectory. Again, this has occurred within the broader development of Gloucestershire's digital tech credentials, which has also exhibited impressive growth, with jobs increasing by **34%** and the business base expanding by **20%**.

Broad Digital & Cyber Sector – Sector Maturity

3.42 The maturity of a sector (that is how established it is) helps to give a rounded sense of **how the base of digital tech-related businesses has emerged and grown over time**.

Figure 3.5 Year of Incorporation (% of business base)



Source: Companies House, 2019

3.43 **Gloucestershire is characterised by a relatively mature digital and cyber sector –** Companies House data shows that digital tech businesses have an average year of incorporation of 2010. This indicates that locally the sector is more established relative to the sector at large, across the UK (2012).

3.44 **This finding emphasises the embedded nature of the sector locally** and shows that the area has the established foundations to grow as a preeminent digital tech location. It also suggests that the area's key tech and cyber anchors (such as GCHQ/NCSC) and Gloucestershire's broader base of characteristics, have proven to be a powerful draw for businesses operating within related industries.

3.45 Beyond this level of analysis, the use of SIC based definitions is of limited value and does not tell a sufficiently compelling story about the breadth and nuanced nature of cyber activity across Gloucestershire and the extent to which Cheltenham has a distinct and differentiated offer. To do this, a more sophisticated approach can be taken, which is explored in section 4.

Part 4: Deeper Sector Insights

4. Deeper Sector Review

The key messages in this section are:

- **An alternative approach to baselining the cyber sector provides a series of impactful and compelling messages.**
- **This generates insights into the true scale of cyber activity in Gloucestershire and Cheltenham.**
- **This AI based approach reaffirms the UK's strength as a global cyber leader based on sector size and jobs.**
- **Gloucestershire is undoubtedly a leading cyber hub, with the largest cluster in the UK outside of London.**
- **This translates to a very high level of specialisation, with the highest concentration of cyber firms nationally.**
- **Within the county, Cheltenham is the epicentre of cyber activity seen both in sector scale and concentration.**
- **Cyber strengths and distinctiveness are apparent when looking at sub-sectors and show key growth drivers.**
- **Whilst Information and Technology is the largest sub sector, 7 are more specialised than the national average.**
- **Sub sectors are characterised by businesses who are cyber focused, yet also distinctive and differentiated.**
- **The cyber sector is valuable, making a direct annual economic impact of £88m, employing over 1,100 people.**
- **Cyber spillovers are significant, with £50m spent annually in the supply chain and over £46m induced.**
- **Gloucestershire's Cyber jobs are highly productive, with each full-time employee generating £78,000 of GVA.**
- **If the ~6,000+employess at GCHQ/NCSC are considered, the scale of the cyber sector will even more significant.**

4.1 Using a cutting-edge approach to define sectoral composition, this section takes a deeper dive to identify and understand cyber and digital activity across Gloucestershire and Cheltenham.

4.2 The insights within this section show that **Gloucestershire is the UK's premier location for Cyber activity**. Building on this message, the credentials of the sector are set out in more detail, highlighting its scale, specialisation and distinctiveness. It also considers the positioning of cyber activity within a broader base of digital industries, which are tech-influenced and make up a larger component of the local economy.

4.3 Data has been gathered using an AI approach which harnesses bespoke 'web crawling' techniques to pinpoint companies who are engaged in relevant cyber and digital activities.

4.4 This process has identified **over 2,000** cyber businesses trading in the United Kingdom. Of these companies, **three quarters** have been tied to a trading address. As such, the figures presented here are likely to represent **a conservative estimate of the activity taking place on the ground**.

4.5 Whilst the approach used here is comprehensive, many parts of the cyber sector are by their very nature clandestine and do not openly publicise on the web. Again, this supports the

conservatism presented within the findings but the trends and story they tell go far beyond the insights that are achievable through a traditional SIC level analysis.

4.6 In this section we provide an in-depth review of the cyber sector in the following areas:

1) **Scale:** that is the size of the sector in terms of the business base and employment.

2) **Competitiveness:** that is the extent to which activity is more concentrated than the national average.

3) **Clustering:** that is the spatial profile of business activity and identifying where density is pronounced.

4) **Distinctiveness:** that is the composition of sub sectors that are propelling cyber and tech activity.

5) **Employers characteristics:** that is the types of businesses operating across cyber sub sectors.

6) **Value and productivity:** that is the direct economic impacts attributed to cyber employment.

7) **Supply chain effects:** that is the economic value linked to supply chain expenditure and induced effects.

8) **Strong digital foundations:** that is the scale and distinctiveness of the wider digital industry base.

4.7 Findings are presented in a visual format throughout and where possible, the relativity of Gloucestershire and Cheltenham's cyber and digital strengths are illustrated against the specified comparator geographies.

Scale: Gloucestershire is the second Largest Cyber Location Nationally…

4.8 In gross terms Gloucestershire has the **second largest number of cyber firms in the country**, with only London home to more.

The **123 businesses** seen across Gloucestershire demonstrate a notable critical mass of cyber activity, particularly across a less urbanised geography where the conditions for clustering may ordinarily be considered as less favourable.

4.9 Here, Gloucestershire has **over double** the level of total cyber businesses compared to Greater Manchester – one of the UK's largest and most connected cities. This relative strength is also seen when looking at the West Midlands, which has **73%** fewer cyber businesses than Gloucestershire.

Cyber Location Rankings

	Total Cyber Companies	Cyber Specialisation
1	London 587	Gloucestershire 6.0
2	Gloucestershire 123	Cambridge 2.5
3	Greater Manchester CA 54	London 1.6
4	Cambridgeshire & Peterborough CA 35	Cambridgeshire & Peterborough 1.4
5	West Midlands CA 33	Swindon 1.2
6	Cambridge 14	Greater Manchester CA 0.7
7	Swindon 7	West Midlands CA 0.5

Source: Glass.ai, 2020

Competitiveness: Gloucestershire is the UK's Most Specialised Cyber Location…

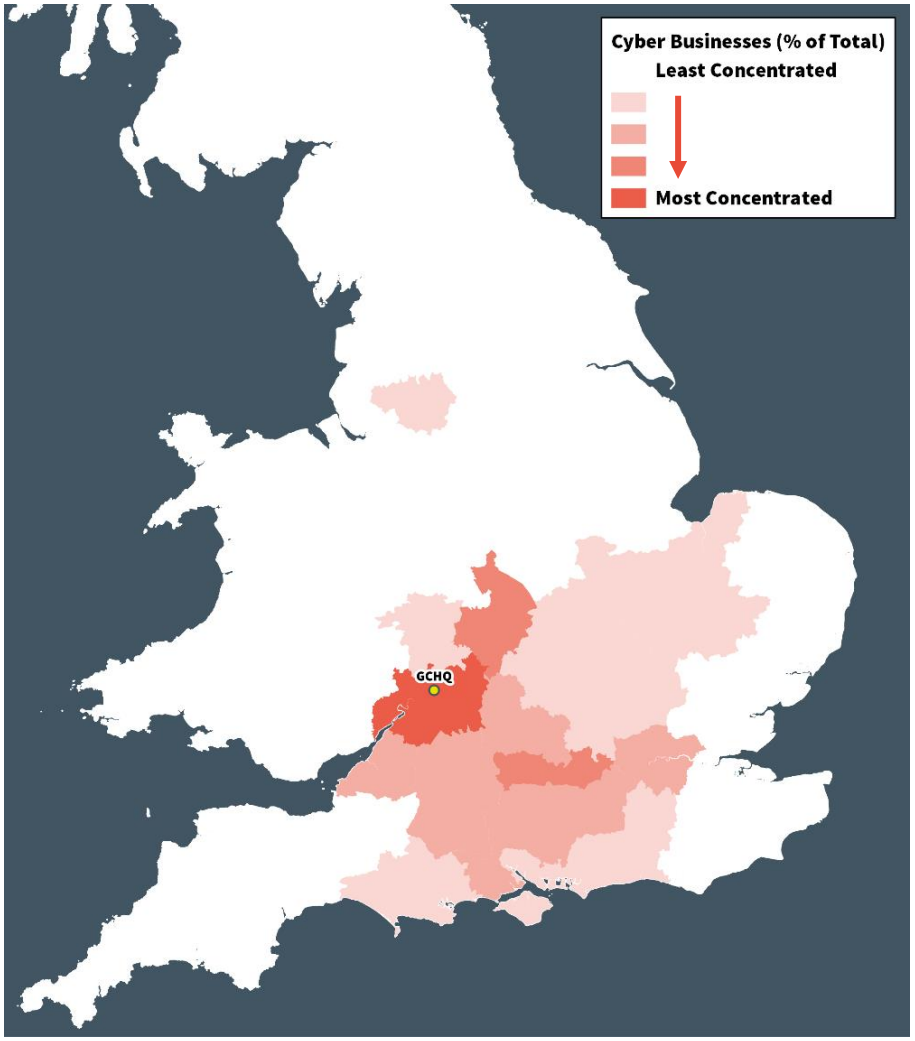
4.10 Specialisation provides a measure of how concentrated sectoral activity is relative to the total business base. This offers a better understanding of the relative strengths of a local economy.

4.11 The level of specialisation is measured in terms of Location Quotient[4] (LQ) – this quantifies how concentrated an industry is compared to the national picture. By this measure, **Gloucestershire is the UK's most specialised cyber location**.

4.12 Here, Gloucestershire has **6 times** the level of cyber businesses than that seen nationally – more than any other location. This illustrates an unrivalled density of sectoral activity taking place across the county, that is not seen at this scale anywhere else across the UK.

4.13 The accompanying map articulates the concentration of cyber businesses at the LEP level. Here, the competitiveness of Gloucestershire's cyber sector is pronounced, where it has **the largest proportion of cyber companies of all LEP areas.** Nearest competitors based on this measure include Worcestershire LEP, Thames Valley Berkshire LEP, West of England LEP and Swindon and Wiltshire LEP.

4.14 Interestingly, the map helps to showcase the relative lack of concentration in London, despite the larger overall size of the sector in terms of the business count. This is a key finding when considering comparative advantages.

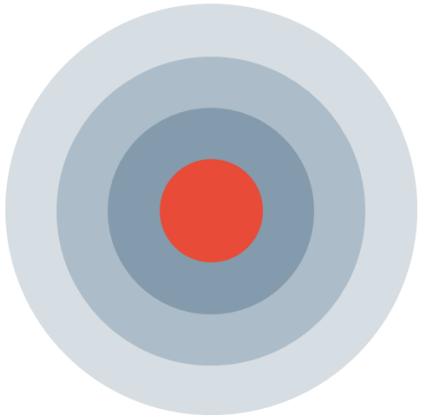


[4] **LQ =** Quantifies how concentrated an industry is compared to the National average. The national average is 1.0, therefore any number above 1.0 is a greater concentration than the national average.

Clustering: Cheltenham is the Beating Heart of Cyber Activity in Gloucestershire…

4.15 Taking a closer look Gloucestershire's geography, we can see that the specialisation that differentiates the county radiates outwards from Cheltenham. The Borough can therefore be considered as being at the **heart of the cyber cluster**.

The UK's Cyber Central



	Total Businesses	Cyber Businesses	Total of England	% of Total Businesses	LQ
Cheltenham	2,999	59	4%	2.0%	11.2
Gfirst LEP	11,637	123	8%	1.1%	6.0
Wider Study Area	102,364	278	18%	0.3%	1.5
England	886,026	1,558	100%	0.2%	1.0

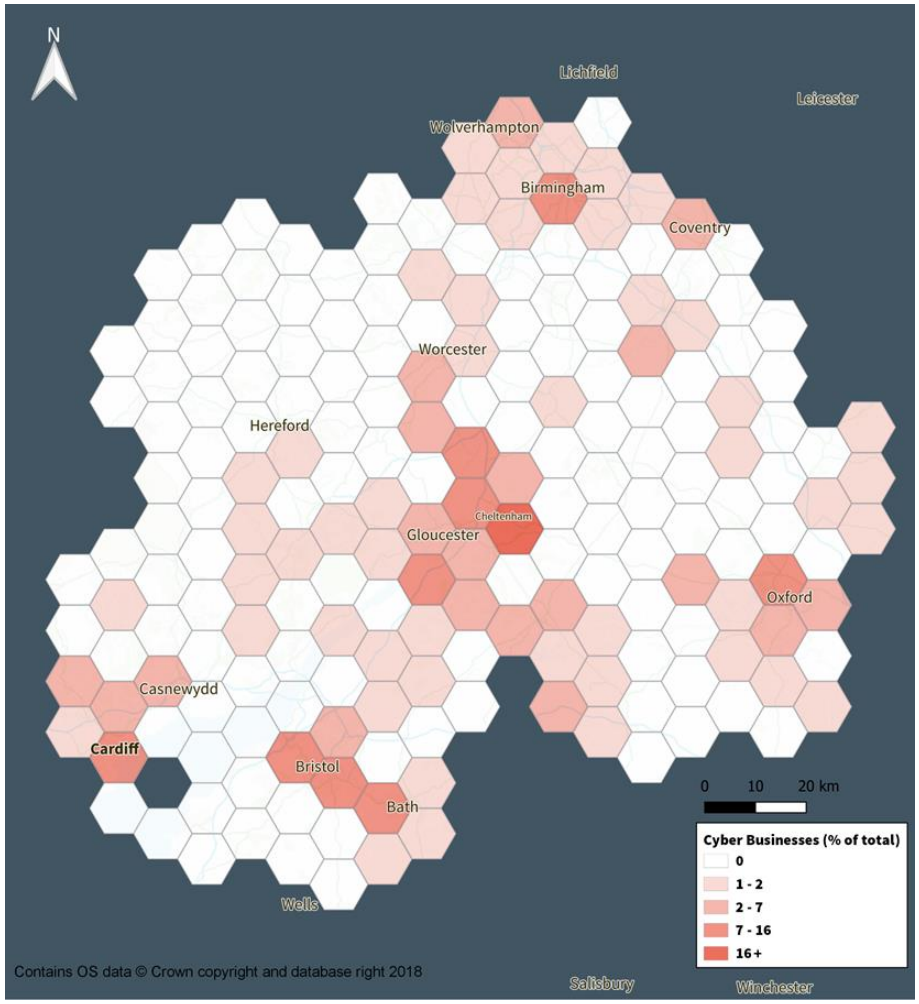
4.16 **Cheltenham has 11 times the concentration of Cyber businesses seen nationally.** This illustrates:

1) **The magnetic effect of GCHQ –** given GCHQ's significance as the UK's home of cyber intelligence it is unsurprising that it is a major draw to the area and exhibits a somewhat magnetic effect. Here, businesses are likely to be either directly participating in the supply chain of GCHQ but also looking to benefit from the knowledge spillovers that undoubtedly exist locally.

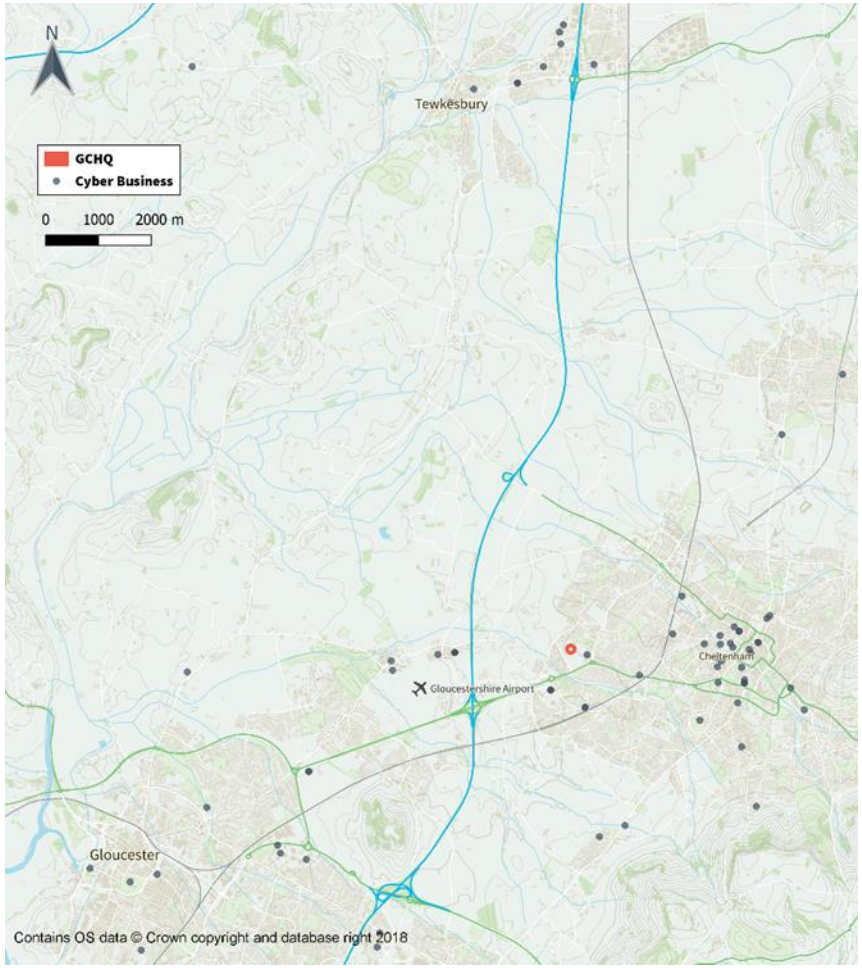
2) **A critical mass of assets –** Cheltenham is home to several prominent assets which make the area an unrivalled destination for cyber businesses, such as **Hub8** (a co-working space dedicated specifically to enabling the growth and development of the flourishing cyber technology ecosystem) and **CyNam** (a network and platform for enabling the growth and development of people and organisations within Cheltenham's flourishing cyber technology ecosystem). These assets are explored in more detail in section 5 and form a fundamental part of the overall ecosystem.

3) **Cheltenham is a driver for Gloucestershire's strengths as a cyber location –** Cheltenham currently comprises half of all cyber business activity across Gloucestershire. This emphasises the strategic significance of Cheltenham as a location to drive future sector growth across the wider region. It also reinforces the rationale for Cyber Central UK to be developed as the cornerstone of a globally significant cluster with significant growth potential.

4.17 Looking across the wider study area, **cyber activity is predominantly clustered in urban centres with activity radiating out from Cheltenham** which sits at the heart of the wider study area and a broader set of cyber credentials.



4.18 Taking a closer look at Cheltenham and the immediate area surrounding GCHQ, there is a clear density of cyber activity. Here, there is a clustering of activity in Cheltenham with smaller groupings of cyber businesses in **Tewksbury** and **Gloucester**. Both are actively targeting tech-led growth and cyber firms, balancing Cheltenham as the area's natural focal point.



Distinctiveness: Cyber Strengths are Characterised by Sub Sectors…

4.19 Taking a more detailed look at the sub sectors that make up Gloucestershire's cyber sector allows for a more forensic understanding of business activity. It also helps to establish messages around uniqueness and the nuanced nature of cyber businesses and those which are propelling the sector forward.

4.20 **Gloucestershire is a unique cyber location**. The table to the right details the **10 largest sub sectors** across the LEP, **7** of which have a greater concentration of activity than that seen nationally (defined by those coloured orange).

4.21 The largest employing sub sector is **Information Technology and Services**, which has **29** businesses operating across Gloucestershire. This is followed by **Computer Networking and Security**, albeit this is not specialised relative to England.

4.22 Other notable sectors that distinguish the cyber sector within Gloucestershire include:

1) **Aviation, Aerospace and Defence –** given the strong links of the sector with GCHQ and military locations, it is unsurprising that this sub-sector is specialised locally, with at least 8 businesses trading in this space.

2) **Higher Education & Universities –** as detailed in the forthcoming ecosystem chapter, the area is bolstered by several universities and colleges which have a specific cyber offer as part of their academia and research.

3) **Computer Hardware/Electrical and Electronic Manufacturing –** Gloucestershire has a prominent part of its cyber economy which has a focus on the production, development and maintenance of physical equipment.

Gloucestershire's Key Cyber Sub-Sectors

	Gloucestershire Cyber Businesses
1	Information Technology and Services 29
2	Computer Networking and Security 21
3	Consulting 10
4	Aviation, Aerospace and Defense 8
5	Computer Software 7
6	Staffing and Recruiting 4
7	Security and Investigations 3
8	Higher Education and Universities 3
9	Computer Hardware 3
10	Electrical and Electronic Manufacturing 3

Note: **Orange** denotes a specialisation in activity

Source: Glass.ai, 2020

4.23 The table provided overleaf provides a further indication of the types of activity that takes place within each sub sector and highlights some prominent businesses operating across Gloucestershire. **The key message here is one of the nuanced nature of cyber activity**, involving businesses large and small, those which operate globally and have a broader offer that extends beyond digital services. This also includes businesses that have benefitted from the county's start-up ecosystem and have experienced rapid growth as a result, since.

Sub Sectors in Focus: Sub Sectors Illustrate the Nuanced Nature of Cyber Activity…

Gloucestershire Cyber Companies by Sub-Sector				
Information Technology & Services	**Computer Networking & Security**	**Consulting**	**Aviation, Aerospace & Defence**	**Computer Software**
Sopra Steria	**Cisco Systems**	**Deloitte - Cyber Intelligence Centre**	**Raytheon**	**Ripjar**
Sopra Steria, a European leader in consulting, digital services and software development, helps its clients drive their digital transformation to obtain tangible and sustainable benefits.	Cisco is a global leader in business, education, philanthropy, and creativity.	Deloitte is a global leader in consultancy and has a specific team that cyber risk and how this can unleash new opportunities. Learn about the Cyber Risk Services we offer.	Raytheon is a prime contractor and major supplier to the U.K. Ministry of Defence and has developed strong capabilities in mission systems integration in defence, national security and commercial markets. Raytheon UK also designs, develops and manufactures a range of high-technology electronic systems and software.	Ripjar is a global company of talented technologists, data scientists and analysts designing products that will change the way criminal activities are detected and prevented.
Staffing & Recruiting	**Security & Investigations**	**Higher Education & Universities**	**Computer Hardware**	**Electrical & Electronic Manufacturing**
InfoSec People	**CORVID Intelligent Business Defence**	**University of Gloucestershire**	**CHB Global**	**Ultra Electronics**
InfoSec People is a leading UK Cyber Security and Technology recruitment business.	Corvid was developed in 2013 by Ultra Electronics, a FTSE 250 company specialising in providing smart electronics technology for the aerospace and defence industries.	The University of Gloucestershire is located over three campuses, two in Cheltenham and one in Gloucester and has specific courses in computer and cyber security.	CHB Global are specialists in sourcing and selling refurbished IBM Tape, Disk and SAN storage solutions. As a IBM Business Partner, CHB Global is able to offer a server solution that meets the growing demands of business and IT infrastructure.	Ultra Electronics Ltd is a group of specialist businesses, located across the world, that design, manufacture, supply and support electronic and electromechanical systems, sub-systems and products for defence, security, cyber, transport, energy and aerospace applications.

Sub Sectors in Focus: Sample Case Studies…

TrustStamp
Cheltenham

TrustStamp is a US and UK tech start-up working on biometric authentication. They are located in Cheltenham and have an active presence in the Hub8 incubator.

In 2019 they joined the GCHQ/NCSC Accelerator Programme as part of the second cohort of start-ups. Their participation provided lots of opportunities for the company and has acted as a platform for their growth. This included access to invaluable cyber security mentoring from NCSC, and attending a hosted trip to Silicon Valley to meet with RSA Security. Here, the company had coaching with Lean-Startup pioneer, Steve Blank.

The resulting growth in the company has been rapid and significant, with the business able to leverage the rich base of cyber security people and services in Gloucestershire. As a result, the business has decided to base a significant proportion of their tech team in Cheltenham (upwards of 15 people).

The company expect to recruit locally, tapping into the supply of cyber and tech specialists. They also intend to make a long-term commitment to partnering within the ecosystem and be a valuable contributor to Glouctestershire and Cheltenham's burgeoning cyber reputation.

Points of Note: Start-up that has benefitted directly from the ecosystem and has a strong sense of local identity.

Survevine
Cheltenham

Surevine builds secure, scalable collaboration solutions for the most security conscious organisations. In doing so, they facilitate the joining of people, enabling collaboration on and around highly sensitive information.

Surevine was a spin out from GCHQ in circa 2008. The company was started by two engineers who were on contract work in the department and subsequently pursed a commercial opportunity. The company has grown significantly and are now a business of 30 staff with an annual turnover of £4m.

Their Threatvine product is the centerpiece to their IP and is a next generation cyber-security information sharing platform designed for secure cross-organisational collaboration and analysis. It also powers the UK's national cyber security information sharing platform.

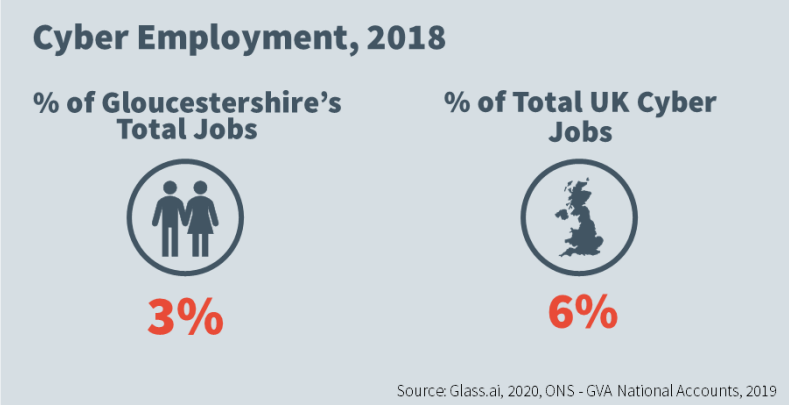
Surevine's engineers work remotely across the UK with a particular concentration in the South West, have 'hubs' in in London and have recently moved their South West hub to Hub8 in Cheltenham. This is part of a strategic move to be part of the Cyber Central ecosystem and benefit from the base of expertise and assets.

Points of Note: Business's flexible operating model, relocated to Gloucestershire, illustrates value of NCSC supply chain.

Employment: The Cyber Sector is a Significant Contributor to Local High Value Jobs…

4.24 **Cyber jobs are knowledge intensive**, requiring some of the most cutting-edge skills and techniques seen of any industry across the country. As part of a consideration of the sector's value, it is necessary to develop a fuller view of the number of jobs accommodated within the sector. From here, it is possible to estimate the economic value attributed to these jobs.

4.25 **Gloucestershire's Cyber sector is estimated to employ around 1,130 people.** Reviewing this figure against the scale of the sector nationally, it is estimated that cyber employment in **Gloucestershire accounts for around 6% of the UK's total jobs in the sector.** The sector is also strategically significant for the rest of Gloucestershire, accommodating **3% of jobs across the LEP area**.



4.26 It is highly likely that these estimations around employment are conservative. Notably, **they do not include the employment that can be attributed to GCHQ and the NCSC, which is estimated to accommodate around 6,000 staff** in a multitude of cyber and national security related activities. It is also projected that this employment base could extend to **7,000** people, in the future. The cumulative effect would therefore push sector employment well beyond **7,000 jobs** in Gloucestershire.

Value: Gloucestershire's Cyber Sector is a Considerable Generator of Economic Value…

4.27 **The strong economic value and productivity credentials of cyber activity** have been well documented, and this is no different within Gloucestershire. Here, we set out initial estimates as to the value of the cyber sector in the county. These calculations have focused on identifying the total value of the sector and provide a conservative estimate as to the overall scale of direct and indirect economic impact.

4.28 **Three main types of economic impact** are presented here – these are:

1) **Direct impacts:** that is the economic output attributed to cyber businesses including labour, capital and supplies.

2) **Indirect impacts:** that is the economic value generated by the cyber supply chain and attributable to sector expenditure (e.g. profits and wages among suppliers of IT support/services and hardware, landlords, and administrative supplies).

3) **Induced impacts:** that is the value generated from the spending power of cyber employees in the wider economy.

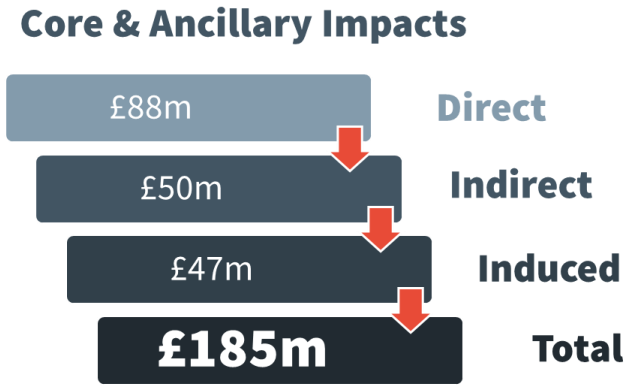
4.29 A large proportion of these impacts will be retained with Gloucestershire's economy, although in practice this is difficult

to estimate. As such, figures presented here assess the total economic impact only.

4.30 Based on our understanding of the business base and the total number of cyber firms actively trading, **Gloucestershire's cyber sector generates a total economic impact of around £185m in GVA per annum.**

4.31 Supply chain activity makes up a significant part of the cyber sector's economic impact, accounting for over **one quarter** of the economic value generated by cyber activity**. The spillover effects of cyber activity are of great significance, therefore.**

4.32 The total economic impact of the cyber sector consists of **£88m** of direct economic impact (consisting of the spend of cyber businesses), **£49m** of indirect economic impact (reflecting the spend by cyber businesses on their supply chains) and **£46m** of induced economic impact (based on the spend of cyber-related employees in the wider economy).



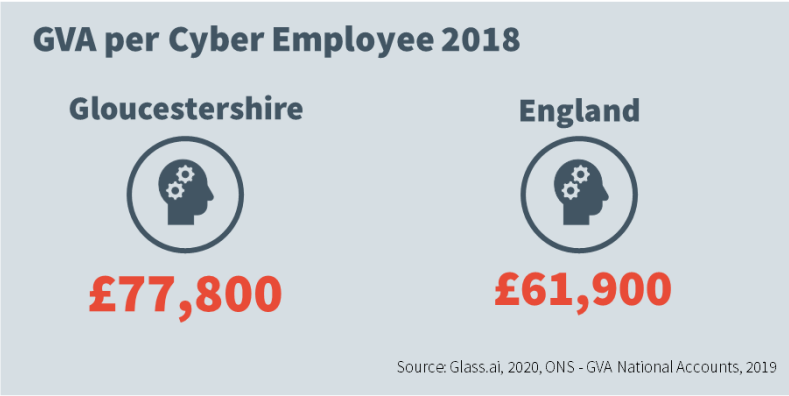
4.33 Gloucestershire's cyber sector also makes a considerable contribution to the UK's total cyber economic value – **representing 7% of the total annual economic impact generated across the country.**

4.34 It is important to note, that these calculations represent a conservative view of the total scale of the sector. Applying an alternative approach, akin to that used in the national cyber study would likely result in a larger economic impact figure. Moreover, the level of cyber employment accommodated at GCHQ of around 6,000 staff is not considered here **would considerably increase the value of the sector position**.

Productivity: Gloucestershire's Cyber Sector is a Driver of Productivity…

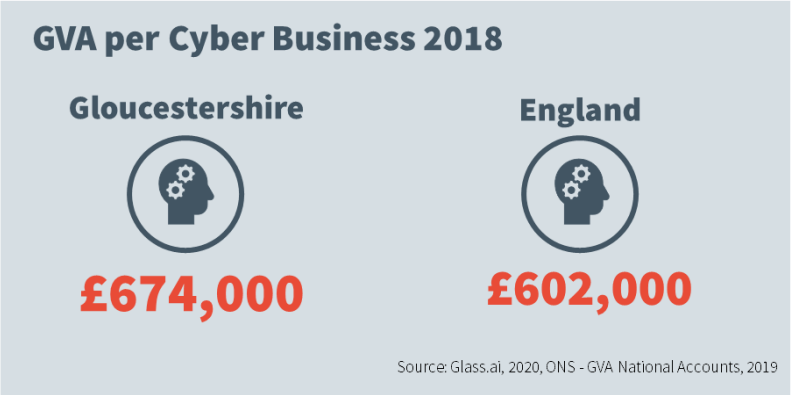
4.35 Gloucestershire's Cyber sector punches above its weight in productivity terms. Looking at productivity as a relative measure, both the sector's workers and businesses outperform the national picture in terms of economic output.

4.36 Analysis shows that **on average each cyber employee generates around £77,800 in GVA per annum, a notably higher figure than that seen nationally.** This reflects the profile of the industries that are currently operating within the sector that typically involve higher order and greater value operations.



4.37 This enhanced productivity is also seen at the business level. Here, cyber businesses in Gloucestershire are on average more productive than their counterparts elsewhere across England. **Gloucestershire's cyber businesses on average generate £674,000 GVA per annum, a greater amount than that seen across the rest of the country.**

4.38 Again, this reflects the industry composition of the sector, where there is a greater amount of activity taking place in more economically productive sectors.



Digital Foundations: Cyber Flourishing as a Consequence of a Strong Digital Sector…

4.39 The research has also sought to understand more about Gloucestershire's wider base of digital businesses, again using an advanced AI approach. **This has identified a strong base of digital companies in Gloucestershire**.

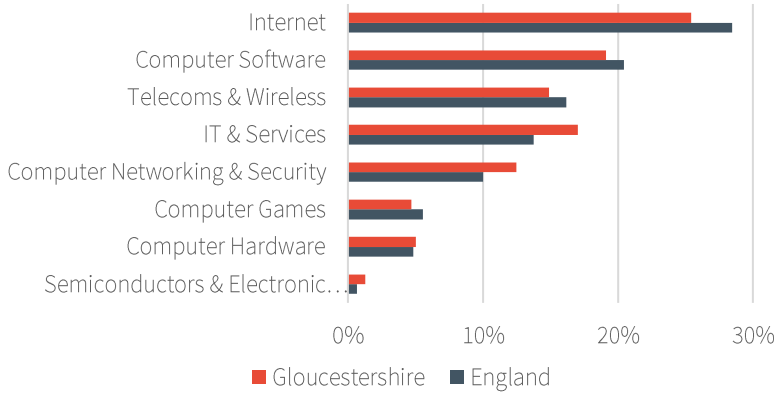
4.40 **There are around 620 digital businesses trading across the county.** These represent a notable scale of activity that provides the foundations for a flourishing cyber sector.

4.41 Looking further afield across the wider study area there are a total of **5,170** digital businesses trading that are both underpin the cyber sector but also rely on its services to function and trade in a seamless and resilient manner.

4.42 Distinct digital concentration is not observed, with specialisation largely reflecting the wider national picture. However, **the digital sector is characterised by a series of prominent sub sectors**, which have a greater concentration locally, including:

1) **IT & Services**
2) **Computer Networking & Security**
3) **Semiconductors and Electric Equipment**

Figure 4.1 Gloucestershire's Digital Sub Sectors



Source: Glass.ai, 2020

4.43 Given its scale, the digital sector is a major contributor of economic value and employment. The digital sector in Gloucestershire is estimated to generate around **£346m in GVA**

per annum – equivalent to 2% of Gloucestershire's total economic output[5].

4.44 The wider study area in which Gloucestershire is situated is also a major driver for the UK's digital sector economic output. In this context it is a digital powerhouse, **contributing approximately £3bn of GVA per annum.**

4.45 Whilst the interrelationships between the cyber and digital sectors are in reality complex, there is an important degree of symbiosis and the relative health of both in Gloucestershire and the wider study area is an excellent sign.

[5] These figures are derived from the DCMS Sectors Economic Estimate (2017) and Glass.Ai Data 2020.

Part 5: Ecosystems Driving Growth

5. Wider Growth Factors

Key research messages in this section are:

- **Data shows that cyber growth can be fuelled by a sizeable working age population, but an ageing profile is a threat.**
- **Demographic trends show the 'Magnet County' initiative is well founded, with a need to attract young people.**
- **Projections show above average population growth but working age gains will be countered by perpetual ageing.**
- **Local limitations are mitigated by wider labour market access, with over 900,000 people with an hour's drive.**
- **Gloucestershire's well qualified residents are well-placed to support the general needs of cyber and digital firms.**
- **Industry demand for digital skills is high, but skills gaps and recruitment challenges suggest there are deficits.**
- **Cyber and digital activity has the potential to boost the county's lower than average rates of enterprise.**
- **Gloucestershire has the highest occurrence of scale-ups amongst all LEPs, a sign of its high performing ecosystem.**
- **The LEP is a leader in innovation, which is likely to be underpinned by its cyber and digital competencies.**
- **Digital infrastructure is a key driver of competitiveness – this has improved but more investment is needed.**
- **Improved connectivity can be secured through investment, market engagement and as part of Cyber Central UK.**
- **Transport quality and accessibility are importance factors of growth which need continued attention and investment.**
- **The cyber and digital asset base is extensive and benefits from scale, dynamics and density that make it distinct.**
- **There is a base of world-class assets in Gloucestershire, reinforced by an absolute ambition to sustain growth.**
- **The area's competitiveness is defined in nuanced ways, such as the desire to create a genuine cyber community.**
- **GCHQ/NCSC is the undoubted heart of the cyber and digital cluster and an asset that must continue to be leveraged.**
- **There are a series of observed ecosystem deficiencies that must be addressed to extend competitive advantages.**

5.1 This section introduces and assesses the factors that underpin thriving and growing cyber industries and the digital companies that form part of the wider supply chain. **Businesses do not grow in isolation but prosper through the presence of a wider ecosystem** – one which provides access to the skills, infrastructure, finance and the ingenuity needed to perpetuate growth, attract investment and power competitive advantage.

5.2 Below we explore the qualities of Gloucestershire's labour market, innovation credentials, 'hard' and 'soft' infrastructure and base of assets to understand how these can be leveraged for future growth and expose any deficits that may need to be addressed going forward.

Ecosystem: Labour Market and People

5.3 **A base of accessible, skilled and employable people is necessary in order for cyber and digital industries to thrive**. Business will continue to need access to the best talent and will be reliant upon people within a given catchment area, with demographics and qualifications playing a major part in the size and suitability of the pool of employable labour.

Today's Population

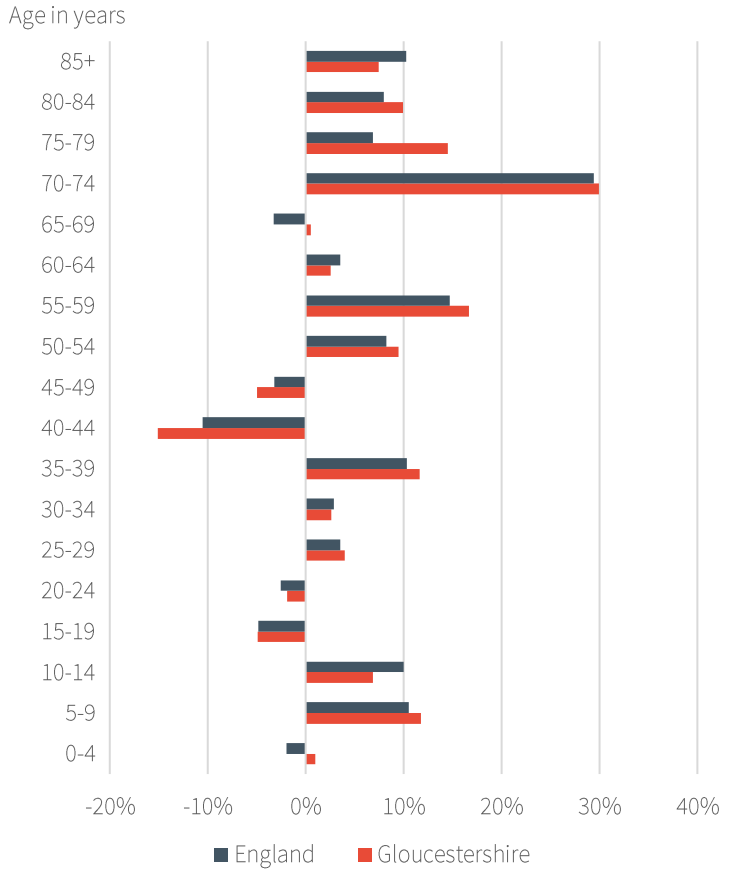
5.4 The demographics of Gloucestershire set the parameters for the pool of working age people that will support cyber and tech-led growth. The population profile and trends also highlight potential risks around labour constraints and the need for the next generation of talent to be inspired, skilled and retained.

5.5 Gloucestershire's demographic characteristics are summarised below:

- **Gloucestershire is home to around 634,000 people**[6], accounting for roughly **one tenth** of the wider study area.
- **Population growth in Gloucestershire has been broadly in line with that seen nationally** – the population grew by **5%** over the 2013-2018 period, while England's population grew by 4%.

  Gloucestershire has a fair-sized working age population – it accounts for **61%** of residents, which is slightly below the national average (63%).

Figure 5.1 Population Growth by Age Band, 2013-2018



Source: ONS Population Estimates, 2013 and 2018

[6] ONS Population Estimates, 2018.

- Gloucestershire has an **older population** than that seen nationally – the 65+ age group represents **21%** of the total population, compared to 18% for England.
- **Gloucestershire has seen relatively high growth in its elderly population** – over the 2013-2018 period, the 65+ population increased by **12%**, relative to a national average increase of 9%. In contrast, the population aged 16 to 64 increased by only **2%**, which is on par with the growth rate for England as a whole.

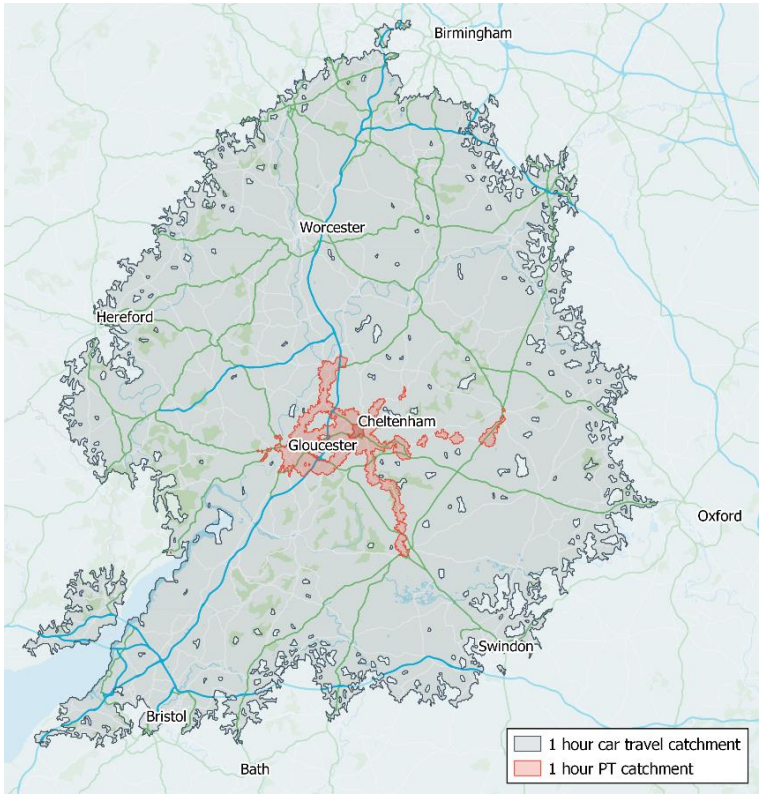
5.6 Demographic trends are a key driver behind the **'Magnet County'** initiative and hint at the need for a targeted response to ensure cyber and digital businesses are backed by an able and steady supply of labour. This will require a focus on the retention and development of young people, the retraining and upskilling of older generations and harnessing cyber and tech opportunities to attract from the best talent from beyond Gloucestershire's borders.

Labour Market Catchment

5.7 **The labour market is the key area from which business are able to source skilled staff and expertise**. This remains important, albeit employees are increasingly becoming fleet of foot and orientated less around static office environments.

- **Gloucestershire's cyber sector is strategically positioned to access a substantial labour market** – there are **900,000**[7] working age people accessible within a one-hour drive of Cheltenham's city centre.
- Relative to this, public transport (PT) **accessibility to the area's cyber community is poor** – just over **170,000** working age people are within a one-hour PT commute.

Figure 5.2 Car Travel and Public Transport Catchments



Source: TravelTime Platform, 2020

[7] ONS Population Estimates, 2018.

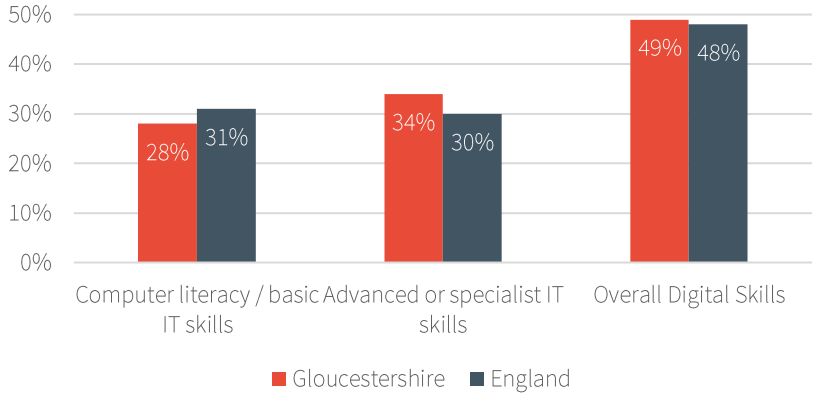
5.8 Gloucestershire's access to a deep array of talent across the wider study area is a huge asset for the county and one which will underpin future sector growth. However, consideration will need to be given to how people can better access employment opportunities via sustainable transport solutions and also harness the benefits of home working, underpinned by digital technologies.

Skills and Occupations

5.9 **Access to skilled people is a key differentiator and driver of competitive advantage**. Cyber businesses need access to the skills and aptitudes necessary to flourish, including digital skills and the ability to work flexibly and remotely.

- **Gloucestershire is a highly qualified place** – **40%** of residents have a degree qualification or higher, which is slightly above the national average (39%)[8].
- In the immediate area of GCHQ, higher level qualifications are even more concentrated – **Cheltenham has one of the highest levels of degree educated residents across the wider study area**. At **48%**, this is 9 percentage points higher than the national average.
- **Gloucestershire has a higher proportion of residents in higher level occupations**, reflecting the area's qualifications – **44%** of residents are in the three highest level occupational groups (Associate Professional & Technical; Professional; and Managers, Directors & Senior Officials). This is slightly below the national average (47%) for these groups.
- **Cheltenham has an occupational profile that is skewed towards high level occupations** relative to the national average – **53%** of residents are in the three highest occupational groups.
- The demand for skills is often reflected in the presence of skills gaps, which may hinder the ability of the local economy to grow. **Advanced IT skills are in greater demand in Gloucestershire** relative to the national average, and are a more prominent need than basic IT skills – over **one third** of employers surveyed felt advanced IT skills need developing among their workforce.

Figure 5.3 Skills that need developing among workforce (% of employers)



Source: UKCES Employer Skills Survey, 2017

[8] ONS Annual Population Survey, 2018.

- Analysis of job vacancy data highlights Gloucestershire as having **high demand for machining and manufacturing technologies skills**, making this a potential focus area of localised skill development[9].

5.10 Whilst the base of resident qualifications is a significant asset and one which has driven the growth of cyber and tech jobs to date, it is a rapidly evolving space where the alignment between employer requirements and the supply of skills is in a constant state of change. There is a prescient need to ensure observed skills gaps are addressed and that skills providers are arming people with the acumen, knowledge and flexibility needed to thrive in cyber and digital sector jobs.

Population Projections

5.11 Looking ahead, projections provide a sense as to how the local population may change and whether the trend of an ageing demographic is likely to perpetuate. This may inform the shape of the labour market catchment and also the need for a differentiated systemic skills response.

- **Gloucestershire's population is expected to grow over the next two decades, but its proportion of working age adults is expected to contract**. Projections suggest that the population in Gloucestershire will increase by **16.8%** (from 611,300 to 714,000) between 2014 and 2039, with an annual average growth rate of **0.7%**[10].
- **These projections are slightly higher than those for England and Wales.** Over this time period, the 65+ age group is projected to increase by **66.6%** , while the working age population (aged 20-64) is projected to rise by **1.4%**.

5.12 Whilst projections provide some comfort around overall population growth and an increasing pool of working age people, there is scope to further enhance labour market access as a consequence of locally-driven growth. Cyber Central UK is a prime example of this, with the ability to attract a large number of people to Gloucestershire.

Ecosystem: Innovation and Enterprise

5.13 **An area's economic prospects are informed by the extensiveness of innovation and enterprise activity**, which are important drivers of growth. These are likely to be factors behind the development of cyber businesses, but also be informed by the prevalence of technology focused firms in Gloucestershire.

- **Gloucestershire is characterised by lower levels of start-up rates relative to the national picture** – with a **10%** start-up rate driven by Cheltenham and Cotswolds, Gloucestershire trails the England start up average (13%)[11].
- **However, in business survival terms, Gloucestershire performs strongly** – its 3-year and 5-year survival rates, 65% and 47% respectively, are higher than the national average (61% and 42%). Recent research conducted by Enterprise Research Centre (ERC) ranked Gloucestershire's

[9]: DCMS, No Longer Optional: Employer Demand for Digital Skills, 2019

[10] Gloucestershire Employment and Skills Board Evidence Base, 2017.

[11] ONS Business Demography, 2018.

3-year survival rate (of firms born in 2015) the **fourth highest** among England's LEPs[12].

- **Scale-up companies are important contributors to the economic vitality of an area** – research by the Scaleup Institute has shown that they create high-quality jobs (circa **3,000** per week) and, on average, are **42%** more productive than peers in the same sector and are also innovative[13]. Critically, digital and cyber technologies are increasingly integral to high-growth firms, as scale-up companies typically rely on digital processes and solutions to grow.
- **Gloucestershire ranks seventh highest among all LEPs for scale-up rates** – the incidence rate of high-growth firms (scaleups), as defined by the OECD[14], is **6.6%** for Gloucestershire compared to 6.2% for the UK.
- **Gloucestershire has a sizeable scale-up community** – as of March 2020, there are 108 scale-up companies operating in the county, with a combined turnover of £2bn and average turnover growth of **47%**[15]. Many are harnessing the power of digital technologies.
- Relative to other LEPs, **Gloucestershire is leading innovation in the areas of work organisation and design.** ERC research provides a relative measure of innovation for each of England's LEP areas – Gloucestershire's best performing innovation areas are:
  - **New methods of work organisation (rank 4 of 39)** – this metric relates to firms' adoption of new methods of organising work responsibilities and decision making. Typical examples of this include firms' first use of a new system of employee responsibilities, teamwork, decentralisation, integration and education/training systems.
  - **Design investment for innovation (rank 3 of 39)** – this metric relates to firms' investment in all forms of design related to the development or implementation of new or improved goods, services and processes.

5.14 The balance of these innovation characteristics is reflected in Figure 5.4 below and offers a platform from which to consider how this could be a more integral part of the cyber and digital ecosystem. They also hint at the areas where there are deficiencies in the asset base and the rationale for improvement is strong. That said, the comparative advantages that Gloucestershire exhibits as a hub of entrepreneurship and the commercialisation of innovation will be important in the context of cyber and digital businesses, as a factor of attractiveness and underlying growth prospects.

5.15 By strengthening these areas of relative weakness, the county will enhance its position as a centre for enterprise and improve the prospects for cyber businesses which are starting up, scaling or seeking to develop broader commercial relationships.

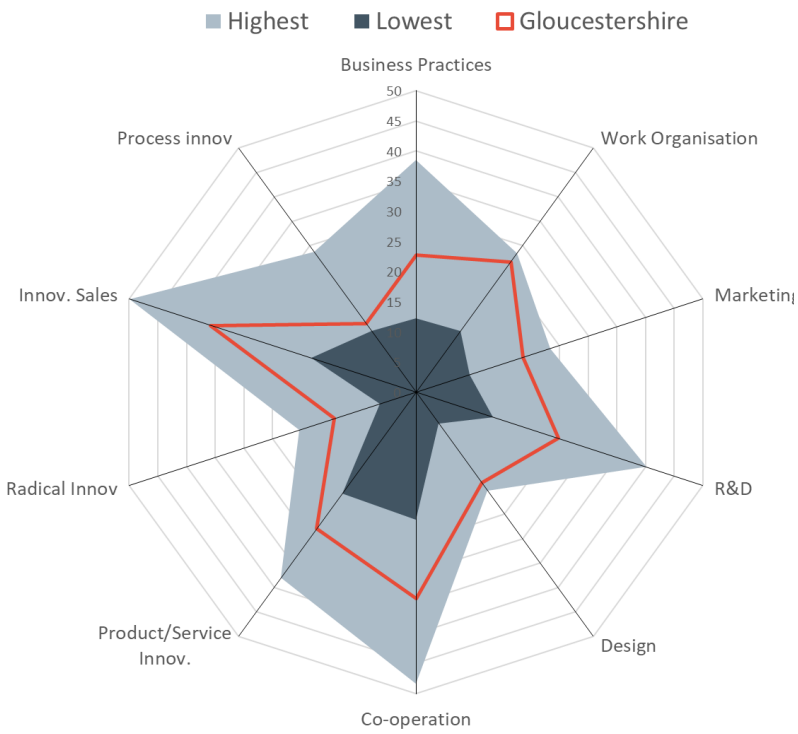
[12] ERC Local Growth Dashboard, 2019.

[13] ScaleUp Institute, Annual ScaleUp Review Highlights 2019.

[14] High-Growth is defined as annualised average growth in employment of 20% or more over a three-year period (2015-18) and restricted to a business having at least 10 employees in 2015.

[15] ScaleUp Institute, 2020.

Figure 5.4 Gloucestershire - LEP Innovation Benchmarks: 2014-16



Source: Enterprise Research Centre, 2019

Ecosystem: Infrastructure

5.16 **High quality and resilient infrastructure is increasingly the bedrock for thriving economies**, whether that be through the transmission of data to the physical movement of goods and services. They are also a key factor in alleviating inequalities and are driving more inclusive and sustainable forms of growth.

5.17 **Digital connectivity and capability are increasingly a differentiator and a requirement for business operating across all sectors**, but is particularly significant for cyber and digital industries, who are heavy consumers of data and bandwidth. It is the key enabler that facilitates the deployment of technology at work, home and whilst on the move.

Digital Infrastructure

5.18 **Fixed broadband is the cornerstone of digital infrastructure connectivity across Gloucestershire**. Reaching homes and businesses, it also backbones mobile networks and wireless connectivity, which service communities across the county.

- **Current fixed broadband connectivity provides a mixed picture**, that is complicated by the rapid dynamics of the market and shift towards gigabit capable technologies. It is clear that the county has made significant strides in increasing overall coverage and the penetration of new technologies in 'not spots', especially rural areas.
- Coverage is reflective of rurality and settlement density, with superfast access excellent across the majority of areas. **However, full fibre capability, which is a key investment area, is far less extensive**, with urban centres lagging in coverage, particularly Cheltenham and Gloucester.

5.19 There is a prime opportunity to influence this position through government programmes, market engagement and a progressive planning system approach. There is also an opportunity to ensure Cyber Central UK has best-in-class connectivity, needed to solidify its position and improve Cheltenham's full fibre offer. Much of this is underway, led by local

authorities and the LEP, in conjunction with improved market dynamics and investment.

Table 5.1 Fixed Broadband Coverage (% Premises)

Local Authority	Superfast ≥30 Mbps	Ultrafast ≥100 Mbps	Full Fibre
Cheltenham	100%	82%	1%
Cotswold	94%	37%	37%
Forest of Dean	83%	20%	16%
Gloucester	98%	87%	1%
Stroud	93%	18%	12%
Tewkesbury	98%	64%	28%
Gloucestershire	95%	53%	15%
England	97%		12%

Source: Thinkbroadband, March 2020

- In addition to service availability, it is important to acknowledge actual adoption of high speed broadband which will drive new benefits and impacts. Take-up data from the Government's Building Digital UK (BDUK) investment programme reflects this and is a reasonable proxy for assessing overall fibre-based broadband take-up in Gloucestershire[16]: This shows that take-up is broadly in line with the UK average, **although there is a need to push for greater adoption towards 100%**.
- **Mobile connectivity is also an integral component of Gloucestershire's digital infrastructure**. It supports businesses on the move and is increasingly merging with fixed networks. Whilst 5G rollouts are happening apace and will become the benchmark for mobile capability and speed, 4G mobile connectivity remains integral to day-to-day businesses and data transfer.
- Data suggests that 4G indoor coverage across the county is strong at the top level, **however, significant variations persist across its constituent authorities**. This is particularly pronounced in more rural authorities. In Cheltenham - the core of the area's cyber offer, 4G connectivity is superb with 100% of premises covered by 4G.

Table 5.2 Mobile Coverage (% Premises)

Local Authority	Premises with No Reliable 4G Signal	4G - Premises Covered
Cheltenham	0%	100%
Cotswold	0.3%	92%
Forest of Dean	0.8%	83%
Gloucester	0%	100%
Stroud	0.2%	90%
Tewkesbury	0%	96%

Source: Thinkbroadband, March 2020

5.20 As with fixed coverage, there is scope to make Gloucestershire an attractive place for mobile investment and accelerate the deployment of 4G/5G. This is already taking place in earnest, through market engagement and, leveraging government programmes the area promoting itself as a testbed for trials. It will be important to ensure that a balanced focus is placed on increasing mobile network coverage in unison with fixed

[16] Reported figures are for the Herefordshire and Gloucestershire area and reflect multiple contracts. ISP Review BDUK Superfast Broadband Take-up Progress, Q2 2019.

broadband, acknowledging the value of a coherent and consistent policy approach which will support the rollout of both.

Data Centres

5.21 **Data centres are important assets in any flourishing cyber region**. These powerful centres of computing facilities and networking equipment provide the storage for and enable the flow of information over the internet. They offer resilience, additional layers of security and provide an opportunity for tech focused firms to co-locate, where the rationale to do so is strong.

5.22 They are an integral part of the digital infrastructure that is necessary to support companies whose business is built around producing and utilising data and will become increasingly important in Gloucestershire as the cyber sector continues to grow. There are two primary data centres located in Gloucestershire:

- **Shield House, Gloucester** – Shield House is a 20,000 square foot high-tech facility. Shield House is a carrier neutral, colocation data centre that serves the region with high technical resilience and connectivity. With capacity for 600 colocation racks, the centre provides technical space to service providers, enterprise, media, education, health care and government organisations.
- **Safehosts, Cheltenham** – Safehosts offers a range of bespoke colocation and hosting options, from dedicated server hosting, through Quarter Racks and Half Racks, to full private lockable 42U racks and private suites and cages for larger requirements. The centre also provides high speed internet transit services and cloud network connectivity services.

5.23 There is an opportunity to learn more about the value of data centres locally and to consider how new entrants can be attracted to Gloucestershire, as a backbone to sector growth. There is also a need to consider how the presence of a data centre at Cyber Central UK could be accommodated and what implications this may have for the shape of the development and how it is taken to market.

Transport Accessibility

5.24 **Transport access continues to be a key driver of economic prosperity** and Gloucestershire benefits from its location on both the national motorway network and a number of trunk roads. This extends to public transport too and north-south and east-west train routes intersecting the county. It is also a rural county that brings transport challenges and is actively pursuing a sustainable transport agenda.

- **Gloucestershire sits in a highly accessible location** that is effectively a gateway connecting the South East, the Midlands, and the North to Wales and the South West.
- **Gloucestershire is well connected by trunk roads and motorways** – the A40 and M5 run through the county, making it easily accessible from all areas of the country.
- **The motorway and local highway networks are highly utilised** – car and van travel are the predominant choice of travel to work for **70%** of Gloucestershire's population, compared to a national average of **62%**[17].

[17] Gloucestershire's Local Transport Plan 2015-2031

- **Gloucestershire benefits from good rail links** – there are currently nine railway stations within the county that enable commuting connections to many major commercial centres in England and Wales.
- **The county is also served by an airport** – located just 10 minutes from the centre of Cheltenham, Gloucestershire Airport is a convenient local hub with flights to the Isle of Man and UK regional airports.
- **Active investments are being made in transport** – these will help address deficiencies, relieve congestion and accelerate modal shift. All of these will combine to improve the area's attractiveness to cyber firms.

5.25 Whilst changing patterns of labour movement and the trend of working from home/flexibly are likely to accelerate, particularly in a post COVID environment, the efficient and rapid movement of people and good will remain an important factor of growth. The LEP will need to ensure it balances its digital connectivity with the transport accessibility, in order to remain competitive and tap into the pool of skilled labour that sits within the wider study area.

Ecosystem: Other Factors of Competitiveness

5.26 There are other elements that are important to the overall attractiveness of Gloucestershire as a home of cyber and tech industry. These are increasingly reflected in a broader assessment of place, but are seen as important facets of overall competitiveness. Quality of life is a prime example, which captures a varieties of domains and is something commonly associated with Gloucestershire given the abundance of natural assets.

5.27 Whilst there is no definitive measure of quality of life, a variety of indices exist which look at the relative performance of local authorities across the UK. One of the most prominent and regularly published is the Halifax Quality of Life Survey[18].

5.28 The 2020 iteration of this survey highlights Gloucestershire's credentials, which feature across a broad range of policy and marketing materials, including those positioning Cyber Central UK. A number of local authorities feature within the top 50 list, reinforcing messages that can be harnessed to support the growth and development of cyber and digital activity across the county.

5.29 Qualitative research and local discussions have showcased the value placed upon quality of place, through the prism of factors such as safety, the environment, housing and a prominent stainability agenda. Gloucestershire should look to leverage and confidently communicate its quality of life characteristics.

[18] The Halifax Quality of Life Survey looks at how local authority areas compare, and takes into consideration 26 different factors that home buyers may consider.

Ecosystem: The Cyber and Digital Asset Base

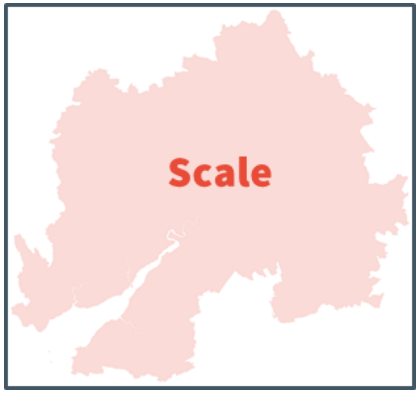
5.30 **Cheltenham and Gloucestershire sit at the heart of an influential digital super-region**, differentiated it from its near neighbours. The area is blessed with a variety of assets that are integral to the cyber ecosystem and have proven to be key drivers of growth, helping the area to secure investment, develop talent and its reputation as a cyber and digital hub.

5.31 The area's cyber asset base and characteristics are defined by:

- **Scale:** the critical mass of assets, facilities and employers that are based within wider study area, creating a cluster of great size that is competing with leading players, nationally and globally.
- **Dynamics:** the base of cyber and digital assets across Gloucestershire, which is an established and growing cyber hub, where ambition is high, momentum strong and the area's cyber identity fundamental.
- **Density:** the core of cyber activity is reflected within the density of assets, start-ups and educators in Cheltenham and the surrounding area, which is Gloucestershire's most prominent cluster.

Scale – Study Area

5.32 **The study area forms the epicentre of a globally-significant cyber and digital cluster** which is competing with global clusters but also acting as a key stimulus for collaboration, tying industry, research institutions and government agencies together within a common cyber cause.



5.33 To an extent, the area's digital and cyber capabilities are crystallised in the SIA, but there are nuances to this which demonstrate the region's unique characteristics and underpin its exceptional prospects for further evolution and growth. These characteristics are:

- **A world-class end-to end ecosystem** – combining all of the key factors that must be in place to secure global competitiveness, including access to finance, first-class workspace, research and innovation capacity and the presence of institutions with the knowledge and capacity to be at the cutting edge of technology. The area's universities anchor this ecosystem, with some 19 higher education institutions being within 75 miles of Cheltenham.
- **Cyber shaping national infrastructure resilience** – the study area is home to a number of national infrastructure providers whose active engagement with industry and academia is helping to ensure national infrastructure

systems are resilient, robust and able to deal with cyber threats.

- **Competition and collaboration** – the area thrives as a consequence of the complex dynamic between internal competition and collaboration, with the balance pivotal to success and competitive advantage and has allowed the study area to attract significant investment and maintain government commitment. Membership of the pan LEP Cyber Resilience Alliance is a good example of these working relationships.
- **International recognition** – the study area has global prominence as a leading cyber cluster and innovator, playing a major role in expanding the overall economic profile and acting as a 'hook' for international cooperation, knowledge exchange and collaboration on common areas of interest.
- **Depth of expertise** – the number of firms, universities and public institutions intertwining with cyber security and digital technology means that the study area is equipped with a vast array of experts, whether they be specialists or those with more general and transferrable knowledge, creating a deep pool of expertise and cyber capacity.

Dynamics – Gloucestershire

5.34 **Gloucestershire has established itself as the primary base of cyber activity within the wider study area**, benefiting from a strong and consistent growth narrative, alongside continued industry and public investment. Benefitting from positive momentum both in policy terms and its growth trajectory, Gloucestershire has become the natural place for cyber businesses to locate and grow.

5.35 The county's cyber profile and success is underpinned by its asset base and traits, including:

- **Cyber informing good growth** – the county's support for cyber and digital sector activity is a representation of a deeper ambition to deliver knowledge intensive, resilient and productive employment across Gloucestershire, which will be driven by evolving technologies and interface with other agendas, including environmental sustainability.
- **Government backing** – Whitehall and successive government administrations continue to support Gloucestershire's cyber agenda, which is aligned well with national strategy and bolstering around the presence of NCSC/GCHQ, with future investment earmarked.
- **Local Authority leadership** – exemplified through the collective support for the sector and progressive approach taken by the public partners, be it via policymaking, engagement with industry and direct investment, putting the pieces in place to allow the sector to thrive.
- **Quality of place** – as a consequence of the county's location, natural environment and accessibility, Gloucestershire has much to offer investors and people seeking a cyber or digital career, as a result of the factors that define its quality as a place to live, work and play.

- **Balancing sector growth** – a countywide cyber and digital industries proposition which emphasises the complementarity of assets, developments, urban centres and infrastructure as being intrinsic to the sector's growth, with a particular focus on creating flourishing and distinct clusters in Cheltenham, Gloucester and Tewkesbury.

Density – Cheltenham

5.36 **Cheltenham is the area's cyber core having the greatest density of related businesses and institutions**, as well as a growing base of assets and workspaces. The evolving ecosystem is being driven by continued government investment in national security assets and the presence of bespoke business support facilities. Combined, these are supporting an increasingly active start-up community, bringing forward the next wave of cyber leaders.

5.37 Cheltenham is set apart by the following characteristics and the vibrant nature of the cyber community:

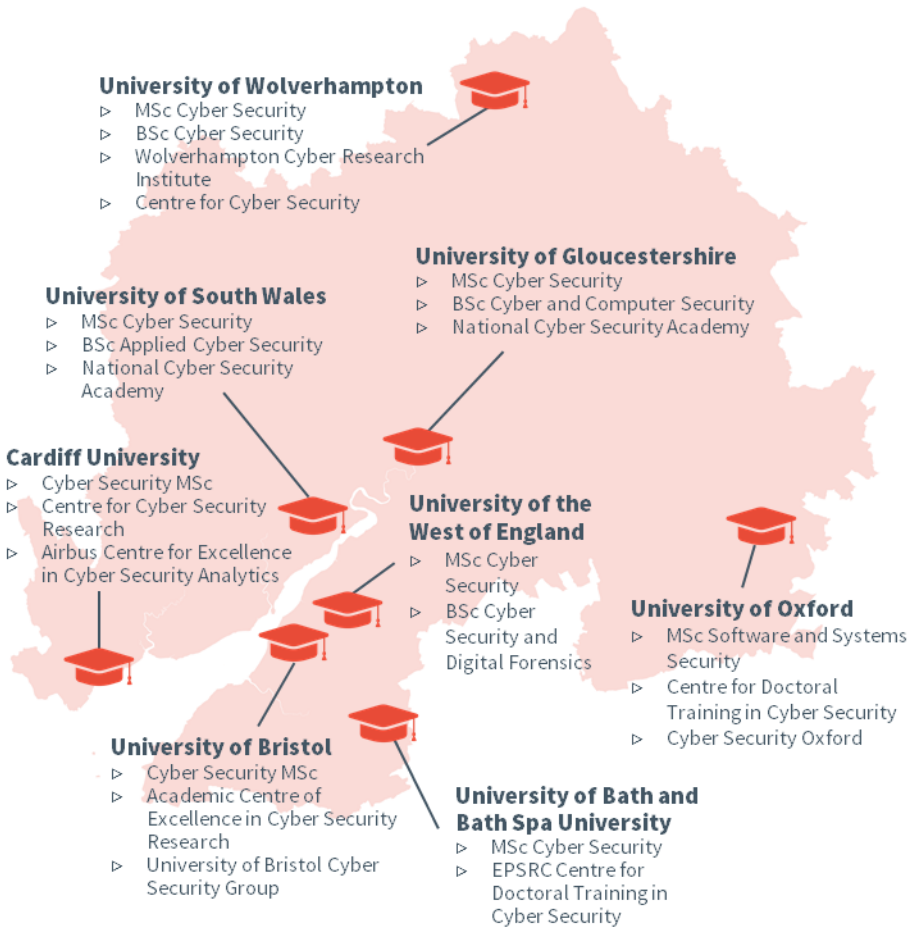
- **The home of GCHQ and NCSC** – a nationally significant asset which continues to grow in prominence as Whitehall's focus on protecting national interests and the economy increases, employing a large number of people, supporting an extensive supply chain, whilst having a skills, investment and business support role far beyond its core function.
- **The Cyber Central UK Opportunity** – ambitions to reinforce Gloucestershire's cyber credentials and to attract a new generation of tech-focused employee to the county are crystallised in Cyber Central UK – a high profile, large-scale and radical development mixing state-of the art business, education, research and living uses.
- **Enterprising start-ups** – a new wave cyber entrepreneurs are calling Cheltenham home, incentivised through its proximity to GCHQ, the presence of start-up workspace, improving status as a place to secure finance and having an active community of cyber professionals who benefit greatly from access to their peers.
- **Anchor employers** – the presence of established businesses with a growing interest in cyber and application of digital technologies makes Cheltenham a hub activity and a place where government, industry and educators engage on matters of national significance and importance.
- **Operating with discretion** – companies located in Cheltenham are able to function and prosper in a place which supports a balance of privacy and discretion with the opportunity to leverage an extensive and growing network of cyber professionals who are active in the area.

Mapping the Asset Base

5.38 Within these geographies, there are a variety of assets that collectively define the cyber and digital industry opportunity. They combine to showcase a unique proposition, founded on material assets, investment and private and public sector initiative.

5.39 Some of the key assets that sit within the study area, Gloucestershire and Cheltenham are summarised below, **demonstrating the breadth and complementarity of each**.

Scale: Study Area



Digital and Cyber Hubs: Bristol, Cardiff, Hereford, Malvern and Oxford are established cyber hubs, with significant clustering of businesses, assets and institutions. Each are actively pursuing a nuanced cyber security agenda and have well-developed ecosystems, including business support and access to finance. In the case of Bristol and Cardiff, both have established digital industry footprints and have attracted significant investment as a result. The Cyber Valley, South Wales Cyber Cluster and Cyber Resilience Alliance are examples of scale and momentum.

Universities: There are a number of internationally renowned higher education institutions across the area, with a pedigree in high level research, innovation and applied teaching. The University of Bristol, University of the West of England, Cardiff University, University of Bath and University of Oxford all offer dedicated cyber qualifications and leverage research and testing facilities to drive innovation and forge industrial partnerships to advance cyber security standards.

Key Sites and Workspaces: Some cyber clusters are orientated around key sites, where there is a strong employer presence, facilities are tailored and other a mix of multinationals and SMEs have a presence. High profile examples include Skylon Park, Bristol Business Park, Bristol & Bath Science Park and Oxford Science Park. The area also benefits from a network high quality workspaces aimed at tech-focused firms, such as Immersive Labs and the Engine Shed in Bristol, Tramshed Cardiff, The Guild in Bath and across a network of Enterprise Zones.

High Profile Employers: The study area is home to a broad spectrum of employers who are progressing cyber activity, delivering solutions and progressing leading research. Firms such as Airbus, Thales, Global Cyber Alliance, CGI, Rolls Royce, QinetiQ, and British Aerospace are investing in cyber technologies, ranging from those with a focus on national security, infrastructure resilience to applications that support the secure transmission and storage of sensitive data.

Projects (Innovation/IoT): The study area is a home to a number of large-scale projects that are driving the development and application of cyber technologies. Examples include the Bristol is Open programme, Cardiff's smart city plans, the launch of Bath's 5G Smart Tourism Trial and the development of the government-backed Cyber Wales and West (Strength in Places) project.

Dynamics: Gloucestershire

Sector Networks: Gloucestershire benefits from an active business base and the presence of networks and partnerships that are in place to support sustained cyber growth. This includes Cynam, which since its inception in 2015, has rapidly grown to a membership of over 900 members, whilst also running a regular events programme. Cynam's influence extends beyond Gloucestershire, but retains a focus on supporting local SMEs and start-ups and being the centerpiece to the cyber ecosystem.

An Educational Response: The relevance of cyber security and digital skills to local sectors and the wider economy has led to a proactive response from education providers. A prime example of this is Gloucestershire College, which has established strong links with GCHQ and neighbouring universities to develop accredited courses, including a Level 3 Forensic Computing & Cyber Security qualification. Working closely with industry, the College is also leading the way with the delivery of vanguard Cyber Security Degree Apprenticeship.

Unified Initiative: Backed by the strategic imperative laid out in strategy and accompanying policies, the public sector has come together in support of knowledge intensive and technology-led growth. Collaboration and collective initiative is seen within a number of projects, such as the joint development of Cyber Central, the development of a countywide investment proposition, cross boundary engagement and integration with Cyber Valley. There has also been collective support for the Strength in Places bid, which will underscore the Cyber Central offer.

Military Presence: Gloucestershire's legacy of a strong military presence is interwoven with its growing cyber identity and the presence of GCHQ/NCSC. This provides the county with a natural focus on national security and defence, whilst the presence of Ministry of Defence (MoD) employees has established a rich feedstock of skilled individuals who have the potential to develop into cyber entrepreneurs.

A Magnet County: Gloucestershire's economic development ambitions stretch beyond cyber and digital industries and crystallise around the need to deliver inclusive and sustainable growth, which fuels prosperity. Within this is a desire to leverage Gloucestershire's quality of life and home building credentials to attract a new wave of young professional, whilst retaining local talent. As such, there is a consistent and powerful push to position the area as the UK's premier cyber location.

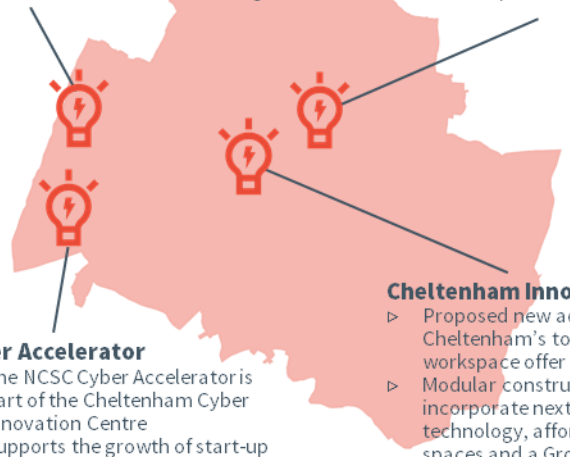
Density: Cheltenham

Cyber Apprenticeships

- Degree level apprenticeship that entails working with GCHQ and NCSC to gain qualifications
- Links with government's national CyberFirst programme
- Offers unique sector insights and a pathway towards a cyber career
- Three-year study in classroom, laboratory and workplace settings
- These augment apprenticeships delivered by Gloucestershire College

Hub8 Incubator

- Hub8 is a purpose-built workspace dedicated to enabling the growth of cyber tech
- Provides flexible offices, dedicated desks, meeting rooms and an event space
- An incubator for emerging cyber technology businesses
- Serve as a 'proof of concept' for cyber technology innovation
- At the heart of Cheltenham's start-up offer alongside Cynam



Cyber Accelerator

- The NCSC Cyber Accelerator is part of the Cheltenham Cyber Innovation Centre
- Supports the growth of start-up cyber companies who will bring new 'better, faster and cheaper' security products to market
- Participants receive commercial growth opportunities as well as mentoring and advice from NCSC
- In excess of £20m of investment raised by participant businesses

Cheltenham Innovation Hub

- Proposed new addition to Cheltenham's town centre workspace offer
- Modular construction will incorporate next generation technology, affordable co-working spaces and a Growth Hub business support centre
- Expected to provide a unique innovation space for start-ups and SMEs in the creative, digital and cyber tech sectors

The Home of GCHQ and NCSC: GCHQ and the NSCC are both located in Cheltenham, making it a key location within the government's national network of cyber and national security assets. The facility is unique and central to Gloucestershire's cyber proposition, in terms of sheer scale, supply chain reach and the different layers of activity that take place within. Increasingly, the NCSC is becoming a magnet for wider investment in cyber, as seen across Cheltenham and through the relative attractiveness of the area to entrepreneurs.

Exceptional Growth Narrative: As a consequence of momentum and recent sector trends, Cheltenham has an exceptionally strong growth story to tell, which is centered on the success of cyber and technology focused companies. With development at Cyber Central shifting towards reality, the density and scale of cyber assets will grow further, being central to the future prospects of the sector in Cheltenham, across Gloucestershire and the wider study area.

Start-ups: The growth of cyber activity in Cheltenham is notable in part due to this being increasingly propelled by start-ups and new-formed enterprise. Anchored around workspaces, business support and accelerator programmes, Cheltenham is home to a substantial base of start-ups, which benefits from the outflow of innovation and labour from NCSC. Consequently, these businesses have scaled and attracted significant investment, including the UK's first cyber unicorn.

A Cyber Community: A defining characteristic of Cheltenham that is difficult to quantify but is inherently present is that of it being a genuine cyber community. This is reflected in the town's reputation as a natural home for cyber professionals and the growing base of assets sparking a greater willingness to collaborate openly and galvanise behind common cyber challenges and areas of commercial opportunity. This notoriety is a key driver behind the area's continued cyber momentum.

A Strong Profile: Cheltenham maintains a strong and visible external profile, founded on a powerful brand, its historic significance, quality of the built environment and proximity to the Cotswolds. This is a key variable in maintaining its relative competitive advantage, with the balance of these assets pivotal to future cyber success and technology influenced companies locating within the Borough.

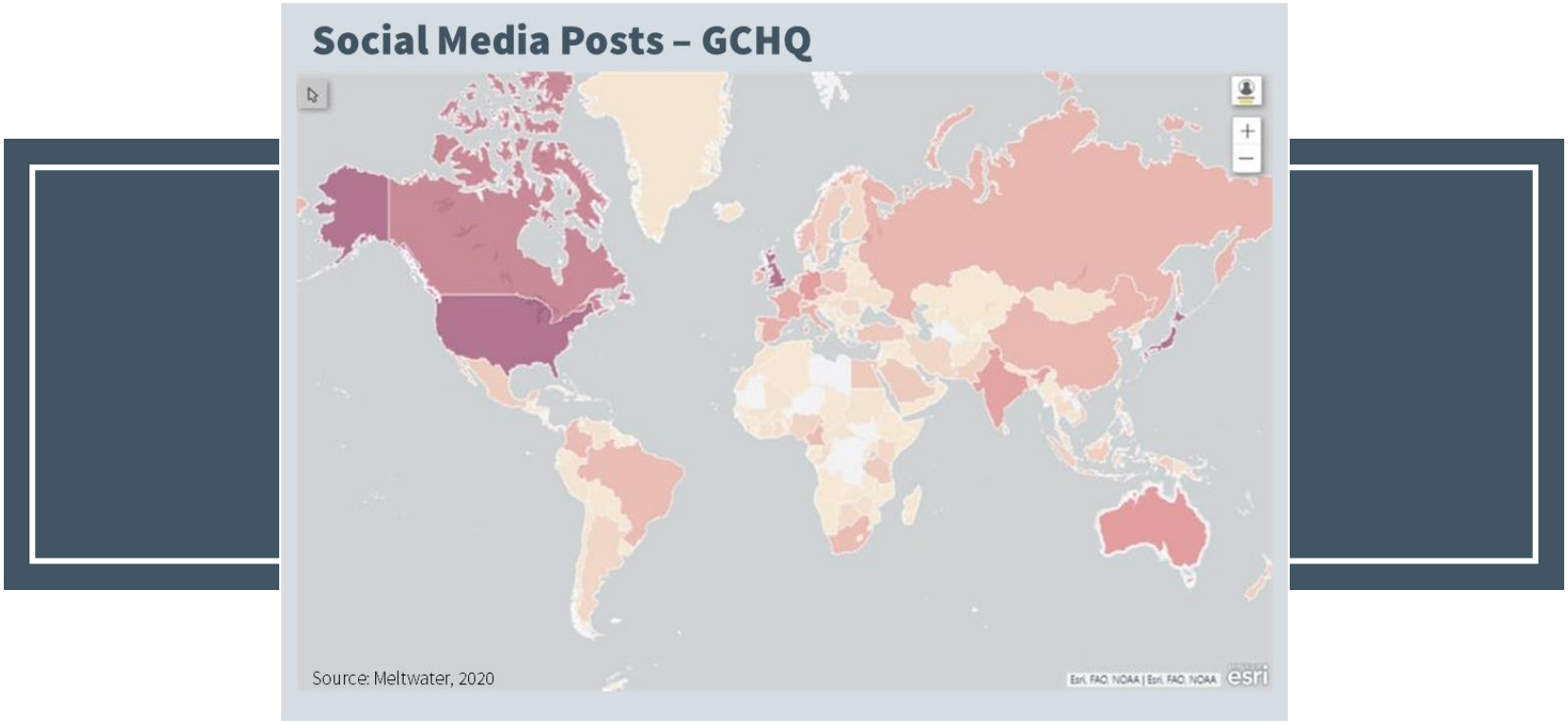
Ecosystem: GCHQ and NCSC – A Multifaceted Cyber Asset

5.40 **GCHQ and the NCSC are the undeniable jewel in Gloucestershire's crown**, as a preeminent cyber and national intelligence asset. Each bring together a multitude of expertise, with a remit that stretches beyond national boundaries and is the conduit for sharing knowledge and insight with an international community. As such, **the external role of the NCSC is of vital importance to the cyber ecosystem and has a magnetic effect**.

Ecosystem: Assets Driving Cyber Notoriety

5.41 **The presence of GCHQ and NCSC is an inevitable driver of an awareness of Gloucestershire's cyber and digital technology strengths worldwide**. It is a powerful symbol of global strength, innovation and collaboration and has helped to facilitate a much wider acknowledgement of the Gloucestershire proposition and of the UK as a cyber powerhouse.

5.42 An assessment of social media posts helps to highlight the level of global awareness and reach of GCHQ as a cyber asset. Using a bespoke social media sentiment research tool at a particular snapshot in time, the true extensiveness of brand awareness is revealed, with **over 300,000 GCHQ-related posts traced**. These illustrate the genuine global reach, with almost every nation generating social media post results. Areas with the highest density of related posts include the USA, Canada, Australia, Japan, India and European nations, many of whom collaborate with the UK on cyber maters.



Ecosystem: Identified Gaps in the Asset Base

5.43 Whilst Gloucestershire's cyber and digital strength is evident within the presence of distinct, innovative and globally-significant assets, **research has also shown that there may be also deficiencies**. This is particularly true when assessing credentials at a localised level, where the benefits of scale are less acute.

5.44 In-depth research and consultation suggest that the future prospects for growth will be reinforced with the following in place:

Access to finance – Cheltenham and Gloucestershire have a nascent investor system in place, making it challenging for cyber start-ups to access finance needed to innovate and grow. This is in contrast to the established pool of investors who have helped to develop Bristol's reputation as a digital and tech hub. There is an opportunity to build on the work of the Cyber Accelerator and incentivise a broader base of investors to be active in the area.

Cultural attractions – as economic development and factors of prosperity increasingly looks at the quality of place and living environment, competitive advantages are being driven by associated assets. It is apparent that Cheltenham and Gloucester would benefit from an enhanced visitor proposition, including an enhanced leisure offer and creation of cultural spaces, that are flexible and have an all-day draw.

The 'cool' factor – whilst the quality of life and heritage found within Gloucestershire's cyber hubs is undeniable, there is a need to build on the standard set by the likes of Hub8, which has embedded a space that appeals to cyber professionals and tech entrepreneurs. A greater density of contemporary and flexible workspaces is needed, in tandem with eateries and spaces that encourage collaboration and creativity. It is also acknowledged that the area's demographics are challenging and attracting a younger labour force will rely on the draw of local assets, whilst becoming a driver of 'coolness' as of itself.

Affordable housing – Cheltenham and Gloucestershire offer high quality housing stock, but the cost of this is a barrier to attracting and retaining skilled cyber talent. There is an immediate need to build up supply and build homes which are within easy reach of cyber and digital industry hubs, are designed in line with high environmental standards and are accessible to a broad spectrum of generations.

Digital infrastructure – whilst the county has made great strides in enhancing coverage and improving access to next generation digital infrastructure, gaps remain. The area must work hard to keep pace with other areas of the UK, as this will continue to be a key factor of competitive advantage and support the development of an 'officeless' cyber business base. It is important that the public sector stimulates market interest and removes deployment barriers in the context of full fibre and 5G rollout.

Skills deficit – whilst education and training providers are responding to the demand for a strong base of digital and cyber skills, based on employer demand, more work is needed to deliver skilled labour at the scale and pace required. Building on the emergence of cyber-focused apprenticeships and degrees, schooling must more fully reflect the need for baseline digital competencies and the supply of talent enhanced through a more balanced approach to training, including a fuller emphasis on apprenticeship take-up.

Part 6: Cyber Central UK – Developing the Ecosystem

6. Cyber Central UK Impacts

Key research messages in this section are:

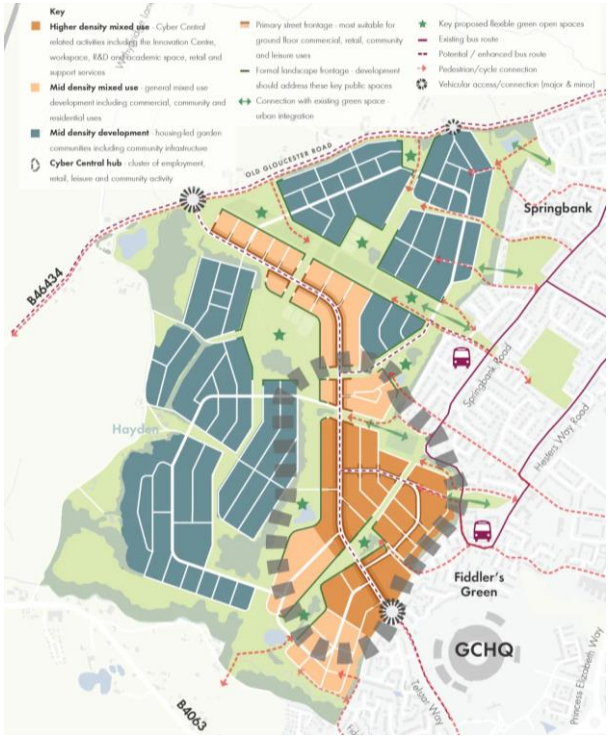
- **Cyber Central UK is a unique opportunity that can become the centrepiece of the cyber ecosystem.**
- **Once built, it will help to address known deficiencies and issues that are currently holding cyber growth back.**
- **The development must retain its boldness in design and scale in order to maximise its impact.**
- **The importance of the development to the sector and future prospects is seen within its economic value.**
- **It will also drive a wide variety of benefits through its draw as a place to live and through exemplar design.**

Development Overview

6.1 **The Golden Valley development, incorporating Cyber Central UK, is a landmark site, designed to be the first true cyber park of its kind in the UK**. Bringing living, working and visitor destination elements together within a Garden Village, it is being positioned as the centrepiece to Gloucestershire's cyber and digital cluster, sitting adjacent to GCHQ/NCSC:

- **Backed by government and industry –** Cyber Central UK has been conceived in response to industry need and the importance placed on cyber resilience by government.
- **A place for innovation and research –** Cyber Central UK will be a focal point for research and the innovation, bringing partners together.
- **More than a business park –** Cyber Central UK will be a campus, defined by activity, energy and variety, including proposals for a cyber themed visitor attraction.
- **A living community –** Cyber Central UK will be a genuine Garden Village incorporating a large number of new homes, creating the UK's first cyber and tech community.
- **The highest specification of construction –** Cyber Central UK proposals call for the highest quality design as well as first-class sustainability and connectivity.

Figure 6.1 Cyber Central UK Vision



Source: Cyber Central UK – Commonplace, 2019

6.2 Specifically, the development is likely to include the following uses and features, which will form the backbone of its economic value and attractiveness to investors and new residents[19].

- **Up to 3,700 new homes**, at the heart of a large-scale community, with construction quality, environmental credentials and the provision of affordable accommodation at the fore.
- **Up to 185,000 sqm of B1 office space**, designed to accommodate a mix of established businesses and start-ups, alongside research and skills uses.
- **Housing one of the UK's National Cyber Innovation Centres**, as the focus for the area's research and development ecosystem.
- **The inclusion of a cyber visitor attraction** which will acts as a powerful tourist and education draw.
- **Best-in-class digital connectivity** supporting the deployment of smart technologies, to deliver a community which is safer, sustainable and better integrated.

6.3 With these elements in place, **the development is likely to be transformational** and be a key driver of cyber and digital sector growth across Cheltenham and Gloucestershire.

Potential Economic Impact

6.4 It is possible to assess the potential contribution that Cyber Central UK could make based on the scheme as specified and assuming it is built to the scale intended. A key measure of the development's value is linked to the employment that the could be created, based on the assumed quality and quantum of commercial space. This in turn will drive economic output in the form of GVA.

6.5 High-level modelling of the direct economic impacts associated with Cyber Central UK suggests that[20]:

- **Upwards of 11,500 people** could be employed on site, dependent on the mix and typology of commercial/office space and jobs this could accommodate.
- **This would generate more than £835m of gross GVA** creating a significant degree of economic uplift and making a major contribution to productivity.
- **Deliver employee wages of approximately £436m** associated with the types of employment that could be created on site.
- **Create more than £15m annually in business rates** providing a significant and sustained revenue stream for the public sector.

Population and Demographics

6.6 **The residential component of the development will create new homes for many people**, including those relocating to Cheltenham from other areas. This will galvanise the 'Magnet County' initiative and could act as a powerful draw for younger generations, who are skilled, mobile and are digitally proficient.

[19] Note – these figures are based on the latest Cyber Central UK scheme design to date and could be subject to change.

[20] Note – estimated impacts do not include a proposed visitor attraction as the detail underpinning this is not yet known.

6.7 A closer interrogation of these factors suggests that Cyber Central UK could make a big impact to the labour market.

- **Nearly 11,000 new residents** could be accommodated on the development, of which more than **85%** could be of working age.
- **The spending capacity of new residents could exceed £110m annually** based on average gross household expenditure.
- **More than 1,300 jobs could be supported** by household expenditure with many being within Gloucestershire.
- **Up to £8m in council tax revenues** could be generated annually as a result of newly-built homes.
- **Over £32m of New Homes Bonus** receipts could be generated for local authorities over a 4 year period.

Wider Benefits

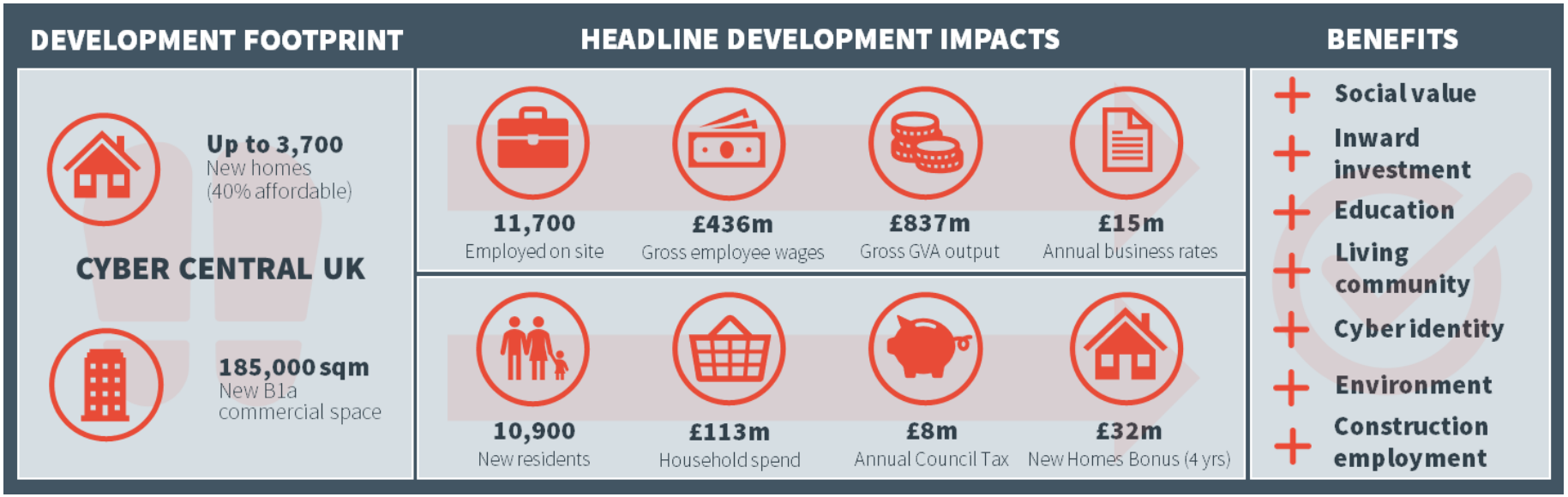
6.8 Beyond what can be quantified, **Cyber Central UK is likely to stimulate a variety of wider benefits** that will directly and indirectly support the local economy. These will largely be driven by the planning process, final masterplan designs and contracts that developers are committed too. They also reflect a longer-term commitment to monitor and measure progress and impact, as the development is built and becomes an operational campus.

6.9 Some of the most important benefits that will be unlocked by virtue of Cyber Central UK's scale and ambitious design narrative include those summarised here. Importantly, each are a key component of a broader take on economic development, typified by a drive towards inclusive and sustainable growth.

Cyber Central UK Impacts and Benefits Summary

6.10 The cumulative impacts and benefits that could be generated by Cyber Central UK are summarised below. Figures are presented in gross terms and the final specification of the development will determine the scale, balance and nature of impacts[21].

Figure 6.2 Cyber Central UK – Headline Development Impacts



Source: Hatch Regeneris, 2020

[21] Note – impacts have been generated using Hatch Regeneris's bespoke impact model. This relies on a number of assumptions regarding the development, known at the time of writing. These may be subject to change as the development specification evolves and is confirmed. Economic development and planning policy will ultimately determine the mix of commercial uses and the types of employment created, which is approximated here. The same is true of the residential component of the Cyber Central UK, with the total number of homes and balance of dwelling size determining the ultimate scale of impacts.

Part 7: Sector Prospects

7. Scope for Continued Growth

Key research findings in this section are:

- **The prospects for future sector growth are to some degree, in local stakeholders' hands and look secure.**
- **The policy platform and pipeline of investment is a great step in boosting growth and increasing attractiveness.**
- **National trends and local economic forecasts provide the basis for further optimism in terms of cyber demand.**
- **There are also a series of risks that need to be considered and responded to, in order to secure sustained growth.**
- **Global competitors offer a helpful reference point from which to reflect and shape future decision-making.**

7.1 Whilst the sector's prospects are shaped heavily by the degree of support embedded within the local growth narrative and accompanying economic development policy, **its success will not rest upon this alone**. In this sense, wider trends will influence the growth trajectory, whilst lessons can also be learnt from farther afield too.

7.2 **The overriding strategic imperative is to continue grow cyber and digital sector size and vibrancy across Gloucestershire**, developing greater critical mass, enhancing the area's reputation for excellence and extending competitive advantages. There is also a collective desire to see the area's national and global relationships expand and strengthen, in recognition of the need to work collectively on common challenges and to increase the visibility of the Gloucestershire and Cheltenham brand.

7.3 The following help to inform a rounded view of sector prospects. Reflections from other global cyber hubs also provide a reference point from which to consider the strengths of competitors and the importance of addressing gaps in the Gloucestershire ecosystem. Where lessons can be learnt, it will be important for examples of best practice to inform the approach taken locally.

National Trends

7.4 The latest statistics published by the UK government and leading sector bodies such as Tech UK, **suggest that the potential for future growth is extremely strong**. These assumptions are influenced by historic trends and the swift and buoyant growth experienced by cyber firms and a wider base of technology focused industries. Indeed, both are increasingly seen as engines for national economic growth, as the need for a large-scale cyber security response becomes more pronounced.

7.5 The government's latest study into the performance of the sector has shown marked growth across a series of key indicators:

- **Business base** – has grown by **44%** in two years.
- **Employment** – has increased by **37%** in two years.
- **Economic output** – GVA has risen by **46%** in two years.

7.6 The report finds that these trends are underlined by an increase in demand (domestic and export driven), burgeoning confidence in the use case and strong and consistent government support. It is reasonable to assume that these trends are also reflected in a Gloucestershire, with similar patterns visible too.

7.7 Extrapolating these trends, whilst assuming the rationale for cyber security becomes stronger, **suggests that the short-medium terms prospects for sector growth are considerable**.

Local Economic Forecasts

7.8 As part of the evidence base gathered to support the land planning process across Gloucestershire, a variety of data has been captured to inform an **Economic Needs Assessment**. This provides an overview of economic characteristics to inform land planning policy and employment land allocations. The evidence base also includes a series of economic forecasts, produced by Cambridge Econometrics and Oxford Economics.

7.9 Using SIC-derived sub sector proxies to assess the potential growth of cyber and digital sectors, the forecasts tell a mixed picture as to the prospects of the sectors in Gloucestershire.

7.10 More specifically, the forecasts assess the growth potential of **Information and Communications sector**, which includes a large proportion of cyber-related activities. Across three scenarios which cover the period 2021-41, two of the forecasts suggest that additional sector employment will be created:

- **Scenario 1:** 0.5% employment growth rate, **1,490 jobs** created over 20 years[22].
- **Scenario 3:** 0.3% employment growth rate, **1,190 jobs** created over 20 years[23].

7.11 Forecasts are inherently subjective and highly sensitive to inputs and assumptions and should be therefore treated with some caution. Assuming a reasonably conservative view, the sector's growth prospects in employment terms look positive. They shouldn't detract however, from the need to take a proactive approach to securing cyber and digital growth and the aggressive pursuit of the 'Magnet County' initiative.

[22] Sourced from the Gloucestershire Draft Economic Needs Assessment, DLP Planning Ltd. Refers to Cambridge Econometrics' Forecast.

Other Drivers of Growth

7.12 There are a variety of other factors that have the potential to further the importance and growth prospects of the cyber sector and industries with a digital technology focus. These are summarised briefly here:

Continued government backing – there is little sign of the UK government deviating away from its current strategic course, both in its support for industries that harness technology and innovation, but also in its acknowledgement of the vital important of a proactive cyber response to ensure resilience. This stability will be integral to future market confidence and be the foundation for attracting investment to Gloucestershire.

Planned investment in the cyber ecosystem – a range of projects are in the pipeline, which will strengthen the ecosystem. Cyber Central UK is the highest profile, but there are other investments planned which will also propel growth, including the creation of a new Cheltenham Innovation Hub, to augment Hub8 and other assets.

Cyber and digital technologies driving resilience – as the integration of technology increases in an economic and societal context, alongside the growing use of and commoditisation of data, cyber security will be a vital ingredient of economic resilience. Cyber solutions and innovation will play a key role in ensuring assets of national significance will be protected, as well as the services and data traded by companies and individuals.

[23] Sourced from the Gloucestershire Draft Economic Needs Assessment, DLP Planning Ltd. Refers to Oxford Economics' Mid-High Forecast.

The phenomenon of fully distributed firms – the age of virtual companies, with no central office presence, but staff based in multiple locations, is becoming increasingly commonplace. As the benefits of working remotely are brought into sharper focus, through financial incentives, the emergence of capable digital tools and the changing basis of commercial trust, so the potential market for cyber will expand. This has been demonstrated on a grand scale as a consequence of COVID-19 and optimisation business continuity plans.

The business imperative – whilst a trend that has shown signs of gathering pace over time, COVID-19 and recent high profile cyber-attacks have sharpened the business imperative, with cyber security seen as a fundamental element rather than a support function. This is likely to persist as more services and data is traded online, making the need for cyber security that more prescient. Indeed, this is reaffirmed by the expected market opportunity, with the global value of cyber security projected to increase to $230bn (USD) by 2021[24].

Inherent Risks

7.13 Whilst there strong signals that the sector is set to grow in value and size, underpinned by a series of strong 'push' and 'pull' factors, **there a number of risks that have the potential to stifle future success and Gloucestershire's competitive edge**. A number of these will be reliant upon decision-making an action taken by local stakeholders, such as councils and the LEP.

Responding to ecosystem deficiencies – addressing the limitations set out in section 5 will require a coordinated response and need the public sector to galvanise a collective effort. A failure to tackle these challenges will risk the area's momentum and limit Gloucestershire from reaching its full cyber potential.

Cyber Central UK realised – it is vital that momentum behind Cyber Central UK is maintained and the delivery of the campus realised. A lack of development progress runs the risk of negatively impacting market confidence, investment and eroding positive sentiment and awareness of the Gloucestershire cyber brand.

Departure from the EU – more is being understood as to the economic implications of Brexit, as details of the future trading relationship are negotiated. Changes in migration, export and investment are likely, which in turn will have an impact on the sector at a local level. Predictive models suggest that there may be a slowdown in export demand and a slowdown in investment[25]. Local agencies will need to be prepared to respond.

COVID-19 rebalancing – as the world recalibrates in a post COVID-19 era, aspects of working life and society will change in the long-term. It is likely that the effects will lead to a refreshed focus on cyber resilience across the international community, leading to significant investment to develop capability. This is likely to put pressure on Gloucestershire's relative competitive strengths and make the case for continued reinforcement and differentiation stronger.

[24] Covid-19 Impact On Cybersecurity Market by TechnologyCovid-19 Impact On Cybersecurity Market by Technology, April 2020

[25] DLP Planning, Draft Gloucestershire Economic Needs Assessment, 2020

Critical Success Factors – Lessons from Afar

7.14 The relative strengths and weaknesses of the Gloucestershire proposition are put into sharper focus **when considering what other cyber hubs are doing internationally**. Horizon scanning is helpful to both inspire and also sets the scene for investing in international relationships. A selection of short case studies is presented below which have established reputations as centres of cyber excellence and where digital firms have thrived.

San Diego

California, USA

San Diego is one of a number key cyber hubs on the West coast of the USA. The city has a long history as a centre of defence and maritime activity and a large military presence as a result.

The city is home to over 150 cyber firms, employing nearly 8,500 people and has become a major hub of activity. The economic contribution of cyber is estimated to be in excess of $2.2bn and its prospects appear to be strong, with 5.5% job growth projected in the future.

The city hosts a number of distinct cyber assets, such as the US Navy Space and Naval Warfare Systems Command, which is a large consumer of cybersecurity expertise and as well as being an innovator and procurement body.

San Diego also has a Cyber Center of Excellence, which is dedicated to accelerating the region's cyber economy and positioning it as a global hub of cyber innovation. This has a focus on attracting and nurturing talent, creating new opportunities and fostering collaboration.

Distinctiveness: Military presence, quality of life, networks, academic specialisms, wider tech cluster

Baltimore/Annapolis

Maryland, USA

Home to the one of the world's largest government-trained cyber workforces, Maryland hosts a large number of cyber data science jobs. It is also the primary location of the US National Security Agency, which collaborates with a number of other institutions, including the Department of Defense Cyber Crime Center.

Maryland is home to a wide array of cyber businesses, including those which rank as some of the largest and most valuable globally. This has allowed the state to develop strong global relationships, working closely with the likes of Israel to develop and commoditise intellectual property.

A number of unique assets punctuate the state, such as Annapolis' Cyber Innovation Center and the Baltimore Cyber Range, the latter of which is providing cyber training through state-of-the-art testing and simulation facilities. A further sign of Maryland's cyber ambitions is the pitching of Port Covington as Cyber Town USA, linked to physical redevelopment and creation of a new cyber hub.

Distinctiveness: Home of national security and key government agencies, density of assets, global links

Boston

Massachusetts, USA

Boston is a pioneer of cyber security, as the home of IT companies who established a foothold in the industry, such as RSA Security. It maintains a strong international cyber identity and is actively targeting investment as a priority for its economic growth agenda.

A number of major firms have an established presence in the city with strong links made with Israeli companies, some of which have relocated or set up satellite offices. The city government is also a backer of the sector and is actively taking the lead in advocating resilience and delivering more effective services.

A key component of the city's ecosystem lies with the presence of high quality universities, which excel in academia and cyber research. This includes Harvard and Massachusetts Institute of Technology which are a natural draw for the world's top cyber talent.

Boston has also thrived as a result of it having a dynamic venture capital environment, which has facilitated considerable investment into cyber and tech companies.

Distinctiveness: Unique university presence, vibrant investment community, close ties with Israel

Be'er Sheva

Israel

Located in the country's desert region, Be'er Sheva is a burgeoning cyber hub that has established itself as the Israel's newest cyber capital, becoming a magnet for investment. Driven by an ambitious national security policy and the relocation of government assets, the city has experienced rapid tech-based growth.

The city has a unique ecosystem which brings together a variety of institutions. This includes Ben Gurion University, Cyberspark Innovation Arena, Cyber Security Research Center and the presence of government agencies, such as the National Cyber Directorate. The imminent relocation of defence forces will also bolster the cyber focus.

The city has been extremely successful in attracting large multinationals and start-ups, such as Oracle, Deutsche Telekom, Paypal and Lockheed Martin. This is expected to lead to cyber employment in the region of 20-30,000 jobs by the mid 2020s. The university is also playing a major role in developing highly skilled cyber talent, working in close collaboration with employers in the area.

Distinctiveness: Targeted investment, highly ambitious policy, unique assets, anchor university

Part 8: Defining Messages

8. Summarising the Proposition

With a cyber sector that is home to 123 businesses, employs over 1,100 people and has an economic value of more than £180m, Gloucestershire's strengths are clear. It's buoyant wider digital business base is also a conduit for growth and is an important part of the cyber supply chain, playing a key role in national strengths and competitive advantages.

8.1 The evidence presented within this report provides fresh and deeper insights on the cyber and digital sectors in Gloucestershire, including their value, impact and distinctiveness. The findings reaffirm local sentiment and confidence in the proposition, based on the story told by data and new methods of analysis. **Gloucestershire is indeed the UK's cyber hub**, propelled by a rich mixture of companies, assets, investment and ambition, which is unique and distinct.

8.2 Seen beyond its borders, **the county sits within a region of great significance**, notable for its assets, expertise and ecosystem on a global scale. Collectively Gloucestershire offers an exceptional place to be a cyber business and is well-placed to support the growth of the next wave of technology inspired companies and start-ups.

8.3 **It is also important to note that GCHQ and the NCSC is an asset which has a magnetic effect and will be key to future prospects**. This analysis has shown that cyber activity extends far beyond it, but its impact and influence is significant. When considering the direct effect of its footprint, the scale of cyber activity in Gloucestershire is even more noteworthy.

8.4 The research findings within should allow the LEP, councils and other stakeholders to **speak confidently about the capabilities of Gloucestershire's cyber proposition**, predicated on:

8.5 **The prospects of the sector look to be positive** on the basis of trends, evidence and the emphatic support that is enshrined within policy, which is both stable and highly ambitious. The investment pipeline is exceptionally strong, and this extends to supporting the ecosystem that will be key to future business growth and attracting interest from farther afield.

8.6 **The development of Cyber Central UK is undoubtedly key to future success**, both in its size and as a reflection of the willingness to respond to government strategy and market demand. Cumulatively, it has the potential to unlock economic value, provide much-needed bespoke cyber space and act as the conduit for collaboration on research and innovation, which is already evident in the mufti-institution Strength in Places bid. Beyond this, the development will set a new benchmark for design, anchor the 'Magnet County' initiative and directly respond to pressures holding back the economy.

Securing Future Sector Growth

8.7 **The future of the sector and maximising growth potential are reliant on a targeted and proactive response, particularly from the public sector**. This should be undertaken with the confidence that a robust evidence base is in place and the rationale to act is clear.

8.8 Key areas of focus reflect the need to progress the cyber agenda at pace and deal with threats to continued growth and sector competitiveness. Those of greatest relevance include:

- **Address known ecosystem limitations:** such as business critical infrastructure, the supply of skilled labour and tackling demographic challenges, the provision of suitable workspace and enhancing the base of cultural assets and institutions.
- **Deliver Cyber Central UK with momentum:** such that market confidence remains high, investment is secured, and ambitions are translated into realised development.
- **Continue to leverage government support:** maintain a direct and positive dialogue with government to ensure Gloucestershire is at the core of national cyber policy and continues to attract public and private investment.
- **Cyber at the heart of the 'Magnet County' initiative:** harness the strategic intent of this initiative to attract a new wave of talent and cyber professionals to the county, with Cyber Central UK anchoring the proposition.
- **Consider the sector's role in economic resilience:** with deliberate intent, position cyber and digital businesses as being key to Gloucestershire's economic resilience and its ability to prosper at times of challenge and shock.
- **Be at the forefront of a post COVID-19 environment:** emphasise the importance of cyber security and the opportunity for digitally dependent enterprise post pandemic, in line with expected changes in working practices and the distribution of firms.
- **Engage and collaborate within the wider region:** build on the strong foundations in place, cooperating on common agendas and leveraging the value and importance of cyber across the wider study area.
- **Consider what has driven success farther afield:** reflect on the critical success factors that are driving cyber excellence globally and consider opportunities for wider collaboration and the development of shared intelligence and IP.

Appendix

Appendix A - Further Research Approach Notes

A.1 The research approach employed within this study is designed to provide stakeholders, policymakers and investors with a better understanding of the scale and depth of cyber and digital activity across Gloucestershire.

A.2 In order to achieve this, a variety of data and information sources have been used, to create a granular and representative assessment of on-the-ground activity.

A.3 In some cases, imperfect or incomplete information has required the following caveats to be applied which should be noted when quoting the findings presented within this report.

- **High level SIC level analysis –** uses a Tech UK definition to set out the overarching cyber and digital capabilities of Gloucestershire and Cheltenham. It has been derived through work undertaken by Tech UK in the production of their annual Tech Nation report, setting out the SIC codes most commonly tied with industries making applied use of digital technologies. It helps to paint an initial picture of sector scale and employment but does not offer a drill-down into cyber specifically.
- **AI sector analysis –** uses bespoke web crawling techniques to pinpoint companies that are engaged in relevant cyber and digital activities, by assessing company characteristics from their online presence. Whilst this process provides a much deeper layer of analysis and goes beyond the limitations of SIC codes, it may still overlook companies that do not have an active website but are legitimate trading entities.
- **AI keyword taxonomy –** the AI sector crawl is driven by a taxonomy of keywords (287) which describe activities most commonly associated with cyber and digital businesses. A master list was developed drawing on central government research and local stakeholder inputs, alongside testing of known companies to sense-check and augment, where necessary. It is possible that some related activity may extend beyond this taxonomy.
- **AI data cleansing –** data presented in this report has been cleansed to provide the truest reflection of cyber and digital businesses. This has involved spot checks, follow-up review of a sample of results and cross-referencing with other information sources (such as CyNam and Hub8 membership lists). Advice from local stakeholders has helped remove errors and offer a conservative view of the cyber and digital sectors.
- **Assessing impacts –** the economic impact figures for cyber and digital-related activity rely on a series of assumptions. At a Gloucestershire level, this has necessitated the scaling up of results where company information was incomplete and making proxy assumptions around the size and turnover to set out total GVA impacts. Indirect and supply chain effects have been calculated using an input-output model which looks at trading relationships between sectors. Cyber Central UK impacts have been modelled based on the latest site specification, with assumptions made about the categorisation of commercial space and housing mix.
- **Sector prospects –** a mix of observed trends and locally-commissioned forecasts have been used to inform

assumptions around cyber and digital sector prospects. These are a blend of UK level performance indicators and an extrapolation of recent sector performance trends in Gloucestershire, which provide a sense of likely direction, assuming the strength of policy support remains stable and Cyber Central UK is developed to its fullest extent. Forecasts have been produced for the Economic Needs Assessment which serves a different purpose to this study, but provides a reference point from which to assess the future prospects of proxy sectors. As with all forecasts, they are a helpful indication, but also have inherent limitations which are suitably acknowledged.

Appendix B - Study Consultees

B.1 **Thanks to the following organisations who each made valuable contributions**, offered unique local insights and helped shape the evidence presented within this report:

- Cheltenham Borough Council
- CyNam
- Department for Digital, Culture, Media and Sport
- GFirst Local Enterprise Partnership
- Gloucester City Council
- Gloucestershire College
- Gloucestershire County Council
- Hub8
- National Centre for Cyber Security
- University of Bristol
- University of Gloucestershire

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