vodafone

From local to global

Repairing the UK economy with thriving digital sectors in our towns and cities

A WPI Strategy report for Vodafone UK

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About the authors

WPI Strategy

WPI Strategy is one of the UK's leading political communications consultancies, with a track record of delivering high impact public affairs campaigns. We offer senior strategic counsel and work extensively with our sister company, WPI Economics, to ensure that campaigns are underpinned by evidence-based content.

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Steve Hughes was previously the head of economic and social policy at the think tank Policy Exchange, and published reports on increasing savings rates and reducing youth unemployment. Before Policy Exchange he worked at the Bank of England, where he helped manage the regulatory system that governs cash distribution in the UK. He has previously worked as an economist at the British Chambers of Commerce where he advised on tax, international trade and SME finance policy, and in parliament, where he researched HM Treasury legislation as it passed through the House of Commons.

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About Vodafone

Vodafone UK connects people, businesses and devices to help our customers benefit from digital innovation. Our services span mobile, fixed line, broadband and the Internet of Things (IoT). We employ around 11,000 people across the UK, and operate more than 400 retail stores nationwide.

Having made the UK's first mobile phone call and sent the first text, Vodafone has a history as a tech pioneer. In 2018 we made the UK's first live holographic call using 5G, and were the first to start carrying live 5G traffic from a site in Salford, Greater Manchester. Today we serve more than 18 million mobile and fixed line customers in the UK, with 4G network coverage at 99%. Vodafone has launched 5G in over 50 places across the UK so far. Our customers voted us the UK's Best Network Provider at the 2020 Trusted Reviews Awards. To help deliver Gigabit UK, we are rolling out full fibre broadband across 12 towns and cities in partnership with CityFibre, reaching one million homes and businesses by 2021.

Our ReConnect programme is supporting women and men back into work after a career break, our IoT technology is working to create a low-carbon society, and our free Digital Parenting magazine is helping families across the UK to navigate the online world safely. For two years running, we have been named one of the UK's 25 Best Big Companies to Work For by the Sunday Times, and a Top 100 Employer by Stonewall.

We are part of Vodafone Group, one of the world's largest telecommunications companies, mobile operations in 22 countries, partner with mobile networks in 42 more, and provide fixed broadband in 17 markets. As of 30 June 2020, Vodafone Group had approximately 300+ million mobile customers, 27 million fixed broadband customers and 22 million TV customers, including all of the customers in Vodafone's joint ventures and associates.

For more information about Vodafone UK, please visit: **www.vodafone.co.uk**

Foreword

COVID-19 has delivered a seismic shock to the UK's economy.

But in the words of Culture Secretary Oliver Dowden, it was technology that "kept our economy ticking over" at a time of national crisis. With businesses turning to video calls and online orders to remain operational, continued economic activity during lockdown has depended on the digital sector. The consequences would have been much worse without it.

This has undoubtedly accelerated digitalisation – the next chapter of which is 5G connectivity. Indeed, 5G is likely to be a primary catalyst for business productivity gains over the next decade in every sector.

The UK is well placed to take advantage of this technological step-change and create the opportunities both at home and on the international stage for our digital sector to flourish and for UK digital businesses to become globally leading tech titans.

There are, however, challenges we must overcome to achieve this

Firstly, like the rest of the economy, the digital sector is likely to feel the impact of COVID-19. This report finds that £15bn of UK economic output that would have been created by the UK digital sector had it not been for the pandemic could be permanently lost over the next decade, along with 37,400 digital sector jobs and 10,800 digital sector businesses.

To avoid these losses, the Government should take robust action in its upcoming Digital Strategy and Spending Review to create the right policy and regulatory environment for the UK digital sector to thrive and grow.

Secondly, despite the significant contribution to UK GDP that the digital sector makes, there is a lack of domestic digital companies which go on to become household names across the globe. Only two UK companies rank in Forbes' Digital 100 – one of which is Vodafone - and those companies who do display global potential are often bought out by foreign players. Meanwhile, a handful of international digital giants makes it harder for smaller companies to grow to global scale.

We think overcoming these challenges requires a local focus.

Vodafone's journey began in 1982 as a small start-up based behind an Indian restaurant. Since then, Vodafone has been pioneering mobile technology. The company made the first ever mobile phone call in 1985, sent the first text message in 1992, and made the first live 5G holographic call in the UK in 2018. Nearly four decades since its beginning as an innovative British start-up, Vodafone is now one of the world's largest technology communications companies, with mobile operations in 22 countries, partnerships with mobile networks in 42 more and fixed broadband operations in 17 markets.

Would Vodafone be able to achieve what it has if it started out life today?

Perhaps. But as acknowledged by the Government in its plans for the 2020 Digital Strategy, digital businesses will have a better chance of success if we develop world-class infrastructure, train up a highly skilled digital workforce and ensure that the regulatory regime is pro competition and pro innovation, such as that being recommended by the Competition and Markets Authority.

Only then will we see our local digital firms fulfil their potential on the global stage.

Nick Jeffery, CEO, Vodafone UK

Executive summary

The digital sector will play a crucial role in the economic recovery from COVID-19 in every part of the UK.

One reason for this is that the nation's digital companies are important drivers of growth in the economy. They produce 7.7 per cent of the UK's total output and underpin far more by providing productivity-enhancing digital products and services to firms in every other industry.

Another reason is that the world is undergoing an economic transformation facilitated by innovations in digital technology. Research commissioned by Vodafone has shown that moving from 4G to 5G could lead to a boost to UK output worth more than £150bn over the next decade.[i]

The serious economic damage caused by COVID-19 will not halt the digital revolution and will in many ways, accelerate it.

But the Government must not take the UK digital sector's promising future for granted. The reality is that, while some businesses have thrived during the pandemic, there has been unprecedented economic dislocation that could negatively affect every sector.

Indeed, this report finds that **£15bn of UK economic output that would have been created by the UK digital sector is at risk of being lost over the next decade, along with 37,400 digital sector jobs and 10,800 digital sector businesses. Yet with the right action most – if not all – of these losses can be avoided**.

The Culture Secretary's announcement of a new Digital Strategy is the perfect opportunity to define and implement this action. This report makes the case for a major focus of the strategy to be on creating a policy and regulatory environment that enables local digital sectors to grow and thrive on the global stage.

From local...

Every region of the UK can legitimately claim that it has a digital cluster of some form or another, sometimes incorporating multiple towns and cities. An essential prerequisite to developing a digital cluster is having a local digital sector that has access to resilient and superfast network infrastructure.

An analysis of the size of the digital sectors in local economies across the UK before the COVID-19 economic shock, found that:

- **There are local digital sector hotspots and not-spots across the UK**

- **Digital companies within the local economies of towns and cities can be spread unevenly**

Committing to grow local digital sectors should be an important element of the Government's "levelling up" agenda.

...To global

The companies in local digital sectors that produce digital output will reap the economic benefits of the world's digital transformation. The UK has many internationally-focussed companies already, but there are significant challenges for policymakers to resolve if these companies are to reach their full potential, with two in particular being significant:

- **A lack of British owned and based UK digital companies with global reach in multiple markets**. There is evidence that UK-owned digital firms too often fail to kick on from their high-growth beginnings.

- **The lack of a level policy and regulatory playing field**. The international digital sector is dominated by a small number of companies, 'Digital Gatekeepers', who have access to data and resources at such a scale that domestic companies are struggling to compete. In addition, small companies in particular are dependent on the services Digital Gatekeepers provide and lack the necessary bargaining power to influence Digital Gatekeepers, who can unilaterally change their terms of service or impose technical restrictions.

Recommendations – Taking local digital sectors global

The forthcoming Digital Strategy is the perfect opportunity to create a policy and regulatory environment that will allow the UK digital sector to maximise its support to the UK's economic recovery at a local and global level. The following recommendations are made with this in mind.

Encouraging the growth of local digital sectors

- **Expand the Digital Catapult so that it has a presence in every region of the UK to support local digital sectors**. The Digital Catapult is the UK's most prominent digital technology innovation centre, but its current geographic coverage is spread too thin.

- **Upgrade the UK's digital skills**. The entire UK workforce requires digital skills. The Government should consider reform of the Apprenticeship Levy and working with further and higher education providers to ensure existing skills gaps are filled.

- **Deliver public services digitally by default**. Procurement and adoption of digital products and services across national and local government would create new markets and boost the growth of local digital sectors across the UK.

- **Support the digitalisation of business**. Government should introduce an incentive scheme to encourage the circa two million SMEs with no online presence to get connected and take advantage of the digital tools that will support them to grow and promote their business.

Enabling the UK digital sector to flourish on the global stage

- **The Government should change its approach to 5G rollout**. There are huge opportunities for UK businesses to contribute to the 5G global digital transformation. The Government should:

  - invest a proportion of the £5bn for gigabit capable Fibre to the Premise (FTTP) in 5G fixed wireless broadband;

  - consider how the charges Mobile Network Operators (MNOs) pay to run their networks can be reinvested into 5G rollout.

- **Speed up digital transformation**. The Government should work to ensure that every person, business and service can take advantage of new and innovative technology, including Internet of Things (IoT) and 5G. A specific example could be the Government working with mobile operators to encourage the uptake of 5G private networks in the sectors most likely to benefit from the advantages 5G private networks have to offer. This includes the ability to wirelessly connect more IoT devices and sensors, to tailor control and security settings and to take advantage of wireless speeds, network slicing and super-low latency.

- **Level the regulatory and competition playing field to encourage the growth of a UK Tech Titan**. There is no one-size-fits-all solution to creating the level-playing field, but it could include:

  - **prohibition of some harmful and anti-competitive conduct;**

  - **access to key assets and innovation capabilities;**

  - **obligations to better empower the consumer;**

  - **implementation of the recommendations in the Furman Review.**

Introduction – Putting our local digital sectors on the global stage

The UK digital sector is fundamentally important to the success of the UK economy. It created 7.7 per cent of total UK output in 2018, amounting to £150bn, pre-COVID-19. [ii] It also supports the wider digital economy – the businesses that do not produce digital products, but that rely on digital technology to function (see Box One, on page 7).

Our economic dependence on digital technology is expected to become even more entrenched in the years to come, with digital innovations benefitting every industry, every workplace and every home.[iii] Indeed, recent research commissioned by Vodafone calculated that the move from 4G to 5G mobile connectivity could generate a productivity boost worth more than £150bn to the UK economy over the next decade[iv].

Being a nation at the forefront of this digital transformation means not only leading the innovation of the next digital advancement. It will also mean designing, manufacturing and installing digital technology, advising on digital adoption and use, and producing the human capital that will support the digital value chain.

The serious economic damage caused by COVID-19 will not halt the digital revolution. In fact, the opposite is true.

The pandemic has spurred digital adoption to occur at a staggering rate. Some sectors would have come to a grinding halt were it not for the fixed and mobile digital connectivity that has supported remote working. For instance, Microsoft Teams logged a total of 900m daily meeting minutes on 16 March 2020. Just two weeks later it logged 2.7bn.[v] Vodafone itself saw about a 30% increase in internet traffic over its fixed and mobile networks.[vi]

There are also indications that those businesses that were more digitally adept pre-pandemic may have weathered the crisis better than those businesses that were less digitally adept pre-pandemic. Vodafone research has found that the most digitalised SMEs have identified new business opportunities during COVID-19 at more than double the rate of the least digitalised.[vii]

As the Culture Secretary Oliver Dowden himself has stated, technology must now be used to power us out of a recession and into recovery.[viii]

But the reality is that while some digital firms have undoubtedly come to the fore during the pandemic, the UK digital sector, like all others, could face challenges. The short trading histories and early years losses that typify tech start-ups have left some in financial difficulty and needing access to government support schemes.[ix] As of the end of August, 20% of firms categorised as Information and Communication businesses – which make up a substantial part of the digital sector – were reporting that operating costs were equal or greater than their turnover.[x]

Indeed, this report finds that **£15bn of potential UK digital sector output could be permanently lost over the next decade, alongside 37,400 digital sector jobs and 10,800 digital sector businesses**.[xi] However, by using its Digital Strategy to implement the right policy and regulatory environment, the UK Government can build the UK digital sector back stronger and protect and nurture UK start-ups and digital business of all sizes.

By taking action, most – if not all – of these losses can be avoided. This report argues that focussing on two interconnected areas provides the best chance for this to happen:

1. **Encouraging the growth of local digital sectors**. The local digital sectors in towns and cities across the UK are high-productivity, high-growth contributors to the UK economy. We tend to talk about the UK digital sector as a whole, but this is a catch-all term for the cutting-edge knowledge and expertise that has been developed in local economies across the country. Ensuring that these local digital sectors can fulfil their potential should be a key aim of government policy and will help realise Government's levelling up agenda.

2. **Enabling the UK digital sector to flourish on the global stage**. Every industry in every country is expected to undergo a comprehensive and productivity-boosting digital transformation in the years to come, massively increasing demand for digital products and services.[xii] The companies that produce digital output will reap the economic benefits of these digital trends. The UK has many of these companies already, but there are barriers to them scaling and becoming global leaders.

Doing both of these things requires changes to the policy and regulatory environment. The forthcoming Digital Strategy is the perfect opportunity to create this environment.

The Culture Secretary's acknowledgement that the UK must develop world-class infrastructure, build a highly skilled digital workforce and ensure that the regulatory regime is pro-competition and pro-innovation is a good start.

Nevertheless, more can and should be done.

This report provides recommendations for the Government to consider, including ideas to improve digital skills, speed-up a 5G-enabled digital transformation, open new markets through public procurement, remove regulatory barriers and create incentives for the UK digital sector to thrive.

Not only is this important to the UK's overall economic prospects, it is important to the Government making significant progress on spreading economic opportunity across the country by "levelling up" and strengthening an independent trading policy by championing British digital companies.

The rest of the report is structured as follows:

- **The importance of the UK's local digital sectors**. This chapter describes the value of digital clusters and the relative strength of local digital sectors in the UK's towns and cities. It illustrates how the economic shock created by COVID-19 may affect local digital sectors and the UK digital sector as a whole.

- **The UK digital sector on the global stage**. This chapter highlights the areas of policy that the Government must consider for the UK digital sector to fulfil its international potential. It discusses the interlinked issues of the inability of the UK to produce home-grown, globally leading digital companies and the existence of so-called Digital Gatekeepers.

- **Recommendations – Taking local digital sectors global**. This chapter puts forward ideas that the Government can pursue to support the development of local digital sectors.

Box One: The distinction between the digital economy and the digital sector

The digital economy is all of the economic activity that is underpinned by digital technology. The digital sector is the term for organisations that specifically produce digital goods and services.[xiii]

For example, a furniture restoration business is part of the retail sector, but its advertising on Instagram, online sales, electronic payments and accountancy software make it a participant in the digital economy; a business that produces computer games is also a participant in the digital economy, but its digital output for digital consumption makes it part of the digital sector also.

Just as the construction sector facilitates the wider economic benefits derived from the infrastructure that it builds, the digital sector facilitates the wider economic benefits derived from the digital output that it produces.

Because digital sectors are intrinsically important to the world's economic future, various attempts have been made to measure them. The OECD, European Commission and the UK Government have all developed methodologies to measure the size and scope of digital sectors; the analysis in this report uses the UK Government's definition.

The importance of the UK's local digital sectors

Local digital sectors in the local economies of UK towns and cities are integral to the future success of the UK digital sector emerging stronger from the COVID-19 recession. This chapter explains why, looking at:

- why local digital sectors and clusters deserve the attention of policymakers;

- an analysis of the relative size of local digital sectors in towns and cities across the UK, and what the findings mean for policy to support them;

- what the impact of COVID-19 might be on the output of the digital sector as a whole.

Digital clusters – the importance of local digital sectors

Companies of the same sector often cluster in the same location because of the benefits that accrue from close proximity – such as from knowledge exchange and access to skilled workers.[xiv] These business clusters tend to contribute disproportionately to economic output and are a source of highly productive, highly paid jobs.[xv]

The explosion in use of digital technology has seen policymakers look at what they can learn from the digital sector clusters that have changed the world. Easily the most famous of these is Silicon Valley in the San Francisco Bay Area, home to the HQs of Digital Gatekeepers and some of the most influential companies on the planet.

Clearly, digital clusters of the size and influence of Silicon Valley are an unrealistic prospect in the UK in the short-term. The many and varied reasons that digital companies are based there have developed over the course of decades (the term "Silicon Valley" was first used in 1971).[xvi]

Yet every region of the UK can legitimately claim that they have digital clusters of some form or another, sometimes incorporating multiple towns and cities, spread across wide geographies. For instance, the grouping of Brighton, Aldershot, Worthing, Crawley and Slough has been identified as the UK's second-largest AI and data cluster outside of London.[xvii]

An essential prerequisite to developing digital clusters is having a thriving local digital sector.

Local digital sectors of towns and cities – what do we know?

Our analysis looks at the size of the digital sectors in the local economies of the towns and cities across the UK before the COVID-19 economic shock. The definition of local economies used in this analysis is a town or city with an urban core populated by at least 50,000 people, the urban areas around this core, and then the wider geography that is home to those who commute to work in the urban area. Sources for the analysis are included in Annex II.

London is included in the analysis. But the fact that is has a large digital sector that produces a large amount of economic output should be of no surprise – it is a global hub for knowledge-intensive industries. Hence, we have excluded it from our conclusions about local digital sectors below but kept it in the overall list of results in Annex I.

With this in mind, the two headline findings from the analysis are:

- **There are local digital sector hotspots and not-spots across the UK**. For example, there are 74 digital sector businesses per 10,000 population in the local economy of Guildford (where the gaming industry has a strong presence); there are just 10 digital sector businesses per 10,000 population in the local economy of Middlesbrough. Table One, on page 9, shows those towns or cities with the most digital businesses and those with the fewest.

  These results could just reflect the numbers of businesses per head of population, i.e. places with high numbers of businesses per head of population will have high numbers of digital businesses per head of population. This is true in

lots of places. However, some places have a greater proportion of digital businesses relative to their overall business population, and others have lower proportions of digital businesses relative to their overall business populations.

When looking at the proportion of digital businesses in a local economy, Edinburgh would replace Cheltenham in the below list, and Aberdeen and Hull would replace Stoke-on-Trent and Swansea.

The size of local digital sectors is relevant when thinking about "levelling up" those communities that have weaker local economies. Digital businesses will drive future economic growth and tend to be highly productive and high-growth. Local economies with smaller local digital sectors will require different policy interventions to nurture and grow their local digital sector than local economies with larger, more established digital sectors. And the former can potentially learn from the latter.

Even though some places may have relatively few digital sector businesses per head of population, these businesses can still be shining examples of digital clusters forming. In Dundee, for example, specialisms in gaming have been established.

towns or cities with most digital businesses per head of population

towns or cities with fewest digital businesses per head of population

Reading	**Swansea**
Guildford	**Lincoln**
Brighton and Hove	**Stoke-on-Trent**
Cambridge	**Middlesbrough**
Cheltenham	**Dundee**

- **Digital companies within the local economies of towns and cities can be spread unevenly**. For example, within Greater Manchester, the council area of Trafford and the council area of Stockport have roughly the same number of businesses. But Trafford has 25% more digital businesses than Stockport.

  Policymakers often highlight the divergence in economic performance between different sub-regions of the UK. The point here is that there are often stark divergences in economic performance within these sub-regions too. This raises questions for local decision-making bodies about how they can level up their own areas.

Taken together, the above findings suggest that local digital sectors benefit from bespoke interventions, requiring local knowledge and expertise to level up local economies across the UK. Hence, the policy and regulatory environment conducive to the growth of local digital sectors should feature a prominent role for organisations and institutions that have an influence on local economic development, such as Metro Mayors (many of which are producing impressive and comprehensive digital plans).

The impact of COVID-19 on local digital sectors

It will take some time before the impact of COVID-19 on the whole economy and local digital sectors can be fully understood. What can be said with certainty is that the UK digital sector as a whole will be challenged by the negative impact on the economy caused by COVID-19 unless robust action is taken. Our analysis compares what the expected economic output of the entire UK digital sector was pre-COVID-19 crisis to different scenarios for what might happen to it post-COVID-19 crisis. Our central scenario is that some of the 2020 drop in UK digital sector output is recovered in 2021, and the sector reverts to its expected pre-crisis expected output and growth trajectory after that (see Chart One, on page 11). **This would mean that £15bn of UK economic output that would have been created by the UK digital sector is lost. However, by taking action to create the right policy and regulatory environment to protect and nurture the UK digital sector, most – if not all – of the losses can be avoided.**

Our low and high scenarios are also represented in Chart One. The low – and optimistic – scenario results in no loss to economic output and the high scenario results in a £41bn loss to economic output.

If no action is taken, a drop in digital sector output ultimately means fewer digital sector businesses and fewer people employed within them. To illustrate what this means:

- if the labour market impact of COVID-19 were to match that of the recession caused by the 2008 financial crisis then 37,400 digital sector jobs would be lost;
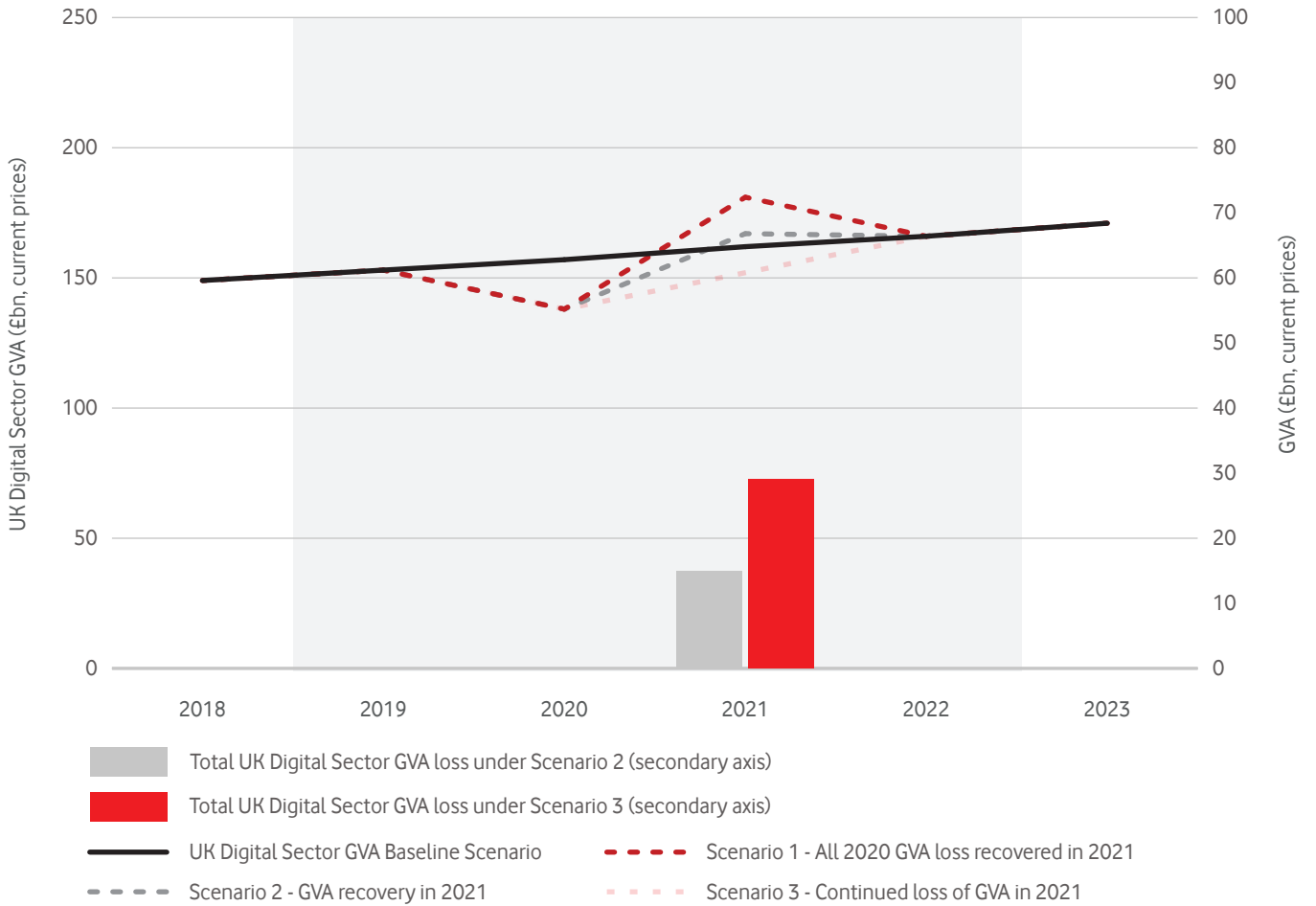
- if the business population impact of COVID-19 were to match that of the recession caused by the 2008 financial crisis then 10,800 digital sector businesses would be lost.

The local digital sectors that produce the largest amounts of economic output stand to lose the greatest amount of output from the shock in absolute terms.

Lost economic output has implications for jobs, tax receipts and living standards and holds back the UK Government's ambition to level up local economies across the UK. As the next chapter argues, ensuring that these economic losses are minimised requires an understanding of how local digital sectors can be supported to fulfil their potential.

Chart One: Scenarios of UK digital sector recovery (returning to pre-crisis growth trend)

Total UK Digital Sector GVA loss under Scenario 2 (secondary axis)

Total UK Digital Sector GVA loss under Scenario 3 (secondary axis)

UK Digital Sector GVA Baseline Scenario

Scenario 1 - All 2020 GVA loss recovered in 2021

Scenario 2 - GVA recovery in 2021

Scenario 3 - Continued loss of GVA in 2021

The UK digital sector on the global stage

There is no doubt that the UK digital sector has a significant international presence. It has high-growth companies operating in sophisticated ecosystems that bring together world-leading institutions, global capital flows and the brightest talent. The sector is often portrayed through the prism of the cutting-edge, life-changing technology that it produces.

But this is only one side of the story. There are burning issues, which can be niche and vastly complex, that have implications for the global status of the UK's local digital sectors in the future. They present significant challenges for policymakers to resolve.

As a result, it is worth exploring two of these (interlinked) issues in more detail:

- A lack of UK-owned digital companies with global reach

- The lack of a level policy and regulatory playing field

UK digital companies – globally relevant, not global leaders?

The Government has set the ambition for the UK to become a global leader in digital technology and innovation. And there is evidence that the UK, when compared to other European nations, is first in class when it comes to producing home-grown, high-growth digital companies. Recent research has found that the UK has the greatest number of billion-dollar tech companies in Europe and has seen the second highest number of new billion-dollar tech companies in Europe within the last year (behind Israel – which is included in Europe in the analysis). Moreover, the UK was adjudged to be one of the European countries most likely to create $1bn tech companies in the coming years.[xviii]

There is also evidence, however, that UK-owned digital firms fail to kick on from their high-growth beginnings. The same research identifies the five European tech firms most likely in the near future to join the global elite of 'tech titan' companies valued at over $50bn. Only one of these firms has a strong UK link – Just Eat was set-up in Denmark but was subsequently moved to the UK by one of the owners, and this year was acquired by Dutch firm, Takeaway.com. The other firms that make the top five are based in Sweden (Spotify), the Netherlands (Adyen) and Germany (Zalando and Delivery Hero).

This adds grist to the mill for those business leaders, journalists and politicians who ask – and in some cases have asked for many years – why the UK has not produced a globally leading digital company.[xix] These questions are often backed with examples of prominent UK digital businesses being sold to an overseas buyer. Examples include:

- ARM Holdings, a semiconductor firm that was started in Cambridge in 1990, was bought out by Japan's SoftBank in 2016 and subsequently sold to US firm, Nvidia.

- Digital travel company SkyScanner was started in Edinburgh in 2002 but is now owned by the largest travel agent in China.

- AI company DeepMind began in London in 2010 before Google acquired it four years later.

There is nuance to this debate. On the one hand, there is evidence that foreign buyouts improve the performance of domestic sectors and mergers and acquisitions are an important part of a functioning economy. On the other, there is the danger that investment and presence in the UK of a firm that has been bought out may be reduced.

It is a subject that policymakers do think about. During his time as Culture Secretary, Matt Hancock stated that the goal for the UK should be to develop companies that rival those of the scale that are being produced in the US and China.[xx]

In recent months it has been rumoured in the press that Downing Street advisers are thinking about how Brexit might help British tech companies scale to significant size.[xxi]

To do this, there needs to be an assessment of the potential barriers to home-grown companies being created, and the lack of a level policy and regulatory playing field is undoubtedly one of them. The UK has the ability to unleash the economic potential and vast opportunities of its digital sector if the regulatory and investment conditions allow.

Case Study: UK leadership in the next generation of innovation

5G and next generation telecoms equipment, in particular Radio access, will require chips based on advanced semiconductors to achieve increased data rates and reduced latency. The UK has a world-leading cluster of compound semiconductor companies which should be supported.

If the UK is to lead the continued development of the telecoms market, a reasonably modest investment in the key semiconductor technologies and chipsets will ensure a secure and open architecture that meets the performance requirements of 5G and beyond. This is in line with the UK's strategy in enabling the deployment of Software based OpenRAN solutions and British global leadership in future technologies.
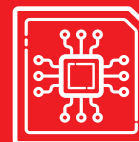
Digital Gatekeepers - the lack of a level policy and regulatory playing field

A small number of digital companies are sometimes referred to as Digital Gatekeepers. They are globally leading companies which have grown through innovation and the development of, and investment in, ground-breaking products and services. However, their position in the market as an unavoidable trading partner means that they have become Digital Gatekeepers with unrivalled access to data and resources that give them disproportionate power and influence in the global digital marketplace.

In the UK digital economy, the emergence of these large Digital Gatekeepers has in some instances created barriers for British start-ups and SMEs, which are looking to innovate and scale-up their products and services, and could restrict their opportunity to grow. Small companies, in particular, are dependent on the services Digital Gatekeepers provide and lack the necessary bargaining power to influence Digital Gatekeepers, who can unilaterally change their terms of service or impose technical restrictions. Two interlinked issues demonstrate the downsides of the Digital Gatekeepers' global influence and dominance. Lack of choice for consumers on the demand-side and lack of access and entry to markets on the supply-side for other digital businesses.

On the demand-side, the dominance of a handful of successful global digital companies means that consumers face a lack of choice in accessing digital products and services. They get locked into digital ecosystems and tend not to switch between app stores or operating systems. The personal data that is consistently fed into these ecosystems further binds the relationship. The growth in closed ecosystems, which limit access to products and services to only those provided through app stores and compatible with operating systems, further limits choice for consumers. As a result, alternative service providers struggle to compete and lock-in effects increase in the established ecosystems.

On the supply-side, closed ecosystems can also prevent innovative new services from emerging and entering the market, which can affect companies of all sizes but is particularly challenging for smaller British companies. Barriers to expansion or entry can take various forms, such as economies of scale, privileged access to important technologies or established distribution and sales networks. In some cases, restrictive practices by Digital Gatekeepers can further inhibit competition and innovation. Those practices could consist of self-preferencing or limiting access to key innovation capabilities such as data, skills and human capital. In some instances, large platform providers also enter and leverage their market power in new markets, directly competing with other providers they host on their platforms, but with the added benefit of asymmetric access to data on the habits of consumers.

These trends create barriers of entry for British start-ups and SMEs and impacts the ability of the UK's digital sector to grow and, as a result, the UK's ability to become a global leader in digital technology.

COVID-19 may have heightened this problem. As a result of lockdown measures and restrictions on economic activity, there is now a greater dependency on products and services – such as online retail, content sharing platforms and remote working tools – provided by markets that are highly concentrated.

The UK Government has already taken an important step in improving this by establishing the Digital Markets Taskforce at the Competition and Markets Authority. The time is right for a robust model of intervention, including taking forward the recommendations in the Furman Review in full. The next stages of policy development are crucial in getting the UK's regulatory environment right as it must be updated in order to encourage competition, innovation and support the growth of UK digital businesses.

The Government should review the UK's competition regulation and invest in digital infrastructure, innovation and skills across the UK in order to realise its levelling up agenda. The Government should also prioritise policy development where there are further regulatory gaps. For example, it should ensure that internet platforms, rather than just mobile operators, are responsible for protecting consumers online and press ahead with online harms legislation as a priority (see Box Two).

Box Two: Online Harms

The online safety of consumers and businesses is vital to the success of the digital economy. Regulation plays a key role in protecting people from online harms. However, much of the burden of this regulation has fallen on the companies that build and run the networks over which internet services are provided, such as MNOs. It has been recognised for some time that the companies which provide the platforms on which content is widely shared and consumed also have a crucial role to play and should take greater responsibility for ensuring user safety and preventing access to harmful content. In particular, when taking into account the impact that profiling and targeting users with specific content has on promoting attention grabbing yet harmful content (e.g. hate speech and misinformation). Only in the last resort should MNOs be called upon to block content at the network level, which is a blunt instrument and costly for those involved.

We welcome that the scope of the Online Harms regulation will focus on online content sharing platforms. The Government needs to ensure that all parts of the digital ecosystem play their full part and that there is a level playing field in how the internet is regulated. With regulation coming into force, Ofcom needs to be set up with the right powers as the first step.

Recommendations – Taking local digital sectors global

The forthcoming Digital Strategy is the perfect opportunity to create a policy and regulatory environment that will allow the UK digital sector to maximise its support to the UK's economic recovery and to level up towns and cities across the UK. The preceding chapters have argued that the strategy should have a strong focus on:

- **Encouraging the growth of local digital sectors**. The success of local digital sectors is crucial to the success of the UK digital sector as a whole and the growth of local digital sectors will play a key role in levelling up towns and cities across the UK.

- **Enabling the UK digital sector to flourish on the global stage**. Change is necessary if companies within local digital sectors are to be at the forefront of the global economy's digital transition.

The following recommendations are made with this in mind.

Encourage the growth of local digital sectors

- **Expand the Digital Catapult so that it has a presence in every region of the UK to support local digital sectors**. The Digital Catapult is the UK's most prominent digital technology innovation centre. Its aims to accelerate the number of trailblazer companies working with advanced digital technologies and to deliver applied research, development and innovation in advanced digital technologies.[xxii] The Digital Catapult has centres in London, the North East, Northern Ireland and Brighton to "provide localised and tailored services where they are needed". But – as demonstrated by this paper – local digital sectors exist far and wide across the UK, suggesting that the current geographic coverage of the Digital Catapult is spread too thin.

- **Upgrade the UK's digital skills**. The entire UK workforce requires digital skills, and this will continue to grow in importance. The Government should consider:

  » **Allowing Apprenticeship Levy funds to be used to retrain existing employees**. 20% of the Apprenticeship Levy underspend (£90m of £450m in 2018-19) should be opened up for digital skills retraining for existing employees.

  » **Working with further and higher education providers to fill existing skills gaps (e.g. cyber security).**

  » **What incentives can be put in place to encourage all firms to improve diversity and inclusion, including by using digital technology to allow flexible and remote working.**

  » **What incentives are available to UK businesses to employ more UK based employees including re-shoring jobs from abroad.**

- **Deliver public services digitally by default**. This has been an ambition of Government for a number of years and some progress has been made. Now is an opportunity to ensure that all services across national and local government are available digitally as well as physically if necessary; this includes the health and social care sector, emergency services, education, justice, borders and defence. Procurement and adoption of digital products and services across national and local government would create new markets and boost the growth of local digital sectors across the UK.

- **Support the digitalisation of business**. Approximately two million SMEs in the UK have no online presence[xxiii]. Government should introduce an incentive scheme to encourage these SMEs to get connected and take advantage of the digital tools that will support them to grow and promote their business perhaps via a voucher scheme, and should do this by 2021.

Enabling the UK digital sector to flourish on the global stage

- **The Government should change its approach to 5G rollout**. 5G is the technology that will underpin global productivity gains in the near future. There will be huge opportunities for UK digital sector businesses to contribute to this global digital transformation. Research commissioned by Vodafone has calculated that in the five years to 2025, the cumulative benefits of 5G to UK output stand at more than £38 bn. For the five years to 2030, they stand at more than £120 bn. Over ten years, this means a productivity-based boost to UK output worth more than £150 bn.[xxiv] On this basis, the Government should:

  » **Invest a proportion of the £5bn for gigabit capable Fibre to the Premise (FTTP) in 5G fixed wireless broadband**. There are a number of advantages to this: 5G can be built and delivered quicker than full-fibre guaranteeing that the Government meets its 2025 deadline and 5G can make a greater contribution to economic growth than full fibre because 4th Industrial Revolution technologies and the future digital economy will be largely powered by wireless connectivity.

  » **Consider how the charges MNOs pay to run their networks can be reinvested into 5G rollout**. Vodafone's own network rollout – providing connectivity to people and businesses across the UK – could be expanded by around 40% if it were not paying fees to the Government to run its network (including spectrum fees, business rates etc.). This would equate to over 600 new and upgraded mobile sites, over and above its current plans. Each site that is built or upgraded with 5G will take the UK closer to a robust, digitally-driven recovery.

- **Speed up digital transformation**. COVID-19 has forced society to engage with technology like never before, and it is unlikely that we will return to how things were before. Instead, the Government should work to ensure that people, businesses and services across the UK can take advantage of new and innovative technology, including IoT and 5G. Specific examples could include:

  » Government working with mobile operators to encourage the uptake of 5G private networks in the sectors most likely to benefit from the advantages 5G private networks have to offer, such as manufacturing. Benefits include the ability to wirelessly connect more IoT devices and sensors, to tailor control and security settings and to take advantage of wireless speeds, network slicing and super-low latency;

  » Ensuring the 40 new NHS hospitals are equipped with the newest digital and connectivity technology;

  » Encouraging take up of IoT – particularly smart buildings and drones;

  » Finding ways to share anonymised data from connected vehicles with local authorities, highways authorities and businesses, while encouraging uptake of telematics in consumer and business vehicles;

  » Incentives via vouchers or tax credits to nudge businesses to adopt technology and digital services to facilitate home and remote working and to use new networks and technology, including IoT and 5G, to produce innovative products and services.

- **Level the regulatory and competition playing field to encourage the growth of a UK tech titan**. While it is local digital sectors that drive the UK digital sector as a whole, national and international regulatory frameworks dictate much of the context in which they operate. There needs to be a review of the potential barriers to home-grown companies being created and scaled up, and the lack of a level policy and regulatory playing field is undoubtedly one of them. The Government should ensure that the CMA's Digital Markets Unit has the resources it needs to continue its work on digital platforms. There is no one-size-fits-all solution to creating the level-playing field, and remedies need to be varied and flexible to address the particular concerns, but could include:

  » **Prohibition of some harmful and anti-competitive conduct**. This conduct includes restrictions on content or service interoperability, bundling of 'must have' services and apps, predatory pricing and unfair terms and conditions in contracts;

» **Access to key assets and innovation capabilities**. Digital businesses, including start-ups and SMEs should be able to take advantage of digital ecosystems based on openness and interoperability principles and should gain access to key assets such as data, software, hardware and APIs, which are critical to competition;

» **Obligations to better empower the consumer**. Including enhanced transparency and obligation to facilitate data portability and data exchanges;

» **Implementation of the recommendations in the Furman Review.**

Annex I – Digital businesses per 10,000 of population by town or city

Aberdeen
17.7

Dundee
9

Glasgow
20.2

Edinburgh
39.9

Tyneside conurbation
(Newcastle and surrounding towns)
16.7

Belfast Urban Area
16.7

Middlesbrough
10.2

Blackburn with
Darwen
13.9

Blackpool
21.8

Burnley
13.3

Leeds
24.5

Preston
20.1

Manchester
27.9

Kingston upon Hull
13.4

Liverpool
16

Sheffield
17.3

Lincoln
12.8

Cheshire West and Chester
27.5

Stoke-on-Trent
12.4

Derby
19.6

Nottingham
22.5

Norwich
23.9

West Midlands urban area
(Birmingham and surrounding towns)
20.8

Leicester
26.1

Coventry
32.6

Northampton
35.4

Cambridge
54.1

Worcester
27.8

Cheltenham
51.3

Colchester
23.9

Swansea
12.9

Newport
15.5

Oxford
42.3

London
73.4

Cardiff
18.9

Bristol
41.5

Reading
109.2

Guildford
75.9

Southampton
32.7

Portsmouth
26

Brighton & Hove
57.1

Hastings
23.3

Exeter
19.9

Plymouth
15.9

Annex II – Technical Annex

The sources used for the analysis in this report are as follows:

1. The geographic areas of the towns and cities in the analysis are those defined by Functional Urban Areas. These geographic areas are used by the Office for National Statistics and the OECD to compare regions of different sizes. A further explanation of them can be found at the following web link: https://www.ons.gov.uk/aboutus/whatwedo/ programmesandprojects/europeancitystatistics

2. The baseline for UK digital sector output and for the businesses that constitute the UK digital sector are taken from the data and analysis produced by DCMS. With sources taken from the following web links:

   • digital sector economic estimates: https://www.gov.uk/government/collections/dcms-sectors-economic-estimates

   • digital sector methodology: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/ attachment_data/file/503666/Digital_Sector_Economic_Estimates_-_January_2016_Revised.pdf

3. Population statistics are taken from NOMIS.

4. The impact of COVID-19 is taken from the latest estimates of the impact from the ONS.

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