

Silicon Cities



Supporting the development of
tech clusters outside London
and the South East of England

Eddie Copeland and Cameron Scott



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About the Technology Policy Unit

Policy Exchange's Technology Policy Unit helps politicians and policymakers unlock the potential of technology: for an innovative digital economy, a smarter public sector and a stronger society. For more information about our work, visit: policyexchange.org.uk/technology-policy or contact Head of Unit, Eddie Copeland, at: eddie.copeland@policyexchange.org.uk/020 7340 2650.

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Contents

	About the Authors	2
	Acknowledgements	4
	Executive Summary	5
	Introduction	10
1	The Current and Growing Importance of Technology for the UK	13
2	What Are Clusters and Why Do They Matter?	19
3	What Do Tech Clusters Need to be Successful?	23
4	Lessons From the UK's Existing Clusters	26
5	Overview of UK Government Policy	35
6	The European Dimension	38
7	Policy Evaluation	40
8	How Can Government Best Support Tech Clusters?	51
9	Policy Recommendations	55
	Appendix	60

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Executive Summary

During a speech to mark the launch of London's Google Campus in March 2012, the Chancellor of the Exchequer, George Osborne, unequivocally stated the government's ambition for the UK technology industry, saying:

*'We want nothing less than to make the UK the technology centre of Europe. This is the path we need to take to create new jobs, new growth and new prosperity in every corner of our country.'*¹

The Chancellor's nation-wide aspirations for the technology sector build upon the government's broader objectives to help the UK's regions – and especially England's northern cities – achieve their full economic potential.

Two years after that speech, there remains a significant gap between the government's vision and the reality of the UK technology sector. Tech companies, tech jobs and the prosperity they bring are highly concentrated in London, the South East and Cambridgeshire.² On number of billion dollar companies created, Cambridge is the leading technology cluster in Europe.³ London's Tech City has established itself as the continent's digital capital. Wokingham in Berkshire has the greatest concentration of technology jobs of any local authority area in the UK.⁴

With an emphasis on maximising private sector job growth, this report explores what more the UK government can do to support the development of tech clusters in other parts of the country, and particularly in the North of England. All around the UK, cities from Bristol to Aberdeen and from Brighton to Newcastle are working to develop their own tech clusters. To date, none has received the same level of government attention as Tech City.

Many writers and commentators have argued that to develop successful tech clusters, governments should emulate the world's most renowned example: Silicon Valley. While there are undoubtedly important lessons to be learned from the USA's West Coast, this report argues that policymakers are misguided if they seek, or try to recreate, Silicon Valley in the UK. Tech clusters have the best chance of success when they build on their own local competitive advantages, specialisms and strengths. As a result, the shape, size and dynamics of the UK's silicon cities will almost inevitably be uniquely their own. This report therefore examines the principles and policies required to meet the specific needs of tech clusters in the UK.

Report overview

Chapter 1 establishes that the technology sector warrants particular attention from policymakers as it creates and supports thousands of well-paid jobs and plays to the UK's natural strengths in technology, science and innovation. It further highlights that the sector's benefits are currently being felt primarily in London and the South East, with the top 10 clusters of tech jobs all being close to the M4, M3 or M25 motorways.⁵

1 HM Treasury, 'Speech by the Chancellor of the Exchequer, Rt Hon George Osborne MP; Google Campus launch', March 2012

2 KPMG, 'TechMonitor UK: Understanding tech clusters and tracking the UK tech sector's outlook for employment and growth', 2013

3 Cambridge Network, 'Study shows Cambridge is Europe's most successful tech cluster', July 2012

4 KPMG, 'TechMonitor UK: Understanding tech clusters and tracking the UK tech sector's outlook for employment and growth', 2013

5 Ibid

Chapter 2 explains why policymakers should focus on supporting tech clusters rather than just tech companies. It shows that clusters are especially good for nurturing the 6–7% of high-growth companies that are thought to have been responsible for creating over half of all new jobs in the UK between 2007 and 2010.⁶ It gives the example of the Cambridge cluster, which is made up of more than 1,500 technology and biotechnology companies, employing 57,000 people and generating more than £13 billion annually.⁷ London meanwhile has an estimated 34,000 technology businesses, and in the next decade there will be a further 11,000, creating 46,000 new jobs.⁸

Chapter 3 details for policymakers the factors necessary for tech clusters to thrive. It emphasises the need to achieve a critical mass of skills, businesses and investment; and the importance of community collaboration, research and development, sound infrastructure and strong local leadership.

Chapter 4 outlines ten lessons that policymakers can learn from three of the UK's most successful and established tech clusters: Cambridge, London Tech City, and the Midlands' Motorsport Valley, each of which demonstrates its own particular characteristics. The report then highlights the potential of three northern regions aspiring to become major tech clusters: Newcastle/Sunderland, Manchester/Salford and Leeds/Sheffield.

Chapter 5 provides an overview of more than 40 policies (out of an estimated 650 targeted towards promoting innovation) that UK governments have introduced since 1994, and which have a significant impact on the development of tech clusters.

Chapter 6 examines the European dimension, citing developments in European tech clusters such as Helsinki, Stockholm and Berlin, and highlighting how the success of the UK's clusters is affected by policies and regulations at a European Union level. The specific example of the draft European General Data Protection Regulation is given, which if introduced in its current form could result in a nine-fold increase in legal compliance costs for SMEs in the digital sector.⁹

Chapter 7 evaluates the effectiveness of the current UK policy landscape towards tech clusters and highlights key areas where government needs to take further action. It argues that while the UK is getting much of the general business environment right, more needs to be done to support entrepreneurs, reform visas, encourage better use of Intellectual Property and improve transport links between northern cities. The chapter notes that the average effective speed of journeys from Manchester, Newcastle, Liverpool, Leeds and Sheffield to London by train is 77.6mph, compared just 46mph between those cities.¹⁰

Chapter 8 provides ten core principles that policymakers should keep in mind when planning interventions to support tech clusters. It emphasises that: government cannot create clusters but it can support (or destroy) what's there; clusters must play to their local competitive strengths; the real competition for the UK's clusters is international, not domestic; and that technology is best transferred from research to commercial settings when people are transferred.

Chapter 9 completes the report by outlining 13 policy recommendations that the UK government should implement at an international, national and local level to support the development of tech clusters outside London and the South East during the next parliament.

6 Nesta, 'Exploring the incidence and spatial distribution of high growth firms in the UK and their contribution to job creation', March 2013

7 University of Cambridge Factsheet: Cambridge Innovation in Numbers

8 London Evening Standard, 'London's tech industry 'will add £12bn to capital's economy', June 2014

9 Polish Confederation Lewiatan and Chamber of Digital Economy 'Economic Consequences for SME Of The EU Regulation On The Protection Of Personal Data According To The Project Approved By The Libe Committee'. Cost cited is PLN 66,600.

10 Effective speed calculated as the direct distance between each city (as the crow flies) divided by the time taken by the fastest direct train available between 8am and 9am on Thursday 17 July 2014.

International

Today, even some of the smallest technology startups are ‘micro-nationals’: selling to and sourcing from overseas customers and suppliers from day one. As a result, the UK’s technology sector is deeply affected by regulations and trade agreements made by the European Union. Given the importance of the technology sector to its economy, the UK has much to gain in terms of investment, exports and business scalability from having the right measures in place at a European level, and much to lose from the wrong ones. The UK government must be proactive in advocating conditions that enable tech clusters based within the EU to thrive in the global economy.

Recommendations

1. The UK government should take a leading role in negotiations over the future shape of the European Digital Single Market and Trade Agreements to ensure that they enable tech clusters based within the EU to thrive in the global economy.
2. In response to the draft European General Data Protection Regulation, the UK government should collaborate with the technology industry to develop an effective, ethical framework for companies’ use of personal data that protects users and maximises innovation.

National

The UK needs a policy framework that gives tech entrepreneurs, tech businesses and tech clusters the best chance of success *wherever* they may emerge. That means ensuring the UK has a business climate that is competitive in the face of international competition and friendly towards entrepreneurship and investment. The report establishes that the single most important success factor for tech clusters is having access to a strong base of workers with the skills – or aptitude to learn – core competencies needed by the sector. For at least the next decade, the UK will not be able to meet its need for technology skills domestically. Government should therefore urgently review visa regulations to enable highly-skilled migrants to work in the UK tech sector.

Universities play a pivotal role in many tech cluster ecosystems, and the report argues that more needs to be done to encourage them to promote entrepreneurship among their students. Enabling students to retain IP of ideas generated during their studies would be a positive place to start. Universities should also provide figures showing how many of their recent graduates have gone on to entrepreneurial activities, and the courses they studied.

Recommendations

Encouraging entrepreneurship

3. Universities should be encouraged to let students retain Intellectual Property of products, services and ideas they create while studying.
4. Universities should provide statistics showing how many of their recent graduates have gone on to pursue entrepreneurial activities, and detail the courses they studied.

Recommendations

Fixing skills

5. Government should work with the technology industry to make the case for greater levels of immigration from highly-skilled migrants working in the technology sector.
6. Startups and SMEs backed by approved venture capital firms or accelerators should be allowed to begin employing skilled migrant workers without prior approval as a licensed visa sponsor organisation.
7. The two-year Post-Study Work Visa for students receiving good degrees in STEM subjects should be reinstated.
8. The cap of 10 endorsements per academic institution should be removed from the Tier 1 Graduate Entrepreneur Visa.
9. The salary threshold should be removed from the Tier 2 Visa requirements for skilled migrants securing employment in the technology sector.

Encouraging Investment and Community Collaboration

10. UKTI should work with clusters and the private sector to create a comprehensive, crowd-sourced map of members of the UK's cluster communities.

Local

On a local level, the report emphasises that businesses need empowered and responsive local political leadership to address specific regional challenges and to promote local strengths. It argues that these requirements can best be served by directly elected mayors, representing whole city regions, who can work with Local Enterprise Partnerships (LEPs) and local authorities to support the development of tech clusters.

Addressing the specific needs of northern tech clusters, the report argues that while (at least in the short term) cities such as Manchester, Salford, Newcastle, Sunderland, Leeds and Sheffield may struggle individually to compete with leading tech clusters around the world, collectively they have the right resources in abundance. Holding them back from realising those combined strengths are the poor road and rail connections that link them. Government should focus on improving transport infrastructure across the whole region to unleash its economic potential.

Finally, and noting the success of the UK government's promotion of London's Tech City, the report finds that UKTI cannot create an internationally-competitive brand and narrative around every cluster in the UK. Instead, policymakers would be better advised to promote the strengths of the best clusters from across the whole northern region – a cluster of clusters. To an international audience, a 'northern powerhouse' offering different specialisms but collaboration where required, with a single entry point via UKTI, could be very attractive and benefit all northern tech clusters.

Recommendations

Responsive local political leadership

11. Government should consider introducing directly elected city mayors with appropriately devolved powers to lead economic growth in their areas – including the development of tech clusters.

Fixing infrastructure

12. Government should invest in rail and road infrastructure to improve the speed of transport connections between northern cities.

Building the brand

13. Government should work to build a ‘northern powerhouse’ brand that promotes to an international audience the combined strength of the most developed northern tech clusters.

Overall, the report argues that the UK government is right to aspire to California’s success, but that the shape and policy needs of its own silicon cities are unique to the UK and its regions.

Introduction

California dreamin'

Silicon Valley. Silicon Fen. Silicon Wadi. Silicon Glen. Silicon Alley. Silicon Roundabout. Silicon Taiga. The list of landforms that have been prefixed with 'Silicon' to describe emerging or established technology (tech) clusters grows all the time.

In part, this nomenclatural nod towards the USA's most successful startup community is a sign of healthy aspiration. Governments around the world have sought to understand and recreate the special formula of the Santa Clara Valley in order to develop their own silicon cities. Countless books, reports, magazine articles and blog posts offer to explain how to emulate the region that gave birth to technology giants such as Hewlett Packard, Google, Facebook and Twitter. Their interest is understandable. Silicon Valley sustains more than 1.4 million jobs and saw 20 IPOs in 2013 alone.¹¹ The area proved better able to weather the 2008 economic storm than most other regions. It has created corporate brands of international renown that have upheaved or created entire new global industries. Some have gone so far as to become engrained in popular culture or even language: we *google*, we *tweet*, we *facebook*.

While it is tempting for governments to try to replicate the environment and success of Silicon Valley, there is a significant risk of learning the wrong lessons. What works in California may not work elsewhere. Conditions present on the USA's West Coast may not be replicable in other countries. Tax regimes, education systems, access to funding and attitudes towards entrepreneurial risk-taking differ between and even within nations. It is therefore a fallacy to think that there is some magic formula for creating a highly prosperous tech cluster when the starting conditions for each are so different. Focusing on the specific model of Silicon Valley can also blind countries and regions to the natural – but potentially very different – strengths and advantages they have themselves.¹²

It is equally important to acknowledge that many ingredients are required for the successful formation and functioning of tech clusters and not all of them are within a government's power to control or influence. Silicon Valley's growth has been – for the most part – organic and unplanned, driven by numerous forces, and has taken place over the best part of six decades. Scepticism is therefore warranted towards claims that a state can simply build its own Silicon Valley *doppelgänger*. Furthermore, while some governmental interventions to nurture tech clusters positively aid their development, many more have proven to be ineffectual or counterproductive.¹³ Creating an effective policy framework to support tech clusters is no simple task.

The view from the UK

The UK government has not been immune from admiring glances towards the USA's West Coast, nor coy about its aspirations to emulate the region's success.

11 Silicon Valley Community Foundation, '2014 Silicon Valley Index', 2014

12 A point made by James Clark for BVCA, 'Tech Country: Looking Beyond London in search of Britain's technological future', March 2013. A good example is the Startup Genome Report 2012, which builds a model of the ideal startup-friendly location. Since the report uses Silicon Valley as its baseline model, it highlights cities such as Sydney and Melbourne, yet inexplicably not Cambridge, England.

13 See, for example: Margaret O'Mara, 'Don't Try This At Home', *Foreign Policy*, 2010; and Paul Starobin, 'Silicon Implant', *New Republic* 242, 2011. A common mistake is for governments to try to create clusters on green field sites by investing in facilities and providing financial incentives for businesses to move to the 'cluster'. Such measures fail to recognise the unique characteristics that make clusters successful – as outlined in Chapters 2 and 3.

As early as November 2010, Prime Minister David Cameron told an East London audience:

*'Don't doubt our ambition. Right now, Silicon Valley is the leading place in the world for high-tech growth and innovation. But there's no reason why it has to be so predominant. Question is: where will its challengers be?... London could be one of them.'*¹⁴

Sixteen months later, at a speech marking the launch of London's Google Campus in March 2012, the Chancellor of the Exchequer, George Osborne, unequivocally stated the government's ambition for the wider UK technology industry, saying:

*'We want nothing less than to make the UK the technology centre of Europe. This is the path we need to take to create new jobs, new growth and new prosperity in every corner of our country.'*¹⁵

Praising the success of London's Tech City, in the same address he outlined more than a dozen policy measures designed to nurture the growth of the technology industry. These ranged from tax incentives for investors to entrepreneur visas; and from opening up government procurement for small to medium sized enterprises (SMEs) to investing in technology and innovation ('Catapult') centres.

The Chancellor's nation-wide aspirations for the technology sector are complementary to the government's broader objectives to reduce the UK's reliance on the public sector, and to help its regions achieve their full economic potential. Put simply: private sector job growth outside the South East is a major government priority.¹⁶ A similar desire has been expressed by the Labour Party, most recently in Lord Adonis' July 2014 Review: 'Mending the Fractured Economy'. In their commentary on supporting the growth of the private sector and the UK's regions, both government and opposition have laid particular emphasis on the need to develop England's northern cities. In June 2014, George Osborne outlined his wish to see a 'northern powerhouse'. He argued that northern cities could be stronger by acting collectively, and that to do so they would require modern transport connections; support for their science and university research; backing for their creative clusters; and greater local power and control.¹⁷

About this report

Taking these policy priorities as a starting point, this report explores what more can be done to fulfil the government's wish for technology to bring private sector job growth to 'every corner' of the UK, and especially to benefit England's northern cities. There is currently a major gap between government aspirations and the reality of the UK technology sector. Tech companies, tech jobs and the prosperity they bring are highly concentrated in London, the South East and Cambridgeshire.¹⁸ On number of billion dollar companies created, Cambridge is the leading technology cluster in Europe.¹⁹ London's Tech City has established itself as the digital capital of Europe. Wokingham has the greatest concentration of technology jobs of any local authority area in the UK.²⁰ To date, the majority of government and media attention has focused on promoting the capital.²¹ By shining the spotlight on London as the UK's competitor to Silicon Valley, some

14 Prime Minister's Office, 'A transcript of a speech given by the Prime Minister in East London on 4 November 2010', November 2010

15 HM Treasury, 'Speech by the Chancellor of the Exchequer, Rt Hon George Osborne MP; Google Campus launch', March 2012

16 HM Treasury, 'Plan for Growth', March 2011

17 HM Treasury, 'Chancellor: We need a Northern powerhouse', June 2014

18 KPMG, 'TechMonitor UK: Understanding tech clusters and tracking the UK tech sector's outlook for employment and growth', 2013

19 Cambridge Network, 'Study shows Cambridge is Europe's most successful tech cluster', July 2012

20 KPMG, 'TechMonitor UK: Understanding tech clusters and tracking the UK tech sector's outlook for employment and growth', 2013. The area is based near excellent transport links to both London and two major hub airports: Heathrow and Gatwick.

21 The Independent, 'Is the success of London's 'silicon roundabout' forcing new startups out of the capital?', May 2013

argue clusters beyond the M25 have been left in the shadows.²² Cities such as Aberdeen, Belfast, Birmingham, Bristol, Cardiff, Edinburgh, Leeds, Manchester, Newcastle, Oxford, Sheffield and Sunderland are just a few of those that are – or have a desire to become – tech clusters. Many have been in development for far longer than Tech City.

Recognising the limitations of applying the Silicon Valley ‘model’, this report looks at the specific business, political, economic and cultural context of the UK, and explores what the government can – and cannot – do to help promote the development of tech clusters outside London and the South East and particularly in England’s northern cities. In doing so, it will be shown that the government is right to aspire to California’s success, but that the shape and policy needs of our own silicon cities will almost certainly be unique to the UK and its regions.

22 A point made by James Clark for BVCA, ‘Tech Country: Looking Beyond London in search of Britain’s technological future’, March 2013

1

The Current and Growing Importance of Technology for the UK

Why care about the technology sector?

In the context of promoting economic growth and private sector job creation, why should the UK government particularly care about the technology sector?

There are three key reasons:

1. it is already a significant and fast-growing part of the UK economy;
2. it creates and supports thousands of good quality jobs, both directly and indirectly;
3. it plays to the UK's natural strengths in technology, science and innovation.

This chapter will explore each in detail.

The value of the technology sector to the UK economy

It is important to emphasise that 'technology' is an umbrella term that can encompass many different industries, from digital media to biotechnology, and from hardware to automotive engineering. That, in itself, is not conceptually problematic for this report: indeed it is the very point, given that many believe specialisation is a key success criterion for tech clusters. It does, however, present a challenge insofar as different studies define the technology sector differently, or only include certain industries, making it very hard to compare results. Yet however it is defined, it is clear that technology is already a major part of the UK economy.

The Department for Business, Innovation and Skills (BIS) estimates that, in 2011, the ICT sector contributed 8% to UK Gross Value Added (GVA).²³ A report by NIESR found that government estimates of the size of the UK's digital economy using Standard Industrial Classification (SIC) codes underestimated the number of companies in the sector by over 100,000 – with their own analysis suggesting there were nearly 270,000 in 2012, 14.4% of all companies.²⁴ The UK's app development market alone is predicted to add £4billion to the economy during 2014, and as much as £31billion by 2025.²⁵ As one newspaper article put it, technology 'already dwarfs utilities and communications and is only a couple of percentage points behind financial services.'²⁶

23 BIS, 'Information Economy Strategy', June 2013

24 National Institute for Economic and Social Research, 'Measuring the UK's digital economy with big data', July 2013

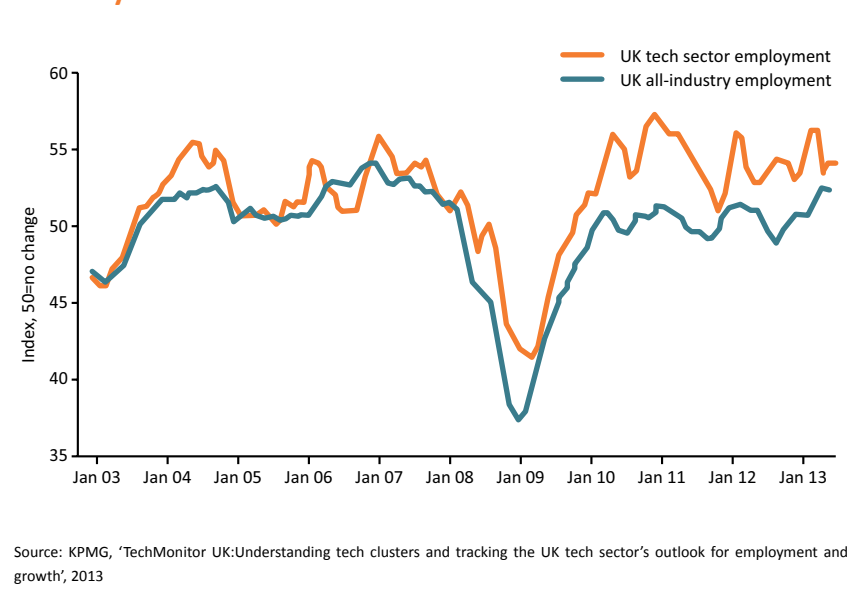
25 The Guardian, 'UK app developers predicted to add £4bn to economy this year', June 2014

26 The Guardian, 'We are the 8% – why tech companies matter to the UK economy', March 2013

The importance of technology for jobs

The technology sector's economic importance is closely linked to its impact on employment. Using a narrow definition of technology, BIS has estimated that 1.2million jobs are in the UK technology sector.²⁷ As many as 380,000 people work just in app development, employed by 8,000 firms.²⁸ Over the past decade, job hiring trends in the UK technology industry have consistently outperformed those seen across the private sector as a whole. This has especially been the case since the start of the global financial crisis in 2008. According to KPMG, the technology sector experienced a shallower downturn in employment in early 2009 – the worst point of the recession – and saw a labour market recovery earlier than the wider UK economy at the start of 2010.²⁹ Roles in the technology sector also tend to be well paid, with typical salaries in digital technology being in the region of £42,500 for positions using SQL, .NET and C#, well above typical private sector wages for the UK.³⁰

Figure 1.1: Tech sector jobs growth mapped against the wider UK economy



27 Technically Compatible, 'The UK Tech Industry – State of Play 2014', May 2014

28 The Guardian, 'UK app developers predicted to add £4bn to economy this year', June 2014

29 KPMG, 'TechMonitor UK: Understanding tech clusters and tracking the UK tech sector's outlook for employment and growth', 2013

30 IT Job Watch – <http://www.itjobswatch.co.uk/>, accessed June 2014

31 Nesta, 'Increasing The Vital 6 Percent', January 2014

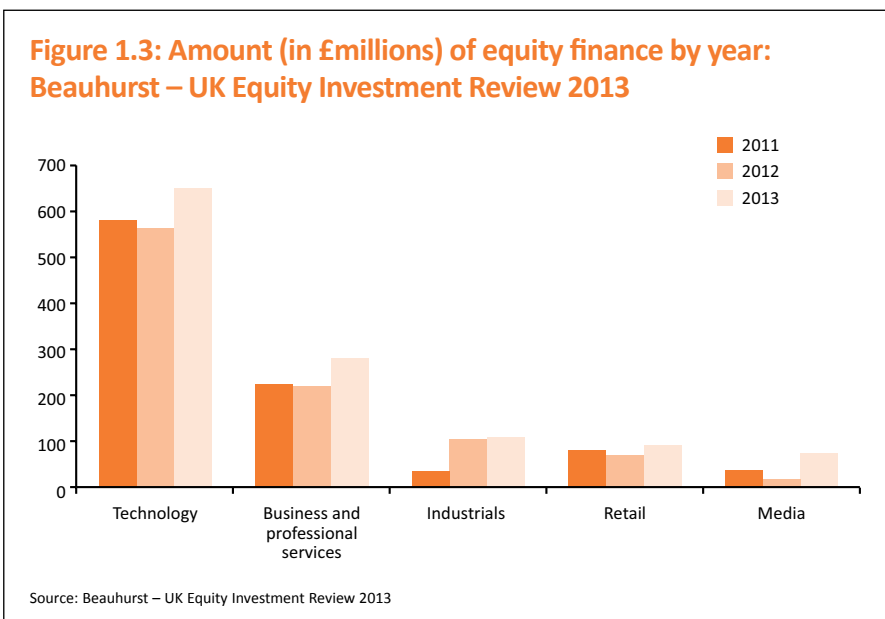
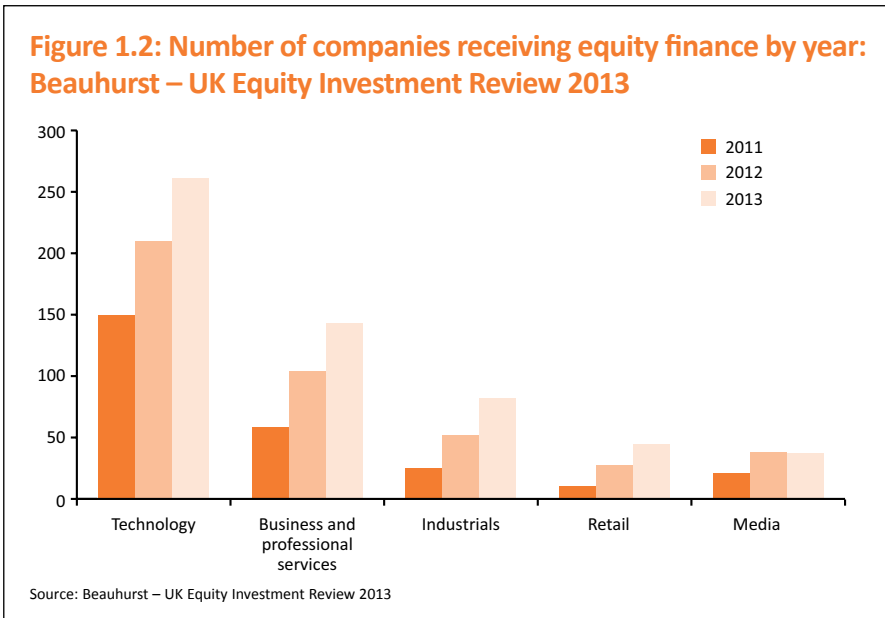
32 Endeavour Insight, 'One High-Growth SME Creates as Many Jobs as 100 New Micro-Businesses', December 2013

33 Nesta, 'Exploring the incidence and spatial distribution of high growth firms in the UK and their contribution to job creation', March 2013

34 The Next Web, 'The fastest growing tech companies in Europe? We found them', April 2014

While many companies together contribute to make a successful economy, for policymakers concerned with job creation, what matters most is the 6–7% of high-growth companies.³¹ A single high-growth SME creates around 200 jobs, as many as 100 new micro-businesses.³² Such 'scale-ups' – defined by the OECD as averaging over 20% employment growth over three years (and which come in all sizes) – were said to be responsible for creating over half of all new jobs in the UK between 2007 and 2010.³³ Significantly, the scale-ups so important for job creation are also the kinds of businesses that the technology industry is well-suited to develop, given its aptitude for creating scalable products. Recent notable UK examples have experienced up to four-digit growth during the period 2011 to 2013, including Hailo (4,003%), MADE.COM (2,567%), SwiftKey (1,258%), Affectv (899%) and HouseTrip (597%).³⁴ The digital technology industry accounted for as much as 27% of the total

increase in employment in London from 2009–12.³⁵ A second indicator of high-growth is the level of equity investment in the sector (equity investments typically being made to support companies that are scaling). In each of 2011, 2012 and 2013, the technology sector received more equity investment than any other in the UK.³⁶



Finally, the technology sector has significant ‘multiplier effects’, indirectly helping to develop and sustain private sector jobs in supporting industries, from accounting to legal services, and from construction to catering. A study by Enrico Moretti found that each innovation economy job in the USA supports up to five elsewhere.³⁷ Referring to Moretti’s work, a report by Demos argued that this is because ‘sectors like the digital economy are labour-intensive, well-paid, and tend

35 Tech City UK, ‘Tech Powers the London Economy’, 2013

36 Beauhurst, ‘UK Equity Investment Review’, 2013

37 Enrico Moretti, ‘The New Geography of Jobs’, Houghton Mifflin Harcourt, Boston, 2012

to cluster – amplifying the benefits for those cities with clusters of innovation jobs.³⁸ To give just one UK example, the Cambridge cluster alone is claimed to sustain at least 400 providers of services and support.³⁹

Playing to the UK’s strengths in technology, science and innovation

These trends highlight a final reason to take the sector seriously: it plays to the UK’s strengths in technology, science and innovation. The UK cannot be globally competitive in every field of technology; clusters from Silicon Valley to Berlin,

“In areas from digital media to biotechnology, and from telecoms to financial technology, the UK can legitimately aspire to be world-leading”

Stockholm to Paris each have their own deep specialisms. But in areas from digital media to biotechnology, and from telecoms to financial technology (fintech), the UK can legitimately aspire to be world-leading.

Key indicators of the UK’s strengths include:

- Three of the top 10 – and 31 of the top 200 – universities in the world are in the UK.⁴⁰
- The UK’s research base is second only to the USA for number of citations, and is the most productive in the G8. (With only 1% of the world’s population, the UK produces 6.9% of world publications, receives 10.9% of citations and 13.8% of citations with highest impact.)⁴¹
- In 2013, 71 out of 500 fastest growing technology companies in Europe, the Middle East and Africa were situated in the UK.⁴²
- Out of 30 companies founded and headquartered in Europe with valuations greater than \$1billion (as of April 2014), 11 are situated in the UK.⁴³
- Over a third of revenues from app development generated by all 28 European member states come from the UK.⁴⁴

38 Demos, ‘A Tale of Tech City’, June 2012

39 The Cambridge Phenomenon, <http://www.cambridgephenomenon.com/what-phenomenon/>, accessed on 13 July 2014

40 Times Higher Education, ‘World University Rankings 2013–2014’

41 Sir Andrew Witty, ‘Encouraging a British Invention Revolution: Sir Andrew Witty’s Review of Universities and Growth’, October 2013

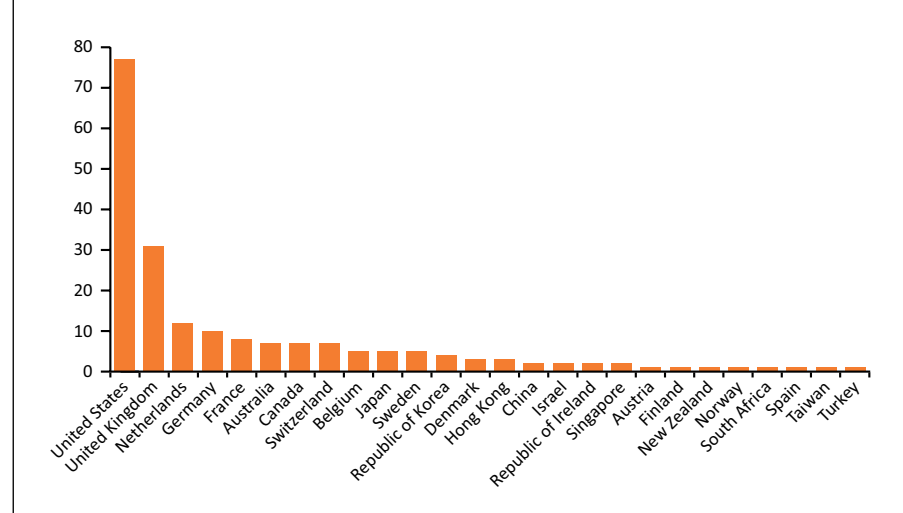
42 Deloitte Fast 500 EMEA

43 GPBullhound, ‘Can Europe Create Billion Dollar Tech Companies’, June 2014

44 The Guardian, ‘UK app developers predicted to add £4bn to economy this year’, June 2014

45 Times Higher Education, ‘World University Rankings 2013–2014’

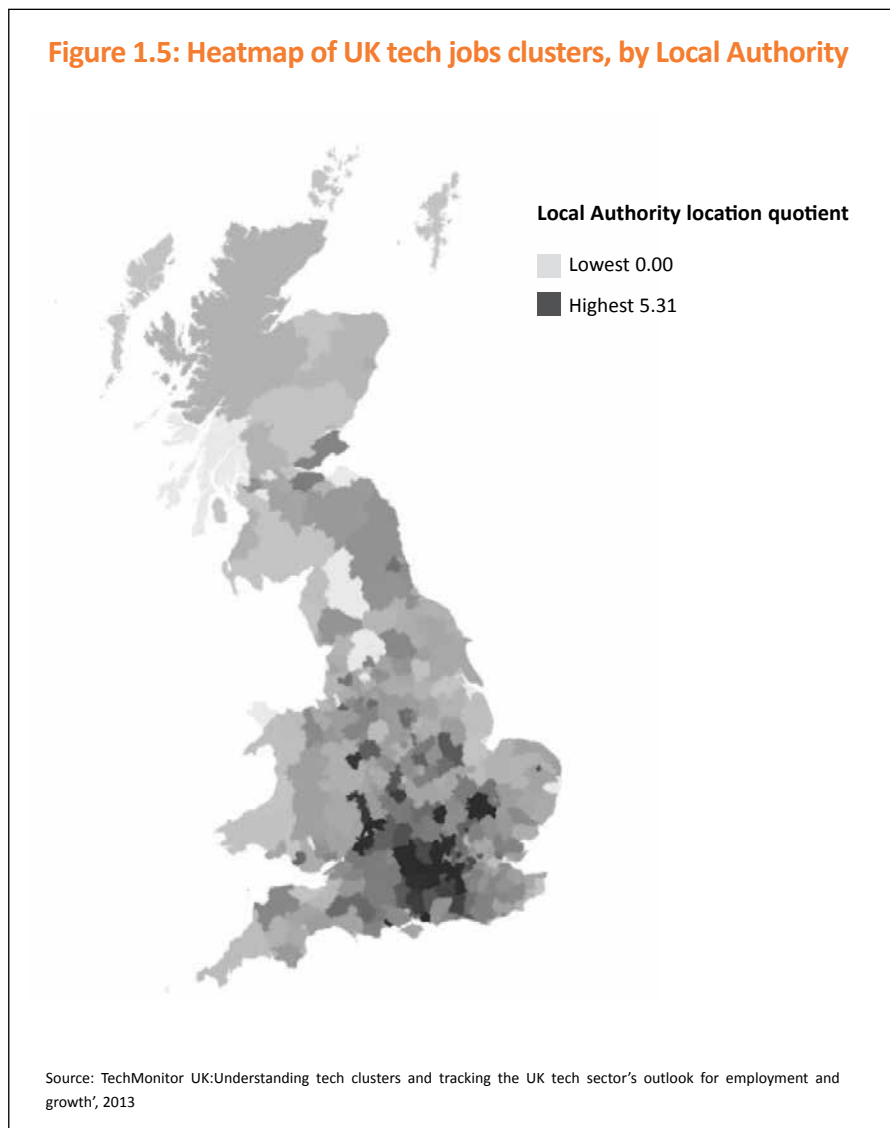
Figure 1.4: Times Higher Education World University Rankings (number of universities in top 200 by country)⁴⁵



The dominance of London and the South East

For policymakers concerned with economic growth and private sector job creation, it should be clear that the technology sector is highly important. Equally evident, however, is that its benefits have not been spread evenly around the UK. According to a study by KPMG, the top 10 clusters of technology jobs (different, as the next chapter will show, from tech clusters) are all situated close to the M4, M3 or M25 motorways.⁴⁶ The study showed that the concentration of tech employment in the South East is greater than the national average in as many as 47 of 66 local authorities. Wokingham in Berkshire – home to an agglomeration of large multinational technology firms in the Thames Valley Business Park and Sutton Business Park – has more than five times the national proportion of technology workers. In London alone, 21 out of 33 local authorities have a higher proportion of workers employed in technology related roles than the national average.

Figure 1.5: Heatmap of UK tech jobs clusters, by Local Authority



46 KPMG, 'TechMonitor UK: Understanding tech clusters and tracking the UK tech sector's outlook for employment and growth', 2013

So while the technology industry is bringing considerable benefits to the UK economy seen as a whole, it is failing to live up to the Chancellor's wish for it to benefit 'every corner of the country'. The question for policymakers is how to extend the sector's benefits to other regions of the UK, and especially to England's northern cities. As the next chapter will demonstrate, a strong case can be made that technology companies have the greatest chance of success when they are part of a cluster.

2

What Are Clusters and Why Do They Matter?

Defining a cluster

There is no universally-agreed definition of a cluster. They vary in geographic shape and size, in the type and homogeneity of the businesses they encompass, the reason for their existence, and the relationship between their constituent parts. As a result, 'cluster' should not be treated as a single concept, but rather as a loose collection of characteristics. There have been several comprehensive reviews of the competing definitions of clusters, and this report does not need or seek to re-enter that debate.⁴⁷ Rather, we take as our foundation the work of Michael Porter, who arguably created the most widely-used classification in his 1990 work, *'The Competitive Advantage of Nations'*.

Porter describes clusters as 'Geographic concentrations of interconnected companies and institutions in a particular field'. He elaborates on this definition with a diamond model that describes four key groups of cluster elements, which can be summarised as follows:⁴⁸

1. **Context for firm strategy and rivalry:**
 - A local context and rules that encourage investment and sustained upgrading.
 - Open and vigorous competition among locally based rivals.
2. **Demand conditions:**
 - A core of sophisticated and demanding local customers.
 - Unusual local demand in specialised segments that can be served nationally and internationally.
 - Customer needs that anticipate those elsewhere.
3. **Related and supporting industries:**
 - Access to capable, locally-based suppliers and firms in related fields.
 - Presence of clusters instead of isolated industries.
4. **Factor conditions:**
 - High quality, specialised inputs available to firms, including: human, capital and natural resources; and physical, administrative, scientific and technological infrastructure.

Three updates to Porter's model

Porter's model has proven durable since it was first published over two decades ago, but requires three main updates for this report's focus on modern clusters in the technology sector.

⁴⁷ See, for example, the Brookings Institute, 'Making Sense of Clusters: Regional Competitiveness and Economic Development', March 2006.

⁴⁸ This is based on BVCA's summary of the diamond model found in 'Tech Country: Looking Beyond London in search of Britain's technological future', March 2013

1. **Footloose customers:** In many fields of technology, it is no longer essential to have customers (or indeed suppliers) on the immediate doorstep. To be viable, even some of the smallest tech startups – especially those in the digital sector – have to be ‘micro-nationals’: selling to and sourcing from a global market from day one.⁴⁹ A case in point is Israel – the so-called ‘Startup Nation’ – whose companies have often launched digital products directly to markets in the USA and Europe.
2. **Cluster mentality:** The interviews conducted for this report highlighted that a key requirement for a modern tech cluster is that it has a collective consciousness of *being a cluster*. This ‘cluster mentality’ reveals that what matters is not merely the physical proximity of technology companies, but having *tech communities*, where there is a common vision and easy exchange of ideas, money and people between groups such as entrepreneurs, investors, universities, research organisations, businesses, and local government.⁵⁰
3. **Stages of development:** Clusters go through different stages of development. Just as they have an upward trajectory, it is also possible that they will eventually decline or evolve into new business areas, in part or in their entirety. Perhaps the most insightful model of this is provided by Ariz and Norhashim who outline a six-stage process covering: *Antecedence, Embryonic, Developing, Mature and Declining*, the sixth stage being *Transformation* – the idea of clusters moving between different phases. Policymakers need to be mindful that clusters at different stages of evolution have different characteristics and needs.

Clusters and high-growth businesses

Why should policymakers concern themselves with supporting *tech clusters* as opposed to just *tech companies*? All other things being equal, a cluster should confer on the companies that reside within it advantages that they would not have were they to set up outside the cluster. For entrepreneurial technology companies wishing to scale, the benefits include:

- **De-risking entrepreneurial activity:** Founding or working for a startup offers little job security. Workers can minimise their risk of unemployment by being located in a cluster with many possible employers that might need their skill set. As a result, clusters tend to increase the pool of workers willing to work for entrepreneurial businesses.
- **Attracting talent:** Clusters that develop a critical mass of companies focused on a particular field tend to attract the best talent. Individuals with relevant skills (which in the technology sector are often highly specialised) are likely to be drawn to clusters that provide the most stimulating career opportunities and the widest choice of employers.
- **Accessing support services:** Being in a cluster reduces the cost (in terms of both time and money) of accessing vital support services, such as legal, accounting and business advice. When a critical mass of companies in a particular sector comes together, it makes it financially viable for a wider number of services to operate in and to service the area. It also enables the

⁴⁹ Horowitz and Hwang, ‘The Rainforest: The Secret to Building the Next Silicon Valley’, Feb 2013

⁵⁰ This is a key distinction between a cluster – like Cambridge or Silicon Valley – and an *agglomeration* of tech companies, such as that found in Wokingham.

development of specialist firms that can provide expert support for the needs of very specific sectors (e.g. legal firms specialising in hardware IP/patent law).

- **Attracting finance:** High-growth technology companies depend heavily on access to angel and venture capital funding.⁵¹ Angel groups and venture capital firms are more likely to be situated in and/or serve clusters where there are a large number of potential investment opportunities. Being in a cluster can therefore make it easier and faster for businesses to access equity finance.
- **Tacit knowledge base:** Clusters that focus on a particular area tend to develop communities of expertise that can collaborate and share information for mutual gain. This is based on the idea that knowledge is an increasing returns process: the cost of creating new knowledge is lower the more knowledge that already exists.⁵²
- **Accessing mentors:** Mature and successful tech clusters build a pool of mentors, as experienced entrepreneurs go on to become advisers and business angels. Knowledge and expertise about how to do business in a specific sector are thereby recycled and new businesses can learn from the experiences of their predecessors. For innovative, high-growth companies, mentors can help guide businesses through the very different challenges they face on their journey from small startup to large enterprise.
- **Collaboration and competition:** The physical closeness of members within a cluster enables cooperation because it creates a reputational risk of bad practice. Entrepreneurs, investors or advisers who exploit others' work, money or ideas unfairly will find it hard to operate again if the community knows they cannot be trusted.⁵³ Competition is enhanced as companies are forced to specialise in order to gain competitive advantage over similar firms in their area. Such specialisation can often be the source of innovation and encourages research and development activity.
- **Brand recognition:** In established clusters, businesses benefit from being associated with the cluster brand. This has been shown in London's Tech City, whose businesses have gained from government-backed publicity. This kudos factor can aid securing investment, customers and talent.

“Clusters that focus on a particular area tend to develop communities of expertise that can collaborate and share information for mutual gain”

The empirical evidence confirms that clusters are good for jobs. According to the Centre for Cities, the UK's top 31 economically significant clusters (across all sectors) together 'employ four million people – one in seven of the working population – and offer average salaries that are typically higher than those in the surrounding region.' The Cambridge cluster is made up of more than 1,500 technology and biotechnology companies, employing 57,000 people and generating more than £13 billion annually.⁵⁴ In June 2014, a report by Oxford Economics claimed that there are 34,000 technology businesses in London, and that in the next decade there will be a further 11,000, creating 46,000 new jobs.⁵⁵ If government cares about technology companies' ability to succeed, grow and create jobs, it should care about tech clusters.

51 UK Business Angels Association, 'Financing High-Growth Firms: The Role of Angel Investors', 2011

52 James Clark for BVCA, 'Tech Country: Looking Beyond London in search of Britain's technological future', March 2013

53 Brad Feld, 'Startup Communities: Building an Entrepreneurial Ecosystem', October 2012

54 University of Cambridge Factsheet: Cambridge Innovation in Numbers

55 London Evening Standard, 'London's tech industry 'will add £12bn to capital's economy'', June 2014

Clusters and regional development

The final reason why policymakers should concern themselves with tech clusters is that they are a powerful tool for understanding and promoting regional economic development. The Brookings Institute has argued that ‘cluster thinking’ is helpful for policymakers because it orientates ‘economic development policy and practice towards groups of firms and away from individual firms’.⁵⁶ They add that cluster thinking encourages policymakers to build on the unique strengths of regions; go beyond analysis and engage in regular dialogue with cluster members; and develop different strategies for different clusters according to their particular needs. Of course, to be effective, policymakers need to have a clear definition of what they regard as a tech cluster in order to distinguish between genuine clusters and mere groupings of technology companies. Failing to do so hinders the development of effective policy measures for regional development.

56 Brookings Institute, ‘Making Sense of Clusters: Regional Competitiveness and Economic Development’, March 2006

3

What Do Tech Clusters Need to be Successful?

Having established that policymakers should care about clusters to support the technology industry and regional private sector job growth, the next step is to understand the factors required for them to be successful. In addition to having a national policy framework that is pro-business, pro-entrepreneurship, pro-investment and pro-innovation, our research highlighted the following key success factors at a local level:

- **Skills:** The single most important success factor for tech clusters is having access to a strong base of workers with the skills – or aptitude to learn – core competencies needed by the sector. Diversity of skills is also imperative. Creative innovation accelerates when different specialisms combine. It is not surprising that many clusters are based near leading universities that provide a regular supply of talent.
- **Community collaboration:** Successful clusters require not just the proximity but the *collaboration* of different groups such as entrepreneurs, investors, universities, research organisations, science parks, businesses and local government. It is by working together towards a common vision that these groups make it easier to start and grow a business and resolve the challenges common to the cluster.
- **Strong research base and knowledge transfer:** Sir Andrew Witty’s 2013 ‘*Review of Universities and Growth*’ underlined that universities play a vital role for clusters in ‘providing national and international connections, strong links with leading companies in their sectors and the capability to analyse and understand research from across the globe and the markets in which that research can be applied.’⁵⁷ In addition, for many tech clusters, the commercialisation of ideas from universities is a vital source of innovation. Successful clusters tend to have sound processes and organisations in place to transfer research ideas to a commercial setting.
- **Access to finance:** Successful clusters depend on having strong representation from angel and venture capital groups to ensure businesses have the necessary investment to grow.
- **Sound infrastructure:** During interviews for this report, having the right infrastructure was frequently cited as being a core requirement for tech clusters’ success. This includes transport links (regional, national and international), office space, as well as access to fast broadband (a point raised by former New

57 Sir Andrew Witty, ‘Encouraging a British Invention Revolution: Sir Andrew Witty’s Review of Universities and Growth’, October 2013

York City Mayor, Michael Bloomberg, during his visit to London's Tech City in June 2014).⁵⁸

- **Hub organisations:** Successful clusters cannot solely be composed of startups; the presence of larger organisations is also crucial. Larger organisations can act as hubs, helping by funding in-house research and development; investing in specialised training for their own staff (who may later found their own companies or work for others); producing spin outs; offering office space and mentoring to startups; becoming a customer or supplier of local SMEs; improving the reputation of the area; and providing an anchor for local industry. Some writers have added that clusters need 'serial acquirers' – companies such as Google, Yahoo and HP – that buy up smaller firms. Silicon Valley has these in abundance.⁵⁹ Hub firms can be private sector, such as Google (London) and ARM (Cambridge), or public sector, such as the BBC (Salford).
- **Local leadership:** Each tech cluster has its own specific strengths, needs and challenges. It is therefore essential to have strong and responsive local leadership. It is particularly vital that there be leadership from the private sector. Government can hinder cluster growth by intervening too early, or trying to fund initiatives without strong backing from local businesses. Such measures can lead to dependency on government financial support rather than building communities that are sustainable for the long term.⁶⁰
- **Specialism:** Clusters do not just compete nationally, but internationally. To succeed, they therefore need to build their expertise and reputation in specific fields. This does not limit clusters to just one domain, and specialisms may evolve over time, but playing to natural local strengths is vital.

Two further truths

As they consider how best to support tech clusters in maximising the presence of these success factors, policymakers should keep in mind two further points:

- **Critical mass:** Many of the factors listed above depend on achieving critical mass. For example, clusters become magnets for talent and investment, but only after they achieve a critical mass of companies working in a particular field – which in turn will only exist where there is sufficient talent and investment. Clusters need to reach a tipping point that produces a virtuous circle of success. Established tech clusters have an abundance of the factors above, which, in turn, encourages yet more to be drawn to the cluster.
- **Rainforest rather than agriculture:** In one of the most influential books written on the success of the Silicon Valley model, Horowitz and Hwang argue that effective clusters are more like rainforests than planned agriculture.⁶¹ They reason that clusters depend on innovation, which mostly occurs through the chance meeting and combining of different ideas. The analogy is that the unplanned chaos of a rainforest yields greater biodiversity than a managed farm. Clusters thrive on chance meetings between members of unrelated groups and the diversity and innovation that ensue.

⁵⁸ London Evening Standard, 'London needs faster internet, says former New York Mayor Michael Bloomberg', June 2014

⁵⁹ MIT Technology Review, 'Why the "Next Silicon Valley" Doesn't Really Exist', November 2013

⁶⁰ Index Ventures, 'The Tech Cluster Phenomenon powering Europe's startup boom', April 2014

⁶¹ Horowitz and Hwang, 'The Rainforest: The Secret to Building the Next Silicon Valley', Feb 2013

In summary, while the core characteristics of successful tech clusters can be identified, their dependence on achieving critical mass and allowing for unplanned and serendipitous meetings makes it much harder for government to plan effective interventions. To help guide policymakers, in the next chapter, this report assesses the lessons that can be learned from three very different tech cluster models that have thrived in the UK.

4

Lessons From the UK's Existing Clusters

Given the limitations of applying the Silicon Valley model to the UK's clusters, what lessons can policymakers draw from experiences closer to home? This section briefly examines three very different models exemplified by well-established tech clusters in Cambridge, London and the Midlands.

Cambridge – long road to success

The Cambridge tech cluster's record of accomplishment speaks for itself: it encompasses 1,535 companies in sectors as diverse as hardware, software, biotechnology, engineering and medical devices, which had combined revenues of £13billion in 2013. Cambridge has been responsible for no fewer than fourteen \$1billion (£642million) technology businesses in the past 15 years (including Aveva, Abcam and CSR), with two reaching \$10–20billion (Autonomy and ARM) – an achievement unmatched by any other UK cluster.⁶²

The lack of public fanfare and government attention for Cambridge compared with London's Tech City can in part be explained by the fact that the majority of its principal companies sell to other businesses rather than to individual consumers. Instead, Cambridge has focused on developing its own networks. Several initiatives, including the *Cambridge Network* and *Cambridge Wireless* provide regular opportunities for members of different communities within the cluster to meet.⁶³ These have typically been created and led by serial entrepreneurs who have become ambassadors for the cluster and mentors to newer firms. Specialised support networks and dedicated office space are also available for tech companies at all stages of their development from startup (IdeaSpace) to SME (St. John's Innovation Centre) to multi-national (Cambridge Science Park). Added to this, the cluster has its own established and self-sustaining group of angel and venture capital firms providing finance, support and contacts to help high-growth companies.

Cambridge benefits hugely from the presence of its internationally-renowned university in terms of research, the creation of spin outs, and also in providing a highly-educated pool of workers to draw from. One in five recent Cambridge graduates works or studies in the region.⁶⁴ The university also earns more from Intellectual Property (IP) developed by its students, alumni and staff than any other higher education organisation in the UK.⁶⁵

Yet the University has not been the only source of the cluster's success in innovation. Indeed, it was the arrival of engineering consultancy firms in the area – starting with Tim Eiloart's founding of Cambridge Consultants in 1960

62 University of Cambridge Factsheet: Cambridge Innovation in Numbers

63 See www.cambridgenetwork.co.uk and <http://www.cambridgewireless.co.uk>

64 HESA, 'Finances of Higher Education Institutions 2012/13'

65 HESA 'HE Business and Community Interaction Survey 2012/13'

(to 'put the brains of Cambridge University at the disposal of the problems of British industry') – that ignited the cluster by combining academic research and talent with commercial focus.⁶⁶ Those private firms have themselves produced a significant number of spin outs. Five created from Cambridge Consultants have gone on to be listed on the London Stock Exchange and several have been sold in multi-million pound deals.⁶⁷ The city is also home to one of Europe's leading research hospitals in the form of Addenbrooke's, which has produced its own centre for medical research, innovation and skills.

Lessons from Cambridge

1. **A grassroots, bottom-up, private sector-led approach can create a successful cluster.** Even without proactive support from local or central government, Cambridge has managed to develop a successful cluster due to the local private sector taking a lead in the growth of technology businesses and the reputation of the cluster as a whole.
2. **Innovation does not just come from universities.** Tech companies and new technologies have spun out from both the university (e.g. Solexa) but also from large 'hub' companies (e.g. Domino from Cambridge Consultants).
3. **Strong support networks are vital.** Cambridge has a community of highly experienced entrepreneurs and investors willing to give their time and energy to mentor new companies and to promote the cluster – part of the 'give it back' culture thought to be so important in Silicon Valley.⁶⁸ Regular opportunities for networking aid the fast exchange of ideas and contacts.
4. **Maturity counts.** The diversity and strength of the cluster are closely related to the fact it has been developing for at least fifty years and has consequently achieved critical mass in tech clusters' key success factors.

London Tech City/Silicon Roundabout – power of the brand

Some commentators have been dismissive of London's status as a tech cluster, arguing that behind the media hype it has not yet created the high-tech, billion-dollar companies found in cities like Cambridge.⁶⁹ That misses the point: much of the cluster's activity has not been based on commercialising university research, but has instead relied on the effective combination of technical and creative skills. Tech City's specialism has turned out to be the development of web- and app-based digital products covering sectors including gaming, digital media and fintech (financial technology). Notable examples of London's successes in the fintech sector include Funding Circle, a business lending platform, and Transferwise, which is seeking to transform currency exchange.⁷⁰

Beginning in the 1990s, an area focused around Shoreditch and Clerkenwell gradually became home to companies such as Dopplr, Last.fm and TweetDeck, with many companies and young tech workers being drawn to the area's cheap rents. The cluster has grown dramatically since then. A recent report by the Centre for London estimates that there are now 3,200 firms in the cluster, employing 48,000 people.⁷¹ Cisco, Facebook, Intel and McKinsey are among the companies that have invested in the area, with Google creating a campus specifically to nurture the development of startups.

66 Cambridge Phenomenon, <http://www.cambridgephenomenon.com/what-phenomenon/>, accessed on 20 July 2014

67 Business Weekly, 'Cambridge Consultants the Kings of Spin outs', February 2012

68 Brookings Institute, 'Making Sense of Clusters: Regional Competitiveness and Economic Development', March 2006

69 See, for example, Forbes, 'Five UK Tech Clusters That Could Put London To Shame', June 2014

70 Index Ventures, 'The Tech Cluster Phenomenon powering Europe's startup boom', April 2014

71 The Independent, 'Is the success of London's 'silicon roundabout' forcing new startups out of the capital?', May 2013

The cluster has received a significant amount of support from government, starting with a speech by the Prime Minister in 2010 in which he set out his agenda to turn London into ‘one of the world’s great technology centres’.⁷²

“The fact that clusters tend to form organically, based on where businesses choose to locate themselves, highlights that government is ill-advised to try to push cluster development into new areas”

The government’s backing has included frequent visits from government ministers; the establishment of the Tech City Investment Organisation (now Tech City UK); efforts to raise awareness about the cluster domestically and internationally; and encouragement for large investors to consider the area.

Another strand of the government’s strategy has been to ‘steer high-tech activity further east, including into a post-Games Olympic Park’,⁷³ an objective that has been considered less successful.

Lessons from London

5. **The brand matters:** London powerfully conveys the importance of the brand. Arguably the UK government’s greatest contribution to Tech City has been to highlight to domestic and international investors and companies that the cluster exists and is thriving.⁷⁴
6. **Clear communication channels to policymakers are needed.** The creation of the Tech City Investment Organisation and regular breakfasts in Downing Street provided business leaders with clear communication channels to senior policymakers, enabling politicians to quickly understand and seek to address obstacles to the cluster’s growth.
7. **Government is best to support what’s already there.** The government’s approach to helping Tech City has broadly been welcomed with its focus on supporting a cluster that was already growing thanks to the local private sector.
8. **It’s hard to move a cluster.** The fact that clusters tend to form organically, based on where businesses choose to locate themselves, highlights that government is ill-advised to try to push cluster development into new areas. The least successful part of the government’s activity in Tech City has been its attempts to move the community further east.

Midlands Motorsport – distributed excellence

In the highly competitive world of Formula 1 racing, a significant number of the world’s leading engineering teams have based themselves in Oxfordshire and Northamptonshire – an area dubbed ‘Motorsport Valley’. Today almost 3,500 companies associated with motorsport are based in the region, employing around 40,000 people, almost 80% of the world’s high-performance automotive engineers.⁷⁵ In 2012, the cluster generated revenues of £9billion.⁷⁶ Eight of the 11 Formula 1 teams, including Red Bull, Lotus, Mercedes, Williams, Caterham, Marussia and McLaren, together with their suppliers, are within 80 minutes’ drive of Silverstone, the home of the British Grand Prix.

In a report for the BVCA, James Clark outlined how British engineers in that region gained a competitive edge in motorsport following the Second World War since:

⁷² Cabinet Office, ‘East End Tech City speech’, November 2010

⁷³ Demos, ‘A Tale of Tech City’, 2012

⁷⁴ Index Ventures, ‘The Tech Cluster Phenomenon powering Europe’s startup boom’, April 2014

⁷⁵ BBC Sport, <http://www.bbc.co.uk/sport/0/formula1/23048643>, accessed on 13 July 2014

⁷⁶ Centre for Cities, ‘Industrial revolutions: capturing the growth potential’, July 2014

'Britain had an abundance of disused airfields and severe shortages of the materials required to construct versatile and durable engines, but ready access to specific types of engines which could be repurposed. These two factors forced British garage engineers to develop racing cars which innovated beyond the engine itself to find extra speed by considering the car as a whole, one that would be fast over the whole track, not just in a straight line.'

He adds that this led to innovations in chassis design, aerodynamics, materials development, advanced engine design, and even operational management. Key to this swift development was the clustering effect produced through the area's intense competition, access to finance, phenomenal technical achievement and rapid dissemination of knowledge.

Lessons from Motorsport Valley

9. **Distributed clusters can work:** It is possible for cluster characteristics to exist even without firms being immediately co-located, on condition that there are regular opportunities for interaction that encourage collaboration and competition. In the case of Motorsport Valley, despite the fact the motorsport teams were originally quite dispersed, frequent and fiercely competitive races have ensured regular contact between competing firms.⁷⁷
10. **Clusters requiring specialisation can draw talent from nationwide.** Motorsport Valley draws engineering talent from the UK's leading universities, and is not solely dependent on graduates from its immediate vicinity.

Three tech clusters. Three very different models. Ten lessons. Yet Cambridge, London and the Midlands are far from being the only areas of technology excellence in the UK. Elsewhere around the country many more tech clusters exist at varying stages of development. Given the government's specific focus on developing England's northern cities, three regions in the North that have a wish and strong potential to become thriving tech clusters are explored below.

Newcastle/Sunderland (North East region)

With a focus on software and gaming, both Newcastle and nearby Sunderland are working to make the North East a major technology hub. There are estimated to be 1,300 software and digital companies in the area, from financial management systems giant Sage (the only software company listed in the FTSE 100), to a large and growing number of innovative startups. In total, there are 32,000 jobs in IT and telecoms in the North East, and a further 1,500 vacancies.⁷⁸

The North East is developing a reputation for IT-based back office functions, including for private sector organisations such as EE, British Airways and Balfour Beattie, as well as government departments such as HMRC and DWP. An area of particular excellence is video games development (and related activities in the supply chain, such as animation) represented by firms like Ubisoft Reflections, CCP Games and Eutechnyx.⁷⁹ Startups, meanwhile, are being encouraged by leading accelerators such as Ignite100, while multinationals such as Accenture have been drawn to the area due to its talented workforce.

⁷⁷ Motorsport Valley's ability to function as a distributed cluster was first outlined by James Clark for BVCA, 'Tech Country: Looking Beyond London in search of Britain's technological future', March 2013

⁷⁸ Dynamo North East, 2014

⁷⁹ Skills and the North East Economy, 'North East Aspirations for Education, Employment and Skills 2011–2016', September 2010

Recent initiatives by organisations such as Dynamo North East and Sunderland Software City are helping to develop a cluster mentality and nurture the strong networks of entrepreneurs, mentors, investors, researchers and political leaders needed for the area to thrive.

Success factors

Skills	<p>The North East claims to have a higher proportion of the workforce operating in technology posts than anywhere else in the UK.⁸⁰ There are five universities in the Region. The University of Newcastle and University of Northumbria are both based in Newcastle, and offer some of the best courses in video game design and computing in the country.</p> <p>Dynamo North East is working with schools, colleges, universities, and employers to 'fix the education pipeline'. Their initiative includes plans to open four University Technical Colleges in the Region, bring more women into IT, boost apprenticeships, and roll out Code Clubs and Maker Clubs to every primary school in the region, while working with secondary schools to provide improved careers advice and clearer pathways into IT jobs.</p>
Community collaboration	<p>Through events like Dynamo 14, Thinking Digital, Industry Conference, DIBI, and VRTGO, the North East is bringing together entrepreneurs, local business leaders, members of the region's universities, investors and local politicians to define a common vision for the area.</p> <p>Regional agencies such as Digital Union in Gateshead and Digital City on Teesside encourage digital innovation and have established regular opportunities for events and collaboration. These are complemented by numerous tech-related user groups, which help share knowledge between different organisations.</p>
Strong research base and knowledge transfer	<p>The North East Satellite Applications Catapult Centre of Excellence, based in County Durham, helps SMEs and large companies to tap into the UK's multi billion pound space sector. Newcastle University is a founder partner of the Centre of Excellence, and hosts the Academic Centre of Excellence in Cyber Security Research, and this year is setting up the EPSRC Centre for Doctoral Training in Cloud Computing for Big Data (based at the Digital Institute's Cloud Innovation Centre).</p>
Access to finance	<p>Newcastle-based investors and angels such as Northstar Ventures, Rivers Capital Partners and IP Group are actively funding businesses in the Region.</p> <p>£125million has been invested via the European Investment Bank. Until recently, local startups relied on London-based investors, but there is a growing angel and VC community in the region.</p>
Support for startups	<p>Accelerators for early stage tech startups include Ignite100 in Newcastle, and Searchcamp and the 23 Mile Fund on Teesside.</p>
Sound infrastructure	<p>Travel to London within 3 hours from Newcastle.</p> <p>Data infrastructure is being upgraded through the 'Go Digital' programme in Newcastle, along with a number of initiatives arising from the recent Growth Deals signed with both the North East LEP and Tees Valley Unlimited.</p> <p>The long-haul hub run by Emirates Airline at Newcastle Airport is estimated to have brought net economic benefits of £4.6million to the North East.</p> <p>The cluster is well served for broadband infrastructure as a point on the superhighway to key government assets at HMRC and en-route to Edinburgh, which has long also served the universities and shared service centres.</p>
Hub companies	<p>Sage, Accenture, British Airways, Balfour Beatty, Nissan, Virgin Money, Convergys, Sky, HP, nPower, Tesco and Proctor and Gamble and Ubisoft Reflections have a presence in the area.</p> <p>The region is home to IT functions of big government departments like DWP, HMRC, Defra and the NHS's Business Services Authority.⁸¹</p>
Local leadership	<p>Through organisations such as Dynamo North East and Sunderland Software City, the North East is using local private sector know-how and drive to build the profile of the area. Local political leaders and the member of Parliament for Newcastle are actively engaged.</p>

⁸⁰ Dynamo, <http://www.dynamonortheast.co.uk/region/>, accessed on 13 July 2014

⁸¹ Dynamo, <http://www.dynamonortheast.co.uk/region/>, accessed on 13 July 2014

Manchester/Salford

Like Cambridge, Manchester and Salford have strengths in a diverse range of technology sectors. According to the trade association, Manchester Digital, digital content and ICT industries now account for 45,800 jobs in the Greater Manchester area and generate £2billion annually in economic output.⁸² Two different hubs appear to be driving progress. In Salford, MediaCity is Europe's first purpose-built business hub for the creative and digital industries, and is home to the BBC, ITV as well as dozens of other media companies.⁸³ It has been claimed that the 36-acre site – which is likely to expand to more than 200 acres in the coming years – will contribute more than £1billion and 10,000 jobs to the local economy, much of which could come from new and innovative startup businesses.⁸⁴ In Manchester, the Sharp Project is home to 50 digital businesses from startups to established organisations. Since opening in 2011 the Sharp Project has created 375 full time equivalent jobs, generating an annual GVA impact of £21.4million.⁸⁵

The area also has significant strengths in life sciences and materials science, helped to a large degree by research at the University of Manchester. The life sciences industry provides £4.7billion in GVA to the Manchester City Region. Added to that, Manchester has strengths in its technology and communications industry, primarily based in Manchester Science Park. There are more than 500 companies in the park in these industries, employing 54,000 people directly and a further 60,000 in related jobs.⁸⁶

Success factors	
Skills	Manchester and Salford have the largest student population in Europe with over 100,000 currently studying in the city's five universities. ⁸⁷
Community collaboration	<p>The University of Salford has a dedicated campus at MediaCity that aims to encourage collaboration between academics, students, professionals and industry.</p> <p>The Sharp Project has aided startups, investors and mentors in working together.</p> <p>Techhub Manchester provides startups with opportunities to meet with angels, advisers and more experienced entrepreneurs.</p>
Strong research base and knowledge transfer	The University of Manchester is a renowned centre of research excellence in life sciences and materials science. The university has made considerable efforts to provide routes to commercialisation via UMI3 (The University of Manchester Innovation Group) and the university's relationships with the pharmaceutical industry. ⁸⁸
Access to finance	Opportunities to access equity finance in region are still limited. While there are some private investors based in the area, and efforts by UMI3 have begun to create a supply of investable businesses, there is still reliance on direct public funding, subsidies and developmental infrastructure.
Support for startups	TechHub Manchester and the Sharp Project both offer support to startups in the area

82 The Guardian, 'Tech City – believe the hype?', May 2013

83 Worldwide Foreign Direct Investment and Trade, <http://fdi-trade.com/news/49-regional-clusters/336-manchesters-technology-cluster>, accessed on 13 July 2013

84 V3.co.uk, 'Look North: Manchester seeks to become tech cluster of choice', November 2013

85 According to an independent report commissioned by Manchester City Council,

86 The Guardian, 'Manchester's missing tech scene? Here comes the resurrection ...', February 2013

87 The Guardian, 'Manchester's missing tech scene? Here comes the resurrection ...', February 2013

88 James Clark for BVCA, 'Tech Country: Looking Beyond London in search of Britain's technological future', March 2013

Sound infrastructure	Just over 2 hours to London by train. According to HSBC's Growing British Business report, Manchester is an emerging 'supercity' due to the investment in its infrastructure. The city has received funding from the Urban Broadband Fund project to provide ultrafast broadband to 6,200 businesses by 2015. Additionally, the London Internet Exchange (LINX) has launched its first regional peering point in Manchester, IXManchester. This enables Greater Manchester's internet-based companies to move traffic faster, cut costs and enjoy increased resilience against network problems. ⁸⁹
Hub companies	BBC, ITV, Cisco, IBM and Microsoft are all present in the area.
Local leadership	Representatives from local government in Salford and Manchester have been pivotal in pushing for the development of infrastructure, services and attracting hub organisations such as the BBC.

Leeds/Sheffield

The Leeds City Region (LCR) is the largest official city region outside of London, comprised largely of businesses in both Leeds and Bradford. Recent analysis shows that Leeds has one of the highest collections of high-growth firms outside of London in the UK.⁹⁰ Both Leeds and Sheffield City Councils and the respective City Region LEPs have been proactive in prioritising the tech industry for growth, with key sectors including financial services, medical technology, digital industries, telecommunications and network infrastructure, and printable electronics.^{91, 92}

Medical technology has been an area of specialism for Leeds in particular, with over 100 businesses employing 3,500 staff in the field. Home to the Department of Health's northern office and specifically its IT administrative function, both the private and public sector have invested in health innovation hubs where the NHS, private sector and academia can collaborate.⁹³

Digital industries, meanwhile, are responsible for almost two-fifths of employment in Sheffield, with most firms clustered in the city centre.⁹⁴ Leeds has the largest number of people employed in the digital and creative industries outside of London, with nearly 6,000 businesses employing over 35,000 people.⁹⁵ Between both regions, particularly strong employment growth has been seen in software development, electronic publishing and computer games, with Rockstar Leeds developing a number of the best-selling *Grand Theft Auto* series, Sumo Digital in Sheffield being one of the largest independent game studios in the UK, and Skybet developing one of the largest Hadoop platforms in the UK. Leeds and Sheffield city regions host the largest number of back office IT workers supporting the operations of the major banks and building societies.

In Leeds, the redevelopment of the Clarence Dock area has provided specialist office space, turning it into a hub for digital companies. Meanwhile the 'Airedale Digital Corridor', which is home to a significant cluster of digital and electronic firms, including Pace and Filtnic, Echostar Europe, Teledyne Defence and Bradford Technology, is estimated to have a combined turnover equal to that of Cambridge.⁹⁶ The region continues to produce large growing firms, with one of the biggest tech flotations of the past few years coming from Servelec, a developer of software infrastructure whose operations originated in Sheffield, raising £122m on the AIM market in December 2013.⁹⁷

89 London Internet Exchange, 'LINX Regional Peering Strategy', June 2014

90 Seven Hills, 'Growth Britannia: Mapping Britain's High Growth Hotspots', 2014

91 Department for Culture Media and Sport, 'Super Connected Cities: Leeds and Bradford submission', February 2012

92 Sheffield City Region Local Enterprise Partnership, 'Strategic Economic Plan', March 2014

93 Leeds Growth Strategy

94 Welcome to Sheffield, 'Creative and Digital Industries'

95 'Leeds City Region Digital Infrastructure Plan', May 2012

96 'Bradford District Industry Sector Profiles 2012'

97 Insider Media Limited, 'Servelec completes biggest tech float in three years', December 3rd 2013

Success factors

Skills	<p>Between the two cities, 195,000 students study in Leeds and Sheffield across 10 Universities – the largest concentration of universities in Europe.⁹⁸</p> <p>There are 140,000 workers in the technology, media and telecoms industries in the region.</p> <p>Both Sheffield and Leeds City Region LEPs have recently secured high value funding from the government via the City Growth Deals scheme to invest in local skills programmes designed to train the next generation with the competencies required in the local economy.</p> <p>Sheffield is home to one of the first University Technical Colleges in the UK, with a curriculum focusing on digital media and engineering.</p>
Community collaboration	<p>Leeds City Council has supported both the Leeds Data Mill, a platform for all organisations (though largely public sector) to share open data with the local community and developers, as well as the Leeds Open Data Institute Node, which runs public open data events and training.</p>
Strong research base and knowledge transfer	<p>Together, Leeds and Sheffield are fast becoming a global centre of excellence in medical technology. The University of Leeds hosts Europe's largest orthopaedic engineering lab.</p> <p>With accelerators like Medipex in Leeds, the Innovation and Knowledge Centre at Leeds University and Medilink Yorkshire and The Humber in Sheffield, knowledge sharing between academia, industry and healthcare professionals is already well established in the region.</p>
Access to finance	<p>Though Leeds has the largest financial services sector beyond London, private equity finance is limited and often startup businesses rely on direct public funding or Government backed finance schemes, such as Creative England.</p>
Support for startups	<p>Dotforge Accelerator, Sheffield Digital Campus, QU2 Leeds Metropolitan University, Sheffield Bioincubator</p>
Sound infrastructure	<p>Just over 2 hours to London by train, with Manchester International Airport an hour by road.</p> <p>New BDUK funding has been set aside for both Leeds and Sheffield city regions to bring superfast broadband coverage up to 95% of premises by 2017, and increase speeds for commercial customers.⁹⁹</p>
Hub companies	<p>Plusnet, BT, EE, Vodafone, HSCIC, Sky Sports, Rockstar North, Sumo Digital, WANdisco, LearnDirect, DePuy International (Johnson & Johnson) and Sky Digital are all present in the area.</p>
Local leadership	<p>Both of the City Councils and Local Enterprise Zones in Leeds and Sheffield have been actively seeking to develop the digital industries in the area.</p>

The examples above represent just three areas of the UK that have ambitions to become major technology hubs. Elsewhere, **Aberdeen** has strengths in technology related to the oil and gas industries, with innovative, medium-sized technology companies such as Tritech working alongside giants including BP and Shell. The corridor between **Bristol** and **Bath** ('Silicon Gorge') has significant strengths in semiconductors, military hardware, software and robotics, arguably making it the closest cluster to Silicon Valley in terms of specialisation. The area around **Belfast** and Newry has been dubbed the 'Emerald Valley', with key strengths in fields such as advanced manufacturing, renewable energy and connected health. **Brighton** is known for its gaming, creative, and web companies. **Cardiff**, meanwhile, is strong in technologies related to healthcare and biosciences. 'Silicon Glen' is centred on

98 Leeds and Sheffield City Regions, 'UK Home of Medical Engineering'

99 ISP Review, 'Alternative Superfast Broadband Plan for South Yorkshire UK Picks BT', July 15th 2014

100 Based on list outlined by
TechCityNews, 'The battle for
Britain's next Tech City', February
2014

Edinburgh and **Glasgow** with expertise in high-technology manufacturing, ICT, and Artificial Intelligence, and the presence of companies including Amazon, Cisco, Oracle, Skyscanner and Freescale. **Liverpool** is known for its strengths in BioHealth, gaming, and digital advertising.¹⁰⁰

The next chapter outlines the key policies that recent governments have put in place that affect them.

5

Overview of UK Government Policy

Given their dependence on a large number of inputs (highlighted in Chapters 2 and 3), tech clusters are inevitably affected by a very broad range of policy areas. Recognising this, current and past UK governments have introduced dozens of policy initiatives which directly or indirectly support their growth. These have focused on aspects such as providing incentives for investors; expanding the range of available funding options for companies; encouraging research and development activity; developing the technology sector; and promoting regional growth. In advance of this report’s policy evaluation in Chapter 7, the table below provides a brief summary of some of the most important measures put in place over the past two decades.

Date	Name	Description
<i>For investors, venture capitalists and business angels</i>		
1994	Enterprise Investment Scheme	Income Tax and Capital Gains Tax (CGT) incentive for investors that purchase share options in SMEs, up to a value of £1m p/a
1995	Venture Capital Trusts	Income Tax and CGT incentive for investors in Venture Capital Trust schemes purchasing shares in SMEs, up to a value of £200,000 p/a
2012	Seed Enterprise Investment Scheme	Income Tax and CGT incentive for angel investors that purchase share options in small firms, up to a value of £100,000 p/a
<i>For companies seeking investment and mentorship</i>		
2006	Enterprise Capital Funds	12 commercial funds backed by government, 11 of which are based in London/South East
2008	Enterprise Finance Guarantee	Encourages banks to extend credit to riskier small companies by providing a Government guarantee against 75% of the value of the loan
2009	UK Innovation Investment Fund	£325m in two venture capital funds of funds that invest in technology businesses within strategically important sectors
2011	Business Angel Co-investment Fund	£50m equity investment fund backed by government with a focus on certain regions
2012	Business Bank	The Business Bank will bring together existing Government SME finance support schemes and manage new funds to improve the UK’s business finance markets
2012	Startup Loans Company	Provides small loans and mentorship to new entrepreneurs and startup companies

Date	Name	Description
<i>For companies seeking investment and mentorship</i>		
2012	Growth Accelerator	A consultancy scheme backed by Government providing business advice to small, high-growth firms
2013	New Enterprise Allowance	Provides welfare claimants with a loan and mentorship when starting a new business
2013	Launchpad Funding	Run by the Technology Strategy Board, Launchpads are small funding competitions for innovative companies to develop specialist projects, targeted at firms within certain tech clusters
2013	High-growth Segment (HGS) on London Stock Exchange	A new growth market for high-growth companies wanting to raise capital through the sale of a small percentage of shares
2014	Stamp Duty Exemption on LSE Growth Markets	For both AIM and the HGS on the London Stock Exchange, purchased shares will be exempt from Stamp Duty liability
<i>For innovative businesses and entrepreneurs</i>		
2000	Enterprise Management Incentives	Income Tax and NIC incentives for employees of small firms who purchase share option in their company
2000	Research and Development Relief	Corporation Tax incentive for SMEs and large firms that invest in qualifying R&D activities
2008	Entrepreneurs' Relief	Entrepreneurs benefit from reduced rate of 10% Capital Gains Tax on any value (up to a maximum of £10m) realised upon the disposal of business assets or shares
2009	Small Business Research Initiative	Expanded in 2013, SBRI provides 100% R&D funding to companies seeking to develop innovative products not offered by the market for the public sector
2011	Government Procurement IT	Target to achieve 25% of total IT procurement from SME suppliers and introduction of the G-Cloud portal, with a further target of 50% of all new IT spending awarded to SMEs through the supply chain
2013	Patent Box	Allows companies to apply a lower rate of 10% Corporation Tax on revenues earned through their patented inventions and innovations
2014	Games Tax Relief	Tax credit payable to games developers based on production cost of qualifying games
<i>For a connected and supportive ecosystem</i>		
2010	Tech City UK	A publically funded body created to represent the tech community within Westminster and encourage growth of technology clusters around the UK
2013	Catapult Centres	A network of technology transfer centres with the purpose of connecting businesses with academics to commercialise innovative products and services in valuable technological markets
2013	Information Economy Strategy	Strategic plan from Government for the technology industry to develop support and stimulate investment. The Information Economy Council meets to discuss progress and issues against the strategy
2013	Future Fifty	A scheme for fifty of the UK's highest growth digital companies to access fast-tracked regulatory and business advice from Government

Date	Name	Description
<i>For provision of digital connectivity</i>		
2010	Rural Broadband Programme	Broadband Delivery UK, part of DCMS, has funded 44 locally led broadband connectivity projects, designed to rollout superfast broadband in rural areas typically underserved by commercial providers
2012	Super Connected Cities	22 Super Connected Cities received investment from the Urban Broadband Fund to deliver superfast broadband infrastructure and Connection Vouchers
2014	Connection Vouchers	A credit from Government for small businesses to upgrade to superfast broadband
<i>For nurturing domestic digital skills and attracting tech talent from abroad</i>		
2003	Global Entrepreneur Programme	Targets overseas entrepreneurs and startups with assistance to relocate their businesses to the UK
2011	Entrepreneur Visa	Tier 1 Visa for foreign nationals securing investment to start a business in the UK
2011	Investor Visa	Tier 1 Visa for foreign nationals willing to invest £1million in UK businesses
2013	Graduate Entrepreneur Visa	Tier 1 Visa for international students looking to take forward (viable) business ideas
2014	Exceptional Talent Visa	Tier 1 Visa route for talented foreign technologists to work in a UK technology firm
2014	Sirius Programme	A competition for foreign graduates with tech talent to win a place at a UK accelerator and receive financial and business support
2014	Computing Curriculum	Introduction of Computing into the curriculum for 5–16 year olds, including coding and understanding how computers work
<i>For regional economic growth</i>		
2010	Regional Growth Fund	£3.2billion economic development fund that support private and public sector projects in targeted geographical areas
2010	Local Enterprise Partnerships (LEPs)	Working across the private and public sector 39 LEPs have a responsibility to achieve local economic growth through development of strategies and rollout of investment plans
2011	Enterprise Zones	24 LEPs awarded an Enterprise Zone where companies are offered relief from business rates, relaxed planning regulation and business ready connectivity.
2011	Growing Places Fund	£730m infrastructure and housing fund provided to LEPs
2012	City Deals	28 cities have agreed devolved financial, planning and skills powers in return for a greater responsibility in achieving local economic growth
2014	Growth Deals	A Growth Deal was agreed with each LEP in July 2014, competitively allocating £6billion drawn from the Local Growth Fund and the European Structural and Investment Fund. The deals will prioritise spending on new infrastructure and projects to create jobs and build new homes.

6

The European Dimension

Just as the domestic business and policy environment is influential for the development of the UK's tech clusters, it is also important to be conscious of trends at a European level. Over the past fifteen years, Europe has witnessed the rise of tech clusters in many different cities beyond the UK. To give just a few examples, in the Nordics, Stockholm is regarded as leading the way, giving rise to companies such as Spotify (music streaming), and Klarna, an innovative payments company. Helsinki is known for its expertise in mobile gaming, listing successes such as Rovio (creators of *Angry Birds*) and Supercell, the company behind *Clash of Clans* and *Hay Day*. Berlin, meanwhile, is home to SoundCloud, the world's largest online archive of recorded sound and music, and Zalando, one of Europe's largest ecommerce companies.¹⁰¹

These tech clusters are competitors to those in the UK, but also potential collaborators. For example, both London and Stockholm can lay claim to Skype, which provided one of the first major exits for a European tech company when it was acquired by eBay in 2005.¹⁰² The rise of tech clusters across Europe additionally benefits the UK technology sector by creating larger markets into which UK tech companies can sell. Having the most advanced digital economy in the G20, the UK has the most to gain from expanding access to European customers.

There may also be advantages for policy. The UK's tech clusters are affected by European Union regulations and the EU's broader business and trade environment. Where challenges or opportunities arise that affect the whole of the technology sector, the UK may find it has a stronger voice by working together with other countries to advocate policy measures that aid the growth of all Europe's tech clusters. As the UK's Business Taskforce and EU E-commerce Taskforce recently reported, regulatory burdens such as disjointed payment services, rules on labelling, sales promotion, web content and data handling across 28 member states are currently acting as artificial barriers to further trading. It was for these reasons that in its June 2014 *Technology Manifesto*, Policy Exchange called for the government to 'work with EU partners to ensure that the European Digital Single Market evolves in a way that supports UK businesses'.¹⁰³

A salient example of the potential impact of EU legislation on UK businesses and citizens is the draft European General Data Protection Regulation. The objective of the regulation is to give consumers greater rights and control over how businesses use their data, and to harmonise rules across all 28 EU member states. This is important work: providing clear protections for citizens and clear responsibilities for companies is an important step towards increasing consumer

101 Index Ventures, 'The Tech Cluster Phenomenon powering Europe's startup boom', April 2014

102 Ibid

103 Policy Exchange, 'Technology Manifesto', June 2014

confidence in the tech sector, which is ultimately good for business. Yet putting the wrong regulations in place could hinder innovation, make impossible some data-driven business models (particularly those that depend on applying analytics to users' data in order to be able to target advertising or other products), and add to the cost of doing business within the European Union for almost any company that handles customer data.

According to a study from Poland, if the proposed regulations came into force, even for entrepreneurs 'performing operations on personal data on a minimum and socially harmless level' the cost of compliance would be up to nine times as high as it is currently.¹⁰⁴ For a typical SME, it estimated that the outlay would be in the region of £12,600 just for drafting documents, legal services and services provided by the company's data protection officer. That does not include the cost of activities needed for the actual protection of personal data against loss and damage.¹⁰⁵ This risks being especially damaging for the UK, given that e-commerce accounts for a greater percentage of GDP in the UK than in any other G20 country.¹⁰⁶ As well as raising costs for SMEs themselves, it could also threaten the availability of many of the digital platform services provided by larger firms (e.g. cloud-based CRM and accounting packages) on which they rely in order to be able to scale quickly. Measures that slow technology companies' growth will ultimately also have negative consequences on the tech clusters in which they operate.

More broadly, at a time when the UK needs to encourage as much international trade and foreign direct investment as possible to support its tech clusters, the government should be clear about the risks of EU measures becoming increasingly out of sync with practice in the USA and other regions. Global technology firms will be reluctant to set up business operations in the UK or provide funding to innovative UK startups if the cost of legal compliance makes doing business within the European Union more expensive than in other parts of the world. Of course, it is not only international companies that have a choice as to where they locate or make their investments. The same logic applies to UK entrepreneurs who may be motivated to move all or part of their operations to rival tech hubs outside of Europe if costs of innovating there are cheaper.

Policymakers should be under no doubt that what happens in Europe matters for all its tech clusters – including those in the UK. For that reason, they need to be proactive in discussions on regulation and negotiations over vital areas such as the Transatlantic Trade and Investment Partnership (TTIP – a trade agreement that is presently being negotiated between the European Union and the United States) to ensure the right policies are enacted for the UK's tech businesses and clusters.¹⁰⁷

“Global technology firms will be reluctant to set up business operations in the UK or provide funding to innovative UK startups if the cost of legal compliance makes doing business within the European Union more expensive than in other parts of the world”

104 Polish Confederation Lewiatan and Chamber of Digital Economy 'Economic Consequences for SME Of The EU Regulation On The Protection Of Personal Data According To The Project Approved By The Libe Committee'. Cost cited is PLN 66,600

105 Ibid

106 Boston Consulting Group, "The Internet Economy in the G20: The \$4.2 Trillion Opportunity", March 2012

107 See European Commission, <http://ec.europa.eu/trade/policy/in-focus/ttip/about-ttip/>, accessed on 20 Ju8ly 2014

7

Policy Evaluation

This report has established that the technology sector is of current and growing importance to the UK economy (Chapter 1). It has argued that tech clusters can help high-growth technology businesses to thrive (Chapter 2) and outlined their key success criteria (Chapter 3). The report has detailed the lessons that can be learned from three of the UK's most established tech clusters (Chapter 4) and provided an overview of relevant policy measures focused on supporting startups, high-growth companies, investors, the technology sector and regional development (Chapter 5). It has further emphasised the need for policymakers to be actively engaged in developments at a European level (Chapter 6). The report has also demonstrated that tech companies and tech jobs are highly concentrated in London and the South East. What can therefore be said about the effectiveness of current policies in delivering the UK government's objectives for the technology sector?

Promoting business and entrepreneurship

First, it is to be welcomed that the UK has a general business climate that is broadly supportive of commerce, with attractive levels of Corporation Tax and recent increases to the maximum Annual Investment Allowance and Employment Allowance.¹⁰⁸ Business and investment, particularly foreign direct investment, are also encouraged by political and legal stability and predictability, and here too the UK does well. (By contrast, France experienced a fall of 77% in foreign direct investment after the election of François Hollande, in part attributed to his government's anti-business rhetoric and uncertainty about the direction of future policies towards enterprise and taxation.)¹⁰⁹ It must also be remembered that tech clusters are not just composed of technology firms but also supporting service companies from many other sectors, and hence it is important that all businesses can operate in an environment that is conducive to business.

In terms of encouraging tech entrepreneurship, however, there is more – or perhaps less – to be done. One of the most glaring features of the policies outlined in Chapter 5 is the sheer number of them. (According to one official at BIS, there are more than 650 policies currently in place to promote innovation in the UK.)¹¹⁰ Large companies with plenty of financial and legal advisers can carefully select and benefit from them. For entrepreneurs and startups, however, their vast number and complexity are likely to be bewildering. Though many of the policies may be beneficial, government could help increase their effectiveness by consolidating them into fewer and simpler schemes, and culling those shown not to be effective.

108 The government has already scrapped or simplified 800 business regulations and has committed to further reform of 2,200 more following the 'Red Tape Challenge' consultation. The reforms are expected to save businesses over £850m per annum (Ret Tape Challenge, Cabinet Office)

109 Wall Street Journal, 'Foreign Investment in France Falls 77%', January 2014

110 Interview conducted for this report in June 2014.

A second point for entrepreneurs is that policies such as Entrepreneurs' Relief only help founders *after* their business has been successful. Arguably even more important is to support potential founders in taking the leap to start their own business in the first place. During interviews for this report, the main barrier to launching a company cited by many people was giving up a reliable salary. It is therefore not surprising that many founders continue to work in their main job while starting a company on the side. According to the ONS, in the period January to March 2014, 451,963 people in employment had a second job defined as 'self-employed'. While not all of these will be entrepreneurs, the figure suggests that there is a substantial number of people working on their own ventures while relying on funds from other employment. For many this is the only way to bridge the gap until they secure investment – a process that can take three to six months even in the best case scenario, and often much longer. Policymakers should be looking at ways to ease the financial transition for entrepreneurs to ensure that they can spend as much time as possible on their venture (as opposed to unrelated work); invest in their own business; and do not have to give up on a business idea too soon due to lack of personal funds.

Skills and talent

Visas

For its tech clusters to thrive in the face of global competition, the UK needs to attract, develop and retain the most talented scientists, engineers, designers and coders. Yet it is clear that the country faces a chronic shortage of workers with these skills; one million technology jobs need to be filled by 2020.¹¹¹ Initiatives such as the Information Economy Council leading a partnership to get 100,000 more young people pursuing technology careers by 2018 are certainly steps in the right direction, but do not go far enough.¹¹² The introduction of Computing into the school curriculum from September 2014 is likely to be of enormous benefit to the UK in the long term. But the need is now.

In the near-term, in addition to increasing the number of technology apprenticeships and levels of adult training, the only practical way to get sufficient technologically skilled individuals into the workforce is to recruit from overseas. Yet recent changes to the UK's visa regulations have effectively shut the door to many of the best and brightest from around the world, and even to international students who have studied in the UK. As a result, between 2010/11 and 2012/13, the number of (non-EU) international students entering STEM subjects at UK universities fell by 8% for undergraduates and 20% for taught postgraduates. For Computer Science, both undergraduate and taught postgraduate entrants experienced a decline of 38%.¹¹³ The problem covers all technology sectors; Motorsport Valley struggles to meet its need for highly-skilled engineers.

Individuals with advanced technology skills are in demand around the world. If they cannot work in the UK, they will take their talents and businesses to countries with more welcoming policies, such as the USA, Canada or Australia.¹¹⁴ One of the most compelling lessons from Silicon Valley is that immigration is good for business: in 2013 the proportion of its startups founded by immigrants was 44% (and before 2005 was as high as 52%).¹¹⁵ Finding a way to reform visas will be a top priority for the next government.

111 Baroness Lane Fox of Soho, Speech to the House of Lords, '25th Anniversary of the World Wide Web', January 2014

112 Technically Compatible, 'The UK Tech Industry – State of Play 2014', May 2014

113 Higher Education Funding Council for England, Written Evidence to the House of Lords Science and Technology Select Committee on International STEM students, March 2014, p.177–181

114 Coventry University, 'Written Evidence to House of Lords Select Committee on International STEM Students', March 2014

115 Inc. 'Why Entrepreneurship needs immigrants', October 2012, referring to Kauffman Foundation report.

Even within existing visa regulations there is scope to help more employers hire skilled migrants. Despite having an annual cap of 20,700, the Home Office granted just 11,790 Tier 2 General visas in 2013.¹¹⁶ It has been suggested that SMEs are deterred from applying due to the cost and complexity of the process. Technology companies seeking to hire a skilled migrant under this route have to undertake a lengthy application process, including obtaining a ‘sponsor licence’ (which the Home Office aims to process within eight weeks), as well as obtaining a ‘certificate

“For the technology sector specifically, where first-mover advantage is paramount, markets and competition evolve quickly, and funding is often dependent on the pace of growth, being unable to recruit the right staff quickly can be highly damaging for businesses”

of sponsorship’ for the desired migrant worker, which typically requires that the position has been advertised in the UK for 28 days.¹¹⁷ (See Appendix for full overview of this process).

For the technology sector specifically, where first-mover advantage is paramount, markets and competition evolve quickly, and funding is often dependent on the pace of growth, being unable to recruit the right staff quickly

can be highly damaging for businesses.¹¹⁸ One means to resolve this would be to enable startups and SMEs to use the sponsor licence of a venture capital firm or accelerator that had supported their business. These organisations typically have a detailed understanding of the businesses that they fund or mentor, having undergone thorough due diligence checks. As such, they would be well-placed to know each business’s personnel needs, and would be keen to support them in scaling.

A further issue is the minimum salary levels required for Tier 2 migrants. Annual salaries must be above £20,500, or the minimum appropriate rate for the sector, which for jobs in technology includes £22,800 for programmers and software development professionals; and £22,500 for IT business analysts, architects and system designers.¹¹⁹ This is problematic since many tech startups can afford only low starting salaries, or pay their staff in part with stock options.¹²⁰ Moreover, the salary cap fails to reflect the wide regional disparities in rates of pay – especially challenging for tech clusters outside of London and the South East where wages can be up to 30% typically lower.¹²¹

Graduate retention

On a regional basis, an additional skills problem for some tech clusters is that there is a net flow of young graduates out of the area, hindering the development of the local skills base they need. While the North East and North West lose 37% and 36% of their STEM graduates from major universities respectively, as many as 55% leave Yorkshire and the Humber.¹²² As such, clusters in Newcastle, Sunderland, Manchester and Salford are retaining a greater proportion of skilled graduates than those in Sheffield and Leeds. In all three regions, graduates from the highest-ranked universities leave in the greatest numbers. In 2013, in the year following their graduation, 61% of employed graduates from the University of Newcastle, 52% from the University of Manchester, 70% from University of Sheffield and 64% from the University of Leeds were working outside the region in which they studied. Universities have a role to play in helping to retain more of their skilled talent in their region.

116 Home Office, ‘Tables for ‘Immigration Statistics, January to March 2014’ Volume 1 & 2

117 Although the job advert can run in advance or concurrently to the sponsor licence application

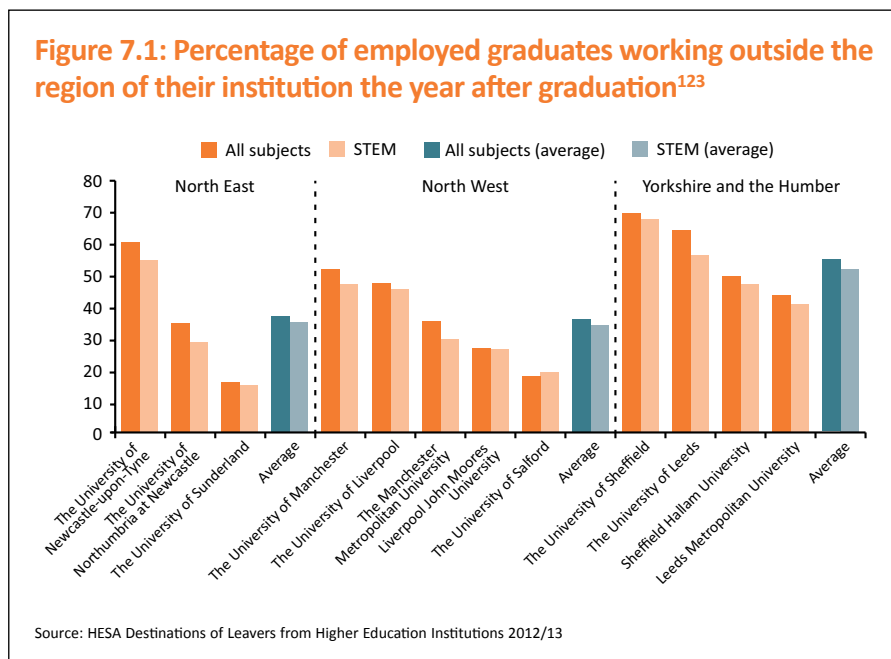
118 For example raising equity investment through the High Growth Segment requires companies to have 20% revenue growth over three years

119 UK Visas and Immigration, ‘Codes of Practice for Skilled Workers’, April 2014

120 The salary threshold is linked to wage inflation, as recorded by the Average Weekly Earnings Index. 25% of London startups offer stock/share options to new graduate employees. (Adzuna, ‘Tech Jobs Trends, October 2013)

121 Office for Nation Statistics, ‘Statistical bulletin: Annual Survey of Hours and Earnings, 2013 Provisional Results’, 2013

122 HESA, ‘Destinations of Leavers from Higher Education Institutions 2012/13’



Community collaboration and local leadership

During visits for this report to the UK's emerging and established tech clusters, it was noticeable that the most successful had the best community networks and strong, local, private sector leadership supported by local politicians. Those living and working within a cluster are, after all, best placed to understand their area's specific strengths and needs. Government has provided a forum for such public/private sector collaboration and local private sector leadership through the establishment of Local Enterprise Partnerships (LEPs), which replaced the nine Regional Development Agencies (RDAs). LEPs bring together local councils with business leaders with a brief to work on economic growth, and are chaired by a representative from the local business community.

While they aid communication between business leaders and local politicians, when it comes to regional economic development, LEPs have not been without criticism. Lord Adonis, for example, notes that only '17 of the 39 LEPs have a "strong case" to represent a functional economic area', which reflects where people tend to live and work.¹²⁴ He adds that there are as many as 37 local authorities that are covered by more than one LEP, creating a mismatch between the geography over which LEPs have responsibility and the business communities on the ground.

Focusing on the specific needs of clusters, Lord Adonis recommends that LEPs should be required to include representation from universities within their area. This seems prudent given that universities play such a vital role in most tech clusters' development. Where this report would differ is in his suggestion that LEPs 'in partnership with local authorities... should... be empowered with larger devolved budgets to promote better skills, infrastructure and economic development, in return for credible growth plans' and that 'Combined Authorities' are needed to look after region-wide development.¹²⁵ Although it would certainly be advantageous for cities to have far greater devolved powers to look after their

123 HESA 'Destinations of Leavers from Higher Education Institutions 2012/13'

124 Lord Adonis, 'Mending the Fractured Economy', July 2014

125 Ibid

own local planning, transport and development needs, from the point of view of tech clusters, those competencies would be more effective if held by a single elected politician – a directly elected mayor.

Why? First, though LEPs may be valuable in encouraging collaboration between the private and public sectors, they remain anonymous to much of the general public, and indeed to the wider business community. With greater local political power should come clear responsibility, visibility, accountability and a democratic mandate from the local community, and that would most effectively be served by a single figure with a city-wide remit (LEPs are, after all, not elected). Second, having a mayor would provide a directly accountable individual with which the private sector could communicate – a significant advantage over the need to deal with members of multiple local authorities and LEPs. (One of the clearest lessons from London Tech City is that having clear, easy and frequent communication channels with policymakers is extremely important.) Thirdly, and given the importance of clusters being able to create a strong brand that highlights their strengths, an elected mayor would have the potential to become an ambassador for a cluster in a way that a committee simply could not.

Access to finance

If policymakers wish to increase the number of private sector jobs in the technology sector, Chapter 2 argued that their priority should be to support high-growth firms. To scale fast, businesses need access to finance. On a national level, the UK has some of the strongest tax incentives in Europe for institutional and individual investors. The Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS) have both proven to be highly effective at stimulating investment in early stage businesses. More than 20,000 companies have raised a total of £10 billion of risk capital through the EIS scheme since its inception in 1994.¹²⁶ As of June 2014, SEIS had helped more than 2,000 companies to raise funds totalling in excess of £175 million.¹²⁷ The British Venture Capital Association reports that in 2012, £681 million was invested in UK technology companies – more than any other industry sector. The UK also does well in terms of Foreign Direct Investment (FDI), with around a third of all software FDI in Europe coming to the UK.

While the national picture is very promising, there is a regional challenge. A study by the UK Business Angel Association found that businesses in London and the South East attracted 54% of angel funding in 2012/13.¹²⁸ At a venture capital level, the two regions also dominated, receiving £3.34 billion, 58% of total UK investment.¹²⁹ In 2012, the total share of annual EIS investment attributed to London and the South East was 74% (57% and 17% respectively).¹³⁰ Consequently, many tech clusters still depend on companies travelling to London to pitch for funding, recognising that too few angels or international investors venture beyond the capital. (This is exacerbated by poor transport links between England's northern cities – a point expanded upon below.)

At the same time, there is a risk of government overreacting to correct a perceived 'funding gap' that may not reflect the real issue. As one prominent figure in Newcastle asked rhetorically: 'Name me a company that has a great

126 HM Revenue and Customs, 'Enterprise Investment Scheme Statistics Tables 8.1–8.5', December 2013

127 HM Treasury, 'Exchequer secretary visits Cambridge to meet local entrepreneurs', June 2014

128 UK Business Angels Association/Deloitte, 'Taking the Pulse of the Angel Market'

129 BVCA, 'BVCA Private Equity and Venture Capital Report on Investment Activity 2012', May 2013

130 HM Revenue and Customs, 'Enterprise Investment Scheme Statistics Tables 8.1–8.5', December 2013

team, a great product and a great business plan that has not received funding.’ The answer is therefore not for government to help provide more venture capital money in the regions – Chapter 3 highlighted that investors will follow investment opportunities of their own accord. The challenge is that it is currently hard for domestic and international investors to see the size and shape of the UK’s clusters – and the investment opportunities they offer. Government should use its resources to make the UK’s tech cluster activity, shape and scale much more transparent to the investor community, and highlight the specific strengths of regions beyond London and the South East.

Table 7.1: Investment by region (UK)

Region	Number of companies			% of companies			Amount invested (£m)			% of amount invested		
	2012	2011	2010	2012	2011	2010	2012	2011	2010	2012	2011	2010
London	191	208	212	23	26	26	2,062	2,901	3,469	36	44	42
South East	115	119	125	14	15	15	1,281	1,138	1,160	22	17	14
South East and London	306	327	337	37	41	41	3,343	4,039	4,629	58	62	56
South West	49	49	46	6	6	6	172	209	739	3	3	9
East of England	39	34	47	5	4	6	424	127	78	7	2	1
West Midlands	77	70	72	9	9	9	332	496	910	6	8	11
East Midlands	32	41	37	4	5	4	163	203	76	3	3	1
Yorkshire and the Humber	39	39	50	5	5	6	131	252	479	2	4	6
North West	66	61	66	8	8	8	535	692	607	9	11	7
North East	82	74	46	10	9	6	410	112	346	7	2	4
Scotland	67	45	61	8	6	7	159	334	171	3	5	2
Wales	37	50	41	5	6	5	87	58	39	2	1	–
Northern Ireland	26	13	20	3	2	2	9	21	163	–	–	2
Total	820	803	823	100	100	100	5,767	6,544	8,237	100	100	100

1. – indicates a value greater than 0 but less than 0.5

Source: BVCA, ‘Private Equity and Venture Capital Report on Investment Activity 2012’, May 2013

Research and knowledge transfer

Universities

Universities play a vital part in most tech cluster ecosystems, providing a pool of talent, ideas, research, and the increasingly important international links on which clusters depend. They are often also a major factor in a region’s specific comparative advantage – for example, the University of Manchester’s strength in materials science. Recent reviews by Hermann Hauser and Sir Andrew Witty have highlighted that despite these inherent strengths, the UK still lags behind other countries in terms of commercialising its research.¹³¹ Given that UK research is published and accessible around the world, the reality is that if the UK does not create businesses from its own ideas, other countries will – and they will reap the economic dividend. It is therefore troubling that the combined revenue of all

¹³¹ See Sir Andrew Witty, ‘Encouraging a British Invention Revolution: Sir Andrew Witty’s Review of Universities and Growth’, October 2013; and Hermann Hauser, ‘The Current and Future Role of Technology and Innovation Centres in the UK’, 2010

UK Higher Education Organisations from intellectual property in 2013 was just £55million. As much as 17% of that was by the University of Cambridge alone¹³² Policymakers need to carefully consider how universities – and the potential entrepreneurs within and outside their communities – can be incentivised to make greater commercial use of their ideas, and reward those that do.

This report would recommend that the UK government encourages higher education institutions to provide statistics showing how many of their recent graduates have gone on to entrepreneurial activities, and detail the courses they studied. On the subject of intellectual property, it is noteworthy that the University of Cambridge has a more relaxed approach to IP ownership than many other UK universities, allowing students to retain IP on ideas developed while at the university. (There are, of course, certain caveats, for example that research is not connected to work sponsored by an external organisation). Though no single approach to intellectual property will be right for every institution, other universities might wish to consider whether a similar model might aid them in encouraging entrepreneurial activity among their own students, increasing commercialisation of their research, and also creating links with alumni that incentivise them to stay in the area.

Table 7.2: Top 10 UK institutions based on Income from Intellectual Property Rights (2012/13)

Institution	Income from IPRs (£ thousands)	Percentage of total UK
The Institute of Cancer Research	11,150	20.1
The University of Cambridge	9,366	16.9
University College London	6,166	11.1
The University of Oxford	4,077	7.3
The Open University	3,795	6.8
The University of Edinburgh	1,904	3.4
Loughborough University	1,815	3.3
Oxford Brookes University	1,775	3.2
Cardiff University	1,541	2.8
Aston University	1,374	2.5
Total Northern Ireland	1,067	1.9
Total Wales	1,749	3.2
Total Scotland	4,701	8.5
Total England	47,978	86.5
Total UK	55,495	100.0

Source: HESA HE Business and Community Interaction Survey 2012/13

132 HESA 'HE Business and Community Interaction Survey 2012/13'

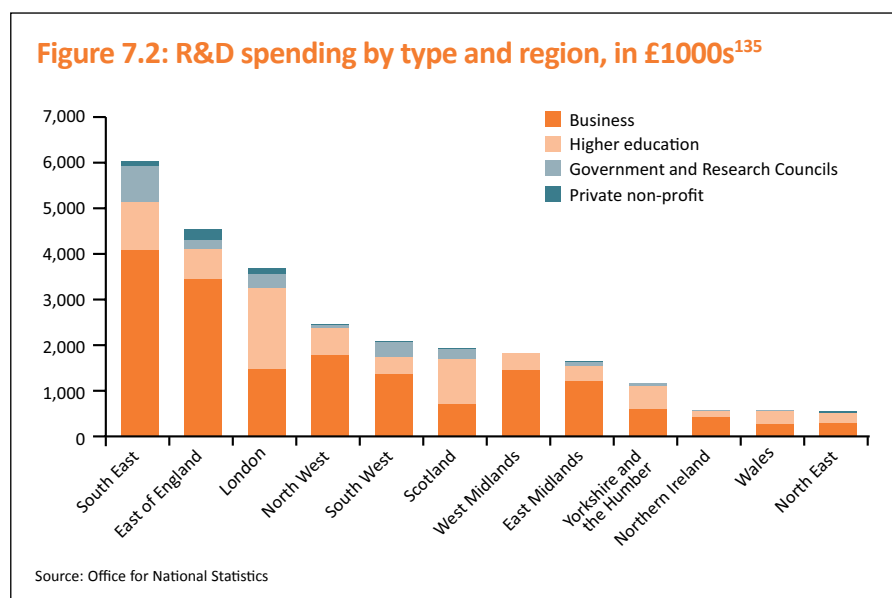
133 BIS, 'Insights from international benchmarking of the UK science and innovation system', January 2014

Research and development spending

In the wider context of research and development (R&D) spending, the UK is behind its competitors in terms of the level of spending as a percentage of GDP.¹³³ The UK's total investment in R&D has been relatively static at around 1.8% of

GDP since the early 1990s and was worth £27billion in 2011. In contrast, the US alone spends £250billion (2.8% of GDP) on R&D per annum. China increased its R&D by 28% in 2009 and 15% in 2010, to roughly £125billion (1.8% of GDP), and South Korea doubled its expenditure between 2003 and 2011 to around £35billion (4.0% of GDP). France and Germany have consistently invested substantially more than 2% of their GDP in R&D, with aspirations to increase this to 3% or more.

Though nationally the UK may lag behind some of its international competitors, when looked at on a regional basis there is a different story. The South East and East of England accounted for 39% of total UK R&D expenditure (£10.6billion) in 2012.¹³⁴ The level of R&D spending in the South East is equivalent to 3% of the region’s GVA; 3.9% in the East of England (which includes Cambridgeshire); but just 1.3% in the North East; 1.9% in the North West; and 1.6% in Yorkshire and Humber. It is therefore clear that the South is receiving the lion’s share of research and development spending. As they consider how public R&D funds are allocated, policymakers may wish to consider whether a more balanced distribution could help tech cluster growth other regions.



Infrastructure

Chapters 2 and 3 outlined how tech clusters depend on easy interaction between groups such as customers, suppliers, workers, advisers and investors. In many cases, people from those groups may need to travel from outside the cluster. Sound transport infrastructure therefore matters for the free flow of people both within and between clusters. As a report by the RSA City Growth Commission recently put it: ‘Effective infrastructure enables agglomeration effects by increasing the density of economic activity, creating positive multiplier effects that increase the value of other types of investment’.¹³⁶ They add that:

‘The UK has chronically underinvested in infrastructure, trailing that of other leading global economies. The impact of underinvestment is considerable; it is estimated that the UK experienced an average of five percent lower growth each year between 2000 and 2010 as a result.’

134 ONS, ‘Statistical Bulletin: UK Gross Domestic Expenditure on Research and Development, 2012’, March 2014

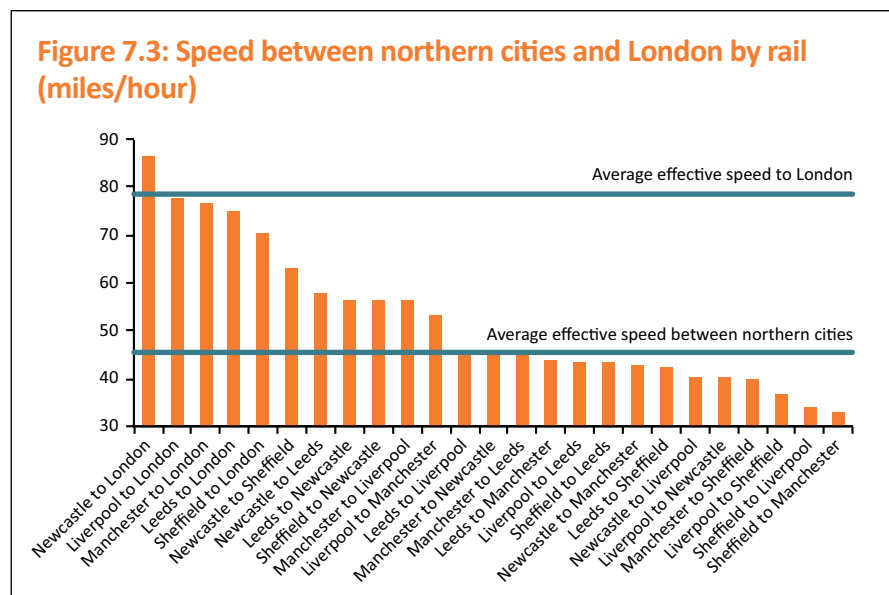
135 ONS, ‘Statistical Bulletin: UK Gross Domestic Expenditure on Research and Development, 2012’, March 2014

136 RSA City Growth Commission, ‘Connected Cities: The Link To Growth’, July 2014

During interviews for this report, a frequently cited example of this problem was the slow speeds of travel between cities in northern England compared with those getting to London. Slow journeys were blamed for making it harder for people to move between clusters to access and share work, ideas and opportunities. In particular, foreign and London based investors were said to be deterred from visiting and investing in the North due the difficulty of travelling between northern clusters. For tech clusters that individually lack the critical mass of businesses, skills and investment needed to thrive alone, transport becomes especially important.

An analysis of the speed of rail transport links between northern cities compared with travel to London reveals that the reported problems are not merely anecdotal. The average effective speed of journeys from Manchester, Newcastle, Liverpool, Leeds and Sheffield to London is 77.6mph (the fastest being Newcastle to London at 86.5mph), compared with an average effective speed between those northern cities of just 46mph, the slowest being between Sheffield and Manchester at 33mph.¹³⁷

Figure 7.3: Speed between northern cities and London by rail (miles/hour)



The situation by road is not much better. As the Chancellor of the Exchequer observed: ‘Manchester and Sheffield are just 38 miles apart – yet it takes over one hour 20 minutes to travel by car. In that time you can get from Southampton to Oxford, which is twice the distance.’¹³⁸ As the next chapter will argue, policymakers looking to help capitalise on northern clusters’ collective strengths should look seriously at how to develop faster transport links between northern cities.

Brand

Looking at the experience of London’s Tech City, arguably the most helpful thing government has done is to promote the area, both domestically and abroad. This kind of promotion is arguably even more important for the UK’s other clusters, which lack the capital’s existing international recognition. Consumers and investors have a choice of regions around the world, and so UK clusters need to

¹³⁷ Effective speed calculated as the direct distance between each city (as the crow flies) divided by the time taken by the fastest direct train available between 8am and 9am on Thursday 17 July 2014.

¹³⁸ HM Treasury, ‘Chancellor: ‘We need a Northern powerhouse’, June 2014

stand out against international competition. To date, government has not matched its work promoting London with efforts to endorse other regions. One recent positive step to remedy this has been the expansion of Tech City UK's remit to focus on developing clusters around the UK, but two policy challenges remain.

The first is that there is currently very poor visibility about the state of the UK's clusters. Different studies use competing definitions of technology which result in the size of some clusters being underplayed – a case in point being the map produced by Tech Britain that suggests the Cambridge cluster is home to just 25 startups and 60 companies.¹³⁹ Conversely, promotional activity by individual cities frequently inflates their size and importance. Without more accurate records, data-driven policymaking and effective promotion of the UK's regional technology capabilities will be hindered.

The second challenge is for an international audience. UKTI cannot create an internationally-competitive brand and narrative around every cluster in the UK. Even selecting just the strongest will rarely be viable when each has to compete against established giants in Silicon Valley, New York, London, Paris and Berlin. Instead, and particularly for northern clusters, policymakers would be better advised to promote the strengths of the whole region – a cluster of clusters that together have attributes that can rival the world's leading centres of technology.

Hubs and regional economic development

Finally, in terms of government's attempts to promote regional economic development and to encourage companies to move to cities and clusters outside of London and the South East, many current initiatives seem unlikely to help tech clusters. In particular, Enterprise Zones and the Regional Growth Fund (which aim to subsidise the cost of doing business in specific areas) have had questionable effect. According to the National Audit Office, as of December 2013, just £492million of the £2.6billion funding allocated to the Regional Growth Fund (RGF) had been delivered to winning projects, with a further £425million held by programme intermediaries. While the RGF is thought to have created or safeguarded 44,400 jobs to date, nearly half of these jobs have been created by just five projects, with the other half being created across the remaining 291 projects. Moreover, the NAO report found that later rounds of funding under the RGF have become increasingly expensive in terms of the cost of each net job created. The first round of funding in 2010 achieved an average cost £30,400 per job, with the comparable figure for the latest round of funding in 2013 at £52,300.¹⁴⁰ In terms of regional allocation of funding, 49% of the total funding awarded through the RGF over the course of the first four rounds went to projects based in the North East, North West or Yorkshire and The Humber.¹⁴¹

Like Enterprise Zones, the RGF misses an important point: cost is not the issue preventing companies from establishing themselves in other regions. This is especially true when looking at the development of England's northern cities. The cost of doing business in a city such as Newcastle is already significantly less compared with London or the South East, with salary levels up to 30% lower¹⁴² and office space up to 50% cheaper. For technology startups having to watch every penny (and indeed for businesses of all sizes) there is a major advantage in being able to make money go further. This is attractive for investors too, who will be keen to see their investment used to grow a business rather than simply to cover its running costs

139 Tech Britain, <http://techbritain.com/clusters/cambridge>, accessed on 14 July 2014

140 National Audit Office, 'Progress report on the Regional Growth Fund', February 2014

141 House of Commons Library Standard Note, 'Regional Growth Fund', 5.02.2014, Policy Exchange analysis

142 ONS, 'Patterns of Pay: Estimates from the Annual Survey of Hours and Earnings, UK, 1997 to 2013', February 2014

(a point worth emphasising for policymakers concerned with nurturing high-growth companies). The cost of living is likewise much less in northern England, making it attractive to workers who can purchase a three bedroom house at the same price as a studio flat in London.¹⁴³ In short, policymakers must ensure they solve the right problem – and it is not cost.

Conclusions

This chapter has highlighted that the UK is getting much of the national policy framework right – especially in terms of incentives for businesses and investors. However, the vast array of policies that affect tech clusters and the businesses within them should be consolidated and simplified to make their benefits accessible to startups and SMEs. More could also be done to ease the financial transition of new entrepreneurs so that they can invest more of their time and money in their businesses. Significant reform of visas and better incentives to keep graduates in regional clusters would help, too. The problems are greater at a regional level. It is not just that tech companies are concentrated in the South East, but the factors that contribute to their success – investment, research funding, and fast transport links – are too.

The next chapter outlines the approach government could take to resolve these issues.

143 The Independent, 'Is the success of London's 'silicon roundabout' forcing new startups out of the capital?', May 2013

8

How Can Government Best Support Tech Clusters?

10 general rules for policymakers

This report has explained that tech clusters come in many different shapes and sizes based on their location, origins and composition. It has also shown that their success, like the wider economy, depends on everything from the robustness of transport infrastructure to the soundness of the education system. In addition, tech clusters' ability to be centres of innovation relies on their being largely unplanned: more like rainforests than agriculture.¹⁴⁴ It has further been highlighted that leading tech clusters such as Silicon Valley and Cambridge have taken many decades to thrive – a hard message for governments seeking results within a five-year election cycle. Put simply, for policymakers seeking to nurture the growth of the UK's tech clusters, there is no magic bullet for success. For all these reasons, in addition to the specific policy recommendations made in the next chapter, there are ten broad insights that policymakers should keep in mind:

1. **Government cannot create clusters but it can support (or destroy) what's there.** With few exceptions, studies from around the world concur that governments cannot wish clusters into existence. Government must work to support existing clusters where they emerge. It is also not realistic to expect that every city can develop its own tech cluster – even the USA (with a population five times that of the UK's) has just a handful. The government needs to have a clear understanding of what constitutes a cluster (as per Chapter 2) and focus efforts on supporting regions that genuinely demonstrate the characteristics highlighted.
2. **National and EU-level pro-business, pro-entrepreneurship, pro-investment, pro-innovation policies are vital for local success.** The most effective way to help clusters emerge naturally is to have a national and international policy framework that gives businesses the best chance of success wherever they are located. This can include general policies towards business, taxation and investment; and specific regulation – such as on data protection – that gives particular sectors the ability to thrive.
3. **Build on mountains, don't fill holes.** The UK cannot and should not try to compete commercially in every field of technology. Government support using public funds should be targeted on sectors where the UK has particular

144 Horowitz and Hwang, 'The Rainforest: The Secret to Building the Next Silicon Valley', Feb 2013

natural strengths and expertise (and therefore competitive advantage), and on markets that have the potential to be worth billions of pounds. On a regional level, it is likewise necessary to identify and play to each area's natural strengths. Policymakers must avoid the temptation to compare every cluster to Silicon Valley: doing so makes it more likely that they will fail to recognise the potentially very different advantages offered by each region.

4. **The real competition for the UK's clusters is international, not domestic.** There is much debate about whether London's economic dominance has a detrimental effect on other UK cities and clusters. Yet in the technology sector, markets, customers and supply chains are truly global, and the UK's clusters must compete with regions in many other countries. At times that may require domestic cooperation as well as competition.
5. **Don't diminish London.** While the UK should celebrate the diversity and strengths of its regions and seek to develop tech clusters all around the UK, government should not shy away from the fact that London is an extremely powerful global brand. In promoting the regions to foreign investors, government should not play down the strength of the capital, but rather use it as a stepping stone to attract interest in the UK's wider technology industry.
6. **The private sector must lead.** The private sector has to want a cluster to succeed before government intervention can help. If government moves too early, it can create dependencies on public sector finance that hinder the financial discipline necessary to sustain a successful business community. As Nesta has put it: 'early private sector involvement is important to secure market oriented strategies in... clusters.'¹⁴⁵
7. **Communities matter.** Clusters work – and become more than the sum of their parts – when they break down silos of knowledge, capital and skills. Government can use its power to convene or create incentives to help bring together groups such as entrepreneurs, businesspeople, academics and investors to provide easy access to those three things.
8. **Technology is best transferred when people are transferred.** When considering how best to commercialise university research, many of those interviewed as part of this research argued that knowledge is best transferred when people are transferred between academic and business organisations. Government should therefore actively seek ways to enhance integration of personnel between universities, research organisations and the commercial sector.
9. **Universities should play a central role in the development of clusters.** Universities are often vital to the success of clusters, and could play a greater role in future. They not only provide ideas (research) and talent (graduates and staff), but also typically have the strong national, international and business links that are central to a modern cluster's success. Universities should be given incentives to commercialise their research and proactively seek greater collaboration with businesses.

¹⁴⁵ Nesta, 'The effect of cluster policy on innovation', March 2012

10. Communication is everything. As clusters pass through different stages of development, their relative competitive strengths, needs and challenges evolve. It is vital that government has mechanisms in place to maintain a strong dialogue with key stakeholders from business, investor and research organisations in each cluster in order to be able to assist them effectively.

Helping northern clusters realise their full potential

The principles above outline how government can help nurture the growth of all tech clusters, whatever their stage of development and wherever they may occur. However, a key aim of this report has been to understand how tech clusters can help fulfil the government's aim of boosting economic growth in England's northern cities. It has been shown repeatedly that the economic dominance of London and the South East is even more pronounced in the technology sector. Not only that, but the key ingredients on which clusters depend, namely finance, research activity and skills, are also biased towards the south. Yet cities including Manchester, Newcastle, Sunderland, Leeds and Sheffield all have strong ambitions to become tech centres of the North. Are their aspirations realistic? If so, what approach can government take to help them succeed?

Roles for local and central government

Local government

There is a need to differentiate between how government can help at local and national levels. Start with the local level. Tech clusters do not want handouts. Government does not need to subsidise the cost of doing business in the North – it is already significantly cheaper than London. What technology businesses do want is local political leadership with the power and accountability to be responsive to their needs. And every region's strengths, challenges, goals and needs are different. Some need to invest more in transport within their city. Others need to focus on soft spending on areas such as networking between business, entrepreneur and service communities. Others still may need new research facilities or faster broadband. The role of local government should be to help address those needs and challenges quickly and effectively.

For all these reasons, policymakers should consider again the case for introducing directly elected mayors who could act according to local priorities. Having a single person accountable at the head of a city region would help make local government more transparent to the local business community. Mayors – working together with LEPs – should have a clear requirement to focus on the economic development of their areas. This kind of independence would give the UK's clusters the ability to compete on their own terms, maximise their strengths and address local issues in a way that a one-size-fits-all policy from central government never could.

“Policymakers should consider again the case for introducing directly elected mayors who could act according to local priorities”

Central government

As elected mayors deal with the specific needs of their cities and act as ambassadors to a domestic audience, central government should focus on addressing the needs and promoting the strengths of the wider region internationally. As tech clusters aim to compete with leading centres of technology around the globe, the major challenge for the North is its fragmentation – both in terms of resources and branding.

For resources, it was shown in Chapter 3 that, to be effective, the inputs vital to clusters' success are based on their ability to gain a *critical mass of skills, investment and businesses*. While in the short term individual northern clusters may struggle to gain critical mass in all the required areas, collectively they have the right ingredients in abundance. The 2011 census found that the average commute of someone who travels into London to work is 40 miles. Drawing a similar radius around Manchester takes in 'Sheffield and Liverpool, Lancashire, Cheshire and Yorkshire, and contains ten million people – more than Tokyo, New York or London'; an area including nearly two million graduates.¹⁴⁶ The experience of the Midland's Formula 1 cluster demonstrates that valuable collaboration and competition can take place over a larger geographical space, provided that there is regular opportunity for interaction. What policymakers may therefore be aiming for is a *cluster of clusters*.

Holding northern clusters back from sharing their immense pool of resources, people and ideas (as highlighted in Chapter 4) are the poor transport links that connect them. The government has indicated an interest in building a high speed rail link between Manchester and Leeds – an 'HS3'. That idea should be considered carefully, but policymakers must also be aware that travel between other cities including Newcastle, Liverpool and Sheffield is also very slow, suggesting that attention needs to be given to the wider transport needs of the North.

On the subject of brand power, clusters all around the world are trying to attract investors, skilled workers, technology entrepreneurs and their businesses. Foreign direct investment will also be vitally important for the success of the UK technology economy. In short, government – mainly through UKTI – has a major role to play in promoting the UK's technology capabilities internationally. Within the next five years, it is unlikely that a globally-competitive brand and narrative can be created for each individual tech cluster. However, for all the reasons of collective power described above, a compelling message could be created around a 'northern powerhouse' whose combined technology capabilities would be among the most impressive in the world. An example of this idea in action is the work of the Northern Health Science Alliance, which helps coordinate activity between eight northern cities that have strengths in medical sciences and promotes the North as an internationally recognised supra-regional life science and healthcare system.¹⁴⁷

To be clear, this is not to imply that northern cities or tech clusters are homogenous – *clearly they are not*. We have seen that Newcastle, Sunderland, Manchester, Salford, Leeds and Sheffield all have strengths in software and digital media but also have their own distinct specialisms. The case study of the Cambridge cluster, which features the very different sectors of telecoms hardware, chip design and biotechnology, highlights that there can be strength in diversity. To an international audience, a northern region offering different specialisms but collaboration where required, with a single entry point via UKTI, could be very attractive and benefit all northern tech clusters.

¹⁴⁶ HM Treasury, 'Chancellor: 'We need a Northern powerhouse'', June 2014

¹⁴⁷ The NHSA, <http://www.thenhsa.co.uk/> accessed on 13 July 2014

9

Policy Recommendations

The evidence outlined in this report shows that promoting the growth of tech clusters outside London and the South East requires government action at three levels: **international, national and local**. Chapter 6 highlighted that the UK's technology companies are deeply affected by regulations and trade agreements made by the European Union. Given the importance of the technology sector to the UK economy (highlighted in Chapter 1), the UK has much to gain from having the right measures in place at a European level, and much to lose in terms investment, exports and business scalability from the wrong ones. The UK government must therefore be proactive in advocating conditions that enable tech clusters based within the EU to thrive in the global economy.

On a national level, the report has made clear the importance of having policies that give tech entrepreneurs, tech businesses and tech clusters the best chance of success *wherever* they may emerge. That means ensuring the UK has a business climate that is competitive in the face of international competition, and friendly to entrepreneurship and investment.

On a local level, tech clusters must be led by the private sector, but need the right infrastructure and responsive political leadership to address local obstacles and promote local strengths.

In addition to the general principles for supporting tech clusters outlined in Chapter 8, below are 13 policy measures that government could take to deliver results in each of these three areas during the next parliament.

International

1. **The UK government should take a leading role in negotiations over the future shape of the European Digital Single Market and Trade Agreements to ensure that they enable tech clusters based within the EU to thrive in the global economy.** The EU accounts for half of all UK services exports (70% for SMEs) and is therefore a vital market for online businesses. Government should lobby to remove artificial barriers to trade wherever they exist. With a range of government departments holding a stake in the creation of the Digital Single Market (e.g. HM Treasury over VAT rates, BIS in e-commerce policy, DCMS in broadband rollout), a permanent group should be established to co-ordinate the various departmental efforts across Whitehall and spearhead British interests in Brussels. Increasingly, even the smallest of tech startups are 'micro-nationals': selling to and sourcing from a global market from day one. The UK government should work

with European partners to ensure trade agreements are in place that enable businesses to reach overseas markets as easily as possible.

2. **In response to the draft European General Data Protection Regulation, the UK government should collaborate with the technology industry to develop an effective, ethical framework for companies' use of personal data that protects users and maximises innovation.** If enacted into law in its current form, the European General Data Protection Regulation is likely to be damaging to digital businesses within the UK's tech clusters. The UK should pre-empt proposed top-down regulation by pioneering its own industry-led model, and advocating its adoption to the European Union. With digital media a major sector in many of the UK's tech clusters, the UK has much to lose from poor regulation. By leading on this issue, the UK can encourage foreign direct investment into its digital sector as a safe place for data-led companies within the European Union.

National

Promoting entrepreneurship and encouraging commercialisation of research

3. **Universities should be encouraged to let students retain Intellectual Property of products, services and ideas they create while studying.** Many universities take full ownership of intellectual property from products, services and ideas developed by their students. This may disincentivise entrepreneurially-minded students from developing research ideas into businesses or asking their university for support for their own projects. By offering to let students retain IP, universities could help encourage higher levels of entrepreneurship and greater commercialisation of research. Creating stronger bonds between universities and their former students may also help retain more graduates in the local area, supporting the growth of regional clusters.
4. **Universities should provide statistics showing how many of their recent graduates have gone on to pursue entrepreneurial activities, and detail the courses they studied.** As part of their role in encouraging entrepreneurship, universities should highlight the number of their students who follow an entrepreneurial route after graduation. Giving greater exposure to which universities are the best at nurturing future entrepreneurs will raise the profile of entrepreneurship and aid the best universities in attracting and retaining the most talented graduates.

Fixing skills

The single most important factor for tech clusters' success is having access to a large pool of talent. To survive and thrive, UK tech clusters must be able to compete for talent internationally. Therefore:

5. **Government should work with the technology industry to make the case for greater levels of immigration from highly-skilled migrants working in the technology sector.** The issue of immigration has become highly-charged

in recent years. To prepare the way for visa reform, government should work with industry to articulate to the public the benefits that *highly-skilled* foreign labour can bring to the technology sector and the wider UK economy. This measure will pave the way for the following policy changes to encourage greater immigration into the UK technology industry:

6. **Startups and SMEs backed by approved venture capital firms or accelerators should be allowed to begin employing skilled migrant workers without prior approval as a licensed visa sponsor organisation.** The difficulty of recruiting staff with technology skills is consistently cited as one of the greatest barriers faced by high-growth firms in the technology sector. The current application process to hire skilled migrant workers ignores the immediacy with which innovative technology startups and SMEs need to fill vacancies to grow quickly. (See Appendix)

In cases where a venture capital firm or accelerator has conducted due diligence on an SME in order to provide investment or support, the SME should be able to apply to hire skilled migrant workers without having to undergo the lengthy process of obtaining a visa sponsor licence from the Home Office. Instead, they should be granted certificates of sponsorship against the licence belonging to their venture capital investor or accelerator, on condition that they apply for their own licence within the next month. (The venture capital investor/accelerator would temporarily accept liability as the registered sponsor during this window.) Having conducted significant checks into their investment and growth potential, venture capital firms and accelerators would be well-placed to understand technology companies' recruitment needs, and would be keen to support them in scaling quickly.

7. **The two-year Post-Study Work Visa for students receiving good degrees in STEM subjects should be reinstated.** The scrapping of the visa has been a major factor in the steep decline in the number of (non-EU) international students applying to study STEM subjects at UK universities. Having trained students at its universities, the UK should aim to take full advantage of their skills in the workforce.¹⁴⁸
8. **The cap of 10 endorsements per academic institution should be removed from the Tier 1 Graduate Entrepreneur Visa.**¹⁴⁹ Entrepreneurial talent is unlikely to be evenly distributed between universities, and this policy therefore risks blocking some of the most talented international graduate entrepreneurs from remaining in the UK. It is revealing that the number of Graduate Entrepreneur Visas granted in 2012 was just 45 (out of quota of 1,000), and in 2013 was 115 (out of a quota of 2,000).¹⁵⁰
9. **The salary threshold should be removed from the Tier 2 Visa requirements for skilled migrants securing employment in the technology sector.** Technology startups should be able to take on staff for a two-year probationary period without a requirement to pay a set up-front salary. 35% of UK Computer Science graduates do not receive an annual salary in excess of £20,000 six months after graduation.¹⁵¹ The requirement to pay skilled

148 A 2011 UKCISA survey found that of all the changes to visa rules in 2011, the abolition of the Post Study Work visa was rated as having the most negative impact on their decision to study in the UK. Several bodies submitting written evidence to the House of Lords Science and Technology Committee in 2014 agreed that it was the most significant factor causing the drop in the number of international STEM students (see p.226, University of Leicester and University of Plymouth). A recent IPPR report has found that among Indian students, 51% agreed that the restrictions on their ability to work in the UK after studying would put off 'most' coming to the UK. (IPPR, "Britain wants you! Why the UK should commit to increasing international student numbers", November 2013)

149 UK Border Agency, 'Visas and immigration: Tier 1 (graduate entrepreneur)', 2012

150 Times Higher Education, 'Critics brand figures for post-study replacement 'disappointing'', October 2013

151 Figure from Universities UK in written evidence to the House of Lords Science and Technology Committee, p. 217–218. Though these statistics do not account for non-EU students, we would not expect a significant difference by country of birth.

migrants between £20,500 and £22,800 often prevents technology startups from hiring from abroad, as they can typically afford only low starting salaries, often subsidising low pay with stock options.¹⁵² Moreover, the salary cap fails to reflect the wide regional disparities in rates of pay – especially problematic for tech clusters outside of London and the South East.¹⁵³

Encouraging investment and community collaboration

Tech clusters thrive when entrepreneurs, businesspeople, academics, investors and local political leaders work together. Government can support and incentivise this collaboration.

10. **UKTI should work with clusters and the private sector to create a crowd sourced map of members of the cluster community.** There is currently no open source map that accurately records every startup, accelerator, investment and angel group, business networking forum, university department and political leadership within each cluster. Lacking this clear picture of the UK's tech clusters and the most important communities within them is problematic because a) central and local government cannot accurately identify the type and scale of businesses within each cluster to meet their needs; b) it makes it harder for members of different groups within a cluster to mix; c) it prevents northern clusters from identifying areas of similar scale and strength to seek opportunities for collaboration; d) it stops new businesses from easily identifying which clusters might best suit their needs; e) it hinders UKTI from being able to articulate the strengths of the UK's tech clusters to international companies and investors. Government should work with the private sector to build on initiatives, such as that by Tech Britain, to develop a resource that can meet these needs.

Local

Local leadership and collaboration

11. **Government should consider introducing directly elected city mayors with appropriately devolved powers to lead economic growth in their areas – including the development of tech clusters.** While the private sector should lead the development of a tech cluster, technology businesses want local government that is accountable and responsive to their needs, with clear and simple lines of communication to get things done. Greater local powers over economic development, transport infrastructure and investment would best be held by a directly-elected mayor, who would provide a single point of contact for a city region and be able to advocate the strengths, and respond to the specific needs, of a cluster.

Given the government's objective to boost economic development in England's northern cities, the following specific measures should be implemented:

Infrastructure

12. **Government should invest in rail and road infrastructure to improve the speed of transport connections between northern cities.** Until they can

¹⁵² The salary threshold is linked to wage inflation, as recorded by the Average Weekly Earnings Index. 25% of London startups offer stock/share options to new graduate employees. (Adzuna, 'Tech Jobs Trends, October 2013')

¹⁵³ Office for National Statistics, 'Statistical bulletin: Annual Survey of Hours and Earnings, 2013 Provisional Results', 2013

independently develop the critical mass of skills, investment and businesses they need to become thriving tech clusters, northern cities would benefit from greater cooperation and competition. Holding northern clusters back from sharing their immense pool of resources, people and ideas are the poor transports links that connect them. The government has indicated an interest in building a high speed rail link between Manchester and Leeds. That idea should be considered carefully, but policymakers must be aware that travel between other cities including Newcastle, Liverpool and Sheffield is also very slow by both rail and road, suggesting that attention needs to be given to the wider transport needs of the North. It should also be noted that Manchester International Airport is currently the only northern hub to provide direct transatlantic flights. Better connections between cities would help improve northern clusters' links with the USA.

Brand

13. **Government should work to build a brand that promotes to an international audience the combined strength of the most developed northern clusters.** Looking at the experience of London's Tech City, arguably the most helpful government activity has been to promote the area, both domestically and abroad. This kind of promotion is arguably even more important for clusters outside of London, which lack the capital's existing international recognition. Consumers and investors have a choice of regions around the world, so cities such as Newcastle, Manchester and Leeds need to stand out against international competition. Within the next five years, it is unlikely that a globally-competitive brand and narrative can be created for each individual tech cluster. However, government should work to develop a compelling brand around a 'northern powerhouse' whose combined technology capabilities would be among the most impressive in the world.

Appendix

Sponsor Licence

Before an SME can hire a migrant worker, they have to register their business as an eligible sponsor organisation

Duration	Action required	Detail for Tech SMEs	Where to find this information independently
1 day	1. Apply online for a Sponsor Licence	Apply at: https://www.gov.uk/apply-sponsor-licence	
	2. Choose licence type	For small tech firms looking to hire a skilled migrant in a long-term position, this will be a Tier 2 General licence	Pages 1–43 of the <i>Guidance for Sponsors</i>
	3. Appoint sponsorship managers from existing staff	At least 1 person will need to be the Authorising officer, Key Contact and Level 1 User Appointed staff will be checked to ensure they meet the suitability requirements, including for unspent criminal convictions and any recent UKVI fines.	
	4. Pay for the Sponsor Licence	£536 for small firms Optionally, businesses can sign up for a premium support service costing £8,000 for SMEs	www.gov.uk/uk-visa-sponsorship-employers/apply-for-your-licence www.gov.uk/employer-sponsorship-join-the-premium-customer-service-scheme
1–5 days (steps 5 and 6 must be submitted within 5 working days upon completion of the online application)	5. Post the original submission sheet to Home Office	It must not be a copy, and must be signed and dated by the authorising officer	<i>Guidance for Sponsors</i> , additional 14 page Appendix
	6. Post at least four supporting documents (originals or certified copies) to UKVI, evidencing either:	Employers' liability insurance cover (worth at least £5m) Registration as self-employed or as an employer for PAYE and NICs with HMRC Current or annual audited financial report Company tax return or latest self-assessment tax return to HMRC Certificate of VAT registration Corporate/business banking statement or a letter outlining the dealings with corporate/business banking provider Ownership or lease of business premises	
1–8 weeks (Home Office processes 80% of applications within 8 weeks)	7. Home Office may visit business	Applicants may be visited by a Home Office official to check the validity of their business, to confirm that the job is genuine, and to check their HR practices	<i>Guidance for Sponsors</i>
	8. Wait to hear progress of application from Home Office	If successful, applicants will receive an A-rating Sponsor Licence, which lasts for 4 years (unless a company is found to be in breach of its duties as a sponsor, in which case a Sponsor Licence can be downgraded and eventually revoked)	Pages 44–68 and 135–143 of the <i>Guidance for Sponsors</i>

Certificate of Sponsorship

Once a business is approved as an eligible sponsor, they can assign a Certificate of Sponsorship to a migrant worker of their choosing, indicating their intention to hire them in qualifying employment

Duration	Action required	Detail for Tech SMEs	Where to find this information independently
28 days	9. Fulfil the Resident Labour Market Test (RLMT)	The RLMT ensures that the job cannot be filled domestically. To fulfil this test, the job must be advertised for 28 days in print and/or online through JobCentre Plus and a national newspaper, a professional journal, recruitment agency or a milkround site If the vacancy is on the 'shortage occupation list', businesses do not need to satisfy the RLMT. Tech jobs on the list include; 1) visual effects or computer animation software developers and systems engineers working in the film, television or games sector, 2) driver developers and communications engineers in the electronics system industry	Pages 69–99 of the <i>Guidance for Sponsors</i> 14 page <i>Tier 2 Shortage Occupation List</i> , drawn up by the Migration Advisory Committee
	10. Meet the employment requirements for skill and salary	The job must be skilled to graduate level (though the migrant need not have graduate qualifications) and the salary must exceed £20,500, or the minimum appropriate salary rate, which for jobs in the tech sector includes; 1) £22,800 for programmers and software developers, 2) £22,500 for IT business analysts, architects and system designers	Pages 1–82 of the <i>Codes of Practice for Skilled Workers</i>
1–31 days (Applications for Certificates of Sponsorship received before 6th of each month, are awarded on the 11th of each month)	11. Apply for a Certificate of Sponsorship	Using the Sponsorship Management System (a software application provided by Home Office) businesses can now apply for a Certificate of Sponsorship, detailing the RLMT and job specification. For Tier 2 General workers paid less than £153,500, businesses will need to register for a 'restricted certificate'	Pages 69–99 of the <i>Guidance for Sponsors</i>
	12. Pay for the Certificate of Sponsorship	For Tier 2 workers, each Certificate of Sponsorship costs £184	www.gov.uk/uk-visa-sponsorship-employers/sponsorship-certificates
1 day	13. Assign the Certificate of Sponsorship to a skilled migrant worker	Once the Certificate of Sponsorship has been awarded, it should be passed on to the migrant for use in their Tier 2 General work visa application. It must be used within 3 months	Pages 69–99 of the <i>Guidance for Sponsors</i>
15 days (Most Tier 2 Visas are processed within 15 days)	14. Wait for approval from the Home Office	If the migrant's application is successful, the business can begin to employ the skilled migrant worker. It will be the business's responsibility to monitor that migrant's contact details, attendance and immigration status	www.gov.uk/government/uploads/system/uploads/attachment_data/file/305304/Tier_2_5_Sponsor_Guidance_04-14.pdf



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