THE DIGITAL POWERHOUSE

THE INNOVATION POTENTIAL OF TECH CLUSTERS IN THE NORTH

MAY 2016

#DigitalPowerhouse

PART OF TECH CITY | WE ARE TECH NORTH

RSA Action and Research Centre

IMPACT HUB

How big is the North's digital economy?

£9.9bn GVA

The region's tech businesses produce £9.9bn GVA

5.2% GVA

The digital economy accounts for 5.2% of the region's economic output

Manchester is the UK's largest tech cluster (by employee size) outside of London

Sage UK, based in **Newcastle**, is one of the few tech companies in the FTSE 100

283,500 jobs

The North is home to 283,500 tech workers

18%

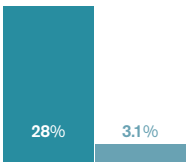
18% of the nation's tech workers are based in the North

82%

1-in-20 of the North's workforce is employed in the digital economy

Why is the North's digital economy significant?

Employment



The North's digital workforce grew by 28% in the last 5 years, compared with 3.1% for the region's non-digital workforce

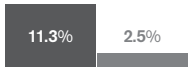
10× faster

The North's digital economy is creating jobs at 10 times the rate of the region's non-digital sectors

363k workers

The North is on course to have 363,000 digital workers by 2020

Productivity



In the last 5 years, the productivity of the digital economy grew by 11.3%. The figure was 2.5% for the non-digital economy

4× faster

Productivity in the North's digital sector is growing 4 times faster than productivity in the North's non-digital sectors

53% more productive

Digital workers in the North are 53% more productive than the region's non-digital workers

Pay

Digital workers in the North are paid on average 60% more than non-digital workers

Median hourly digital wage vs. non-digital wage

What are the North's tech specialisms?

- Connected devices and the Internet of Things
- Digital advertising and marketing
- E-commerce and marketplaces
- Gaming
- Social networking
- Online gambling

What is a fully charged Digital Powerhouse worth?

£5.7bn GVA

Raising tech worker productivity in line with the national average would create an extra £5.7bn in GVA

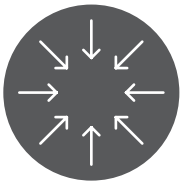
9,700 founders

Increasing the rate of tech self-employment in line with the rest of the UK would result in over 9,700 more tech founders

Analysis by RSA Action and Research Centre, TECH NATION, From TECH CITY, In partnership with Nesta, IMPACT HUB

Recommendations

Introduce Tech Taster vouchers
The introduction of vouchers should be considered as a way of allowing businesses to get a taste of what tech could do for their operations



Establish a Digital Powerhouse Contract Portal
A portal could be created that collates private and public sector contracts in one place, establishing a Northern hub of commercial opportunities

Champion the tech co-operative model
Tech co-operatives should be promoted in the North as a means of helping tech firms band together and achieve economies of scale

Kickstart new corporate-backed accelerators
Northern tech groups, together with Tech North, should consider identifying corporates that may be interested in backing tech startup accelerators

Make the North a testbed for experimental tech
Northern tech clusters should look at ways they could be proving grounds for experimental technologies (e.g. the use of robotics in social care or blockchain technology in the welfare system)

Establish digital immersion events
Public service teams should consider organising events with nearby tech communities in order to share procurement knowledge and better understand local needs and strengths

Move towards 'problem-based' commissioning
Public sector commissioners should consider the benefits of problem-based procurement, which does not define solutions from the outset

Open up data on KPIs and procurement results
Local authorities and public services should consider releasing their data on procurement history and key performance indicators (KPIs), so as to help tech communities understand the opportunities available

Create a 'Procurement Powerhouse' social enterprise
Northern entrepreneurs should consider creating a social enterprise to link public sector buyers with tech businesses in the region, providing a sustainable solution to matchmaking

Encourage the use of open source software
Partners in the North should champion the use of open source software to enable collaborative innovation, opening software markets up to more local competition

Organise a '600 that Share' movement
The region's 600 very large businesses could be encouraged to pledge to do more to support their local tech community

Establish a 'Founder of Founders' award
A Founder of Founders award could be given to business owners who do the most to support their fellow entrepreneurs

Pool the resources of university outreach teams
The outreach teams of Northern universities should consider joining forces to present a single unified offer to local tech businesses

Consider a 'what works' review of tech business support
A 'what works' review could be undertaken to better understand how the region's business support offer might be improved for tech businesses

About the RSA

The RSA (Royal Society for the encouragement of Arts, Manufactures and Commerce) believes that everyone should have the freedom and power to turn their ideas into reality – we call this the Power to Create. Through our ideas, research and 27,000-strong Fellowship, we seek to realise a society where creative power is distributed, where concentrations of power are confronted, and where creative values are nurtured. The RSA Action and Research Centre combines practical experimentation with rigorous research to achieve these goals.

About Tech North

Established in 2015, Tech North is a government-funded initiative delivered through Tech City UK. The specific goal of Tech North is to accelerate the development of the North's digital economy through the promotion and support of digital entrepreneurship. Its remit is to attract talent, entrepreneurs and investment to the North of England, specifically the seven cities of Hull, Leeds, Liverpool, Manchester, Newcastle, Sheffield and Sunderland. Tech North champion initiatives that support the development of the North's digital economy, working with local and central government to inform policies that help accelerate growth.

About Impact Hub

Impact Hub is a global network of centres for social innovation and social entrepreneurship. The first Impact Hub opened in London in 2005 – one of 85 Impact Hubs in cities across six continents. Altogether, the Impact Hub Network has over 13,000 members working at the cutting edge of social innovation, social entrepreneurship and the impact economy. By building a network of spaces and communities – collaborative, inspiring, mixed-used, resource-rich and diverse – we have established a locally-rooted, globally-connected ecosystem perfect for the birth, growth and scaling of impact-driven ideas and businesses.

Contents

The Vision **7**

Private Sector Collaboration **17**

Public Sector Collaboration **28**

Knowledge Exchange **38**

Next Steps **48**

Appendix **50**

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The definitions and part of the data and analysis documented in this report are based on Nesta's seminal work in Tech Nation 2016, undertaken in partnership with Tech City UK. For more information about their study, please contact Juan Mateos-Garcia at juan.mateos-garcia@nesta.org.uk

About Tech City UK

Tech City UK is a government-backed organisation charged with accelerating the growth of the digital economy in London and the UK. We focus on areas like digital skills, smart capital investment, infrastructure, international development and leadership.

Research partners:

GrowthIntel

burningglass CAREERS IN FOCUS

Nesta

Forewords

Ed Vaizey
Digital Economy Minister

James Wharton
Northern Powerhouse Minister

The North of England, long famous for its industrial might and entrepreneurial drive, is now being recognised for its creative clout and innovative thinking. These attributes explain the recent surge in growth in the tech communities across the North, from Newcastle to Manchester, from Liverpool to the Tees Valley.

This Government is determined to rebalance the economy by building a Northern Powerhouse. That is why we have tasked Tech North with unleashing the potential of Northern tech clusters using a £2m annual budget from Government to deliver initiatives such as Northern Stars and Founders Network.

We have also given £11m to local authorities in Manchester, Leeds and Sheffield to support the development of Northern tech businesses. These grants will be used to help nurture start-ups, foster collaboration, and provide mentoring, learning and business support.

But, as The Digital Powerhouse report sets out, there is much more to be done. There are huge opportunities for tech companies to grow: devolution, smart cities, big data, and the corporate supply chains which depend on new products to remain competitive and prosper. The potential is huge.

This report identifies strong tech clusters in the North and sets out the importance of tech collaboration to economic growth. It highlights opportunities and threats for Northern entrepreneurs and tech companies and gives useful examples of how barriers to growth have previously been overcome.

Tech will not be considered a separate sector for long. It is already at the centre of our lives and is an integral part of the Northern economy. It is increasing the efficiency of industry, closing the gap between customers and business, and transforming data into products.

Starting a tech business could be considered an act of innovation in itself; indeed creativity is a theme which runs through The Digital Powerhouse report. We know that tech businesses can help drive innovation throughout the wider economy, and for them to recognise their maximum potential fresh new methods of collaboration must be used.

Tech North has worked with the RSA (Royal Society for the encouragement of Arts, Manufactures and Commerce) and the Impact Hub network to deliver this valuable report. It is leading the way in showing that the North is filled with opportunity and innovation. Now our superb digital companies must take the opportunity to drive the growth which underpins the Northern – and increasingly Digital – Powerhouse.

By working with these dynamic digital entrepreneurs, who are creating growth in their local economies, we will continue to make the North an even greater place to work, live and invest in.

Eileen Burbidge
Chair, Tech City UK and Partner, Passion Capital

It is with genuine excitement when we speak of or hear about initiatives boosting the Northern Powerhouse, the push to drive growth and productivity in the world-famous Northern cities of England. This Digital Powerhouse report highlights what a crucial component and role 'digital' plays to that growth and how the North has, in abundance, the assets, ambition and opportunities to fuel the value creation of the Northern tech clusters.

This report maps out how the North can better engage with its tech clusters, drawing on respective expertise and innovation in order to provide solutions for smart cities and digitise industry strengths. A North that is fully leveraging its tech clusters can help create new products and services that will lead to new jobs, increased productivity and new businesses. Establishing, expanding and realising these market opportunities will help Northern companies remain competitive and efficient – further attracting even more investment and greater value for the region.

Tech North was established by government and Tech City UK to accelerate the potential of the Northern tech clusters. This report shines a brilliant light on all the assets and opportunities already underway which serve as a foundation for the growth of the new Digital Northern Powerhouse.

Herb Kim
Executive Chair, Tech North

Welcome to The Digital Powerhouse, a report from Tech North, in partnership with the RSA and the Impact Hub network. We commissioned the report to investigate the opportunities that exist for the North's digital tech sector which we believe is key to the success of the Northern Powerhouse.

The Digital Powerhouse report demonstrates how the North can grow its economy by better connecting its growing tech clusters with its own market opportunities, with government devolution, digitisation of services, corporate need for disruptive tech and the power of data all examined.

We've been delighted by the input we've received from across the North. Through roundtables and interviews, we've been able to incorporate ideas and insights which form the report's backbone.

What's clear is that new thinking is required to make best use of the tech cluster expertise, assets and opportunities here in the North, and we hope this report acts as a catalyst for this.

The Vision

Introducing the Digital Powerhouse

The North's digital economy is thriving. Today the region is home to seven of the UK's 27 key tech clusters, each of which boast pioneering businesses, ambitious founders and accomplished innovators – all of whom Tech North was established to support. The proliferation of accelerators, co-working spaces, meetup groups and community events is testament to the North's enthusiasm for the digital economy, and to the widespread belief that there are better things to come. From the launch of the C4DI co-working space in Hull, to the expansion of Newcastle's well-regarded Ignite accelerator programme, through to the continued success of Liverpool's Baltic Triangle, this is the story of a 'Digital Powerhouse' in the making.

What does this mean in economic terms? The region's tech businesses produce £9.9bn in Gross Value Added (GVA), amounting to 5.2 percent of the North's total economic output.[1] Over 280,000 tech workers are employed either in tech businesses or traditional industries, the equivalent to one in 20 of the workforce.[2] The significance of the North's tech scene becomes more apparent when set against the picture for the UK as a whole. Eighteen percent of the nation's tech workers are based here, and the largest tech cluster outside of London (by employee size) is in Manchester.[3] Sage UK, based in Newcastle, is one of only a handful of technology companies in the FTSE 100.

Northern cities are making particular headway in several subsectors of the digital economy. Manchester has a world-class digital advertising cluster, Hull is building up its expertise in e-commerce, and Liverpool is foremost among UK cities for connected devices and the Internet of Things. HealthTech has become a strong suit for Leeds, software is a speciality for Sunderland, and there is a notable grouping of social network businesses taking root in Newcastle. Such is the degree of specialisation that several cities have taken on distinctive monikers, including Liverpool ('sensor city'), Sheffield ('maker city') and Leeds ('data city').

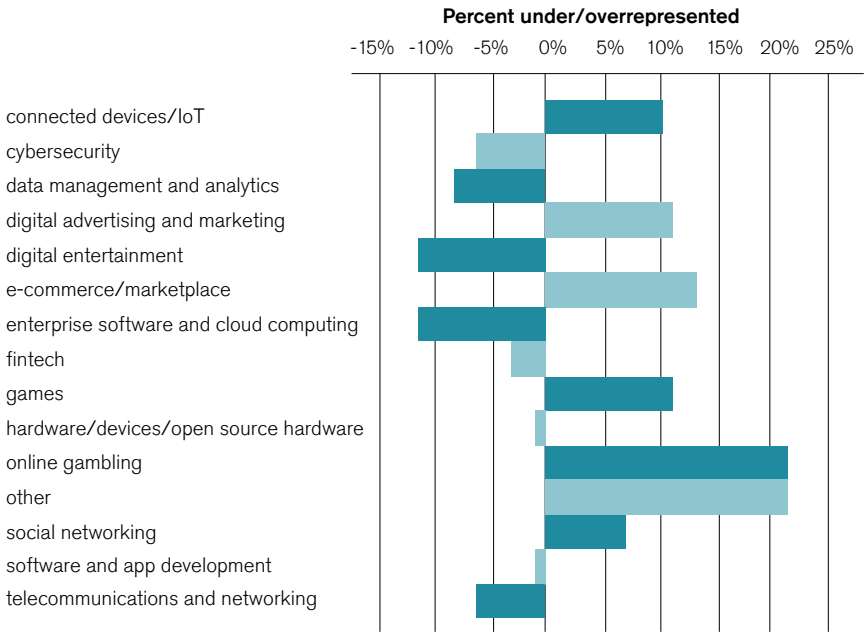
Figure 1 shows the over and underrepresentation of different digital subsectors in the North, relative to to what would be expected given the prevalence of these subsectors nationwide. These figures, from a company called GrowthIntel that uses Big Data to generate predictive marketing intelligence, are a rough approximation of the region's current tech specialities and are liable to change as markets shift and new technologies come into play.

1. Tech City UK and Nesta (2016) *Tech Nation 2016*. London: UK. Figures derived from Annual Business Survey.
2. Ibid. Figures derived from Annual Population Survey.
3. Ibid. Figures derived from Annual Population Survey.

Box 1: What do we mean by tech businesses?

Tech businesses are those that solely provide a digital product or service, or which heavily rely on one as a primary source of revenue.[4] Tech business activity encompasses the creation of information and communications *technology* (including servers, hardware and software) as well as digital *content* (including games, broadcast media and digital marketing). In this report, we are concerned with 'native' tech activity (eg computer programming and gaming) as well as tech activity in traditional industries (eg in health, gambling and finance). More detail on our methodology can be found in the Appendix.

Figure 1: Digital subsector representation in the North relative to the UK average



Source: RSA analysis of GrowthIntel data (2015) sourced as part of Tech Nation 2016

The digital economy is a good economy

The emergence of the North's digital economy has received considerable attention – and for good reason. The sector UK-wide grew almost a third faster (in turnover) than the rest of the economy between 2010 and 2014, highlighting its importance as a source of prosperity and wealth.[5] The digital economy also plays a significant role in job creation, notwithstanding the ongoing debate about the long-term impact of tech on employment. Research by the Kauffman Foundation in the US shows that the ICT sector is responsible for a large proportion of all new startups,

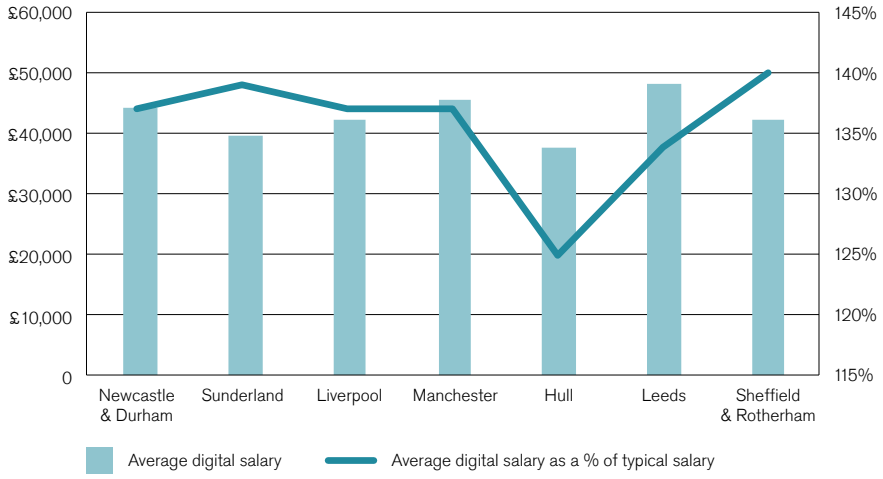
4. The RSA has sought to align its definition of the 'digital economy' as close as possible to the one used by Nesta and Tech City UK in their Tech Nation 2016 report. However, in parts of this report we draw upon research and datasets that may frame the digital economy differently, such as that from Cisco or the Small Business Survey.

5. Tech City UK and Nesta (2016) Op cit. Source: Annual Business Survey/Business Structure Database (2014).

and that these startups are critical for net job growth.[6] Most importantly, we know that productivity – the gold standard economic indicator – is higher among digital employees than the workforce of any other sector, bar mining.[7]

It is not just the founders of tech businesses who benefit from this wealth creation. According to Burning Glass Technologies, a data mining company that analyses labour market information, the average advertised salary of a digital employee in the UK is just under £50,000, 36 percent higher than the advertised average for all sectors.[8] The advertised salary for a digital worker in Leeds is £47,959, while in Liverpool it is £42,153 (see Figure 2). Salary growth in the tech industry has also sped ahead of wage rises in other sectors.[9] Between 2012 and 2015, advertised digital salaries grew by 29 percent in Leeds, 26 percent in Sunderland and 27 percent in Newcastle and Durham – indicating that they are among areas with the strongest growth in digital salaries.[10]

Figure 2: Average advertised digital salaries and digital salary premiums in Northern tech clusters



Source: RSA analysis of Burning Glass data (2015) sourced as part of Tech Nation 2016.

Looking at the challenging economic landscape of the North as a whole brings the advantages of a thriving digital economy into even sharper focus. If the region were classed as a country, it would be shown to have grown more slowly than all but one EU state in the past 10 years, with levels of productivity that have historically lagged behind the UK average.[11] The devolution of spending powers to cities like Manchester and Leeds, coupled with major new investment programmes such as HS2,

6. Hathaway, I. (2013) *Tech Starts: High-Technology Business Formation and Job Creation in the United States*. Kauffman Foundation.
7. Hourly productivity (measured as total wage bill divided by total number of hours worked) is £21.83 in the digital industries. The only sector (using one digit SIC codes) to have greater productivity is mining and quarrying at £23.57. Source: Annual Population Survey (2015).
8. See *Tech Nation 2016* for a full description of Burning Glass's methodology.
9. Tech City UK and Nesta (2016) Op cit.
10. Ibid.
11. Cox, E. (2015) *Rhetoric to Reality: A Business Agenda for the Northern Powerhouse*. IPPR.

are expected by the government to boost economic growth and make real the aspirations for a Northern Powerhouse. But it is also important to recognise the role being played by the digital economy, which is grounded in innovation and led by the private sector. As Table 1 shows, employment and productivity are growing at a considerably faster rate in the North's digital sector than in the region's non-digital industries.

Table 1: Changes in employment and productivity in the North's digital and non-digital sectors (2011/12–14/15)

	Employment growth	Productivity growth
Digital sector	28.1%	11.3%
Non-digital sectors	3.1%	2.5%

Source: RSA analysis of the Annual Population Survey data.
Note: Productivity refers to the total weekly wage bill divided by total hours worked per week. Employment growth refers to jobs rather than hours worked.

The coming wave of digitisation

For these reasons alone, Northern aspirations for a bigger digital economy are worthy of attention. However, tech businesses will become even more relevant due to the coming wave of digitisation. Up until recently, the digital economy was primarily concerned with the creation of ICT hardware, server tools and computer software – making it a relatively siloed industry. Yet the spread of digitisation – the process of collecting and converting information into a digital format – means the digital economy is beginning to underpin the activities of nearly every sector.[12] Cisco, a leading voice on the subject, predicts that the UK market for digitising healthcare, retail, transport and energy will be worth £100bn by 2025.[13]

Digitisation is nothing new, but the pace of change is accelerating. The media industry was one of the first sectors to be disrupted by digital innovation, allowing new online players to muscle in on the markets for film, music and news. More recently, the transport, hospitality and restaurant industries have been shaken up by the arrival of sharing economy platforms, such as Uber, Airbnb and Deliveroo, which are now household names. Cisco expects the same forces of digital disruption to transform agriculture, manufacturing and financial services.[14] But this is not just a private sector phenomenon. Education, healthcare and civic governance are all being shaped by digital innovation – often leading to better value for money and improved outcomes for students, patients and citizens in the round.

What is driving digitisation? One factor is technical capabilities. Improvements in computer processing power, storage and bandwidth have ramped up the possibilities for sophisticated data analysis. The world's stock

12. Source of digitisation definition: http://whatis.techtarget.com/definition/digitization
13. Hinks, J. (2015) *UK startups in line for £100bn Internet of Everything windfall* [article] Tech Radar, 18th March 2015.
14. Cisco (2015) *The Internet of Everything: Unlocking the opportunity for UK startups*.

of available data is also doubling in size every year, thanks to ubiquitous internet connectivity (including access to smart phones) and the spread of internet-connected devices.[15] One estimate suggests the number of IP-enabled sensors worldwide will reach 50bn by 2020.[16] The question is whether the North's emerging Digital Powerhouse can be alert to the possibilities of these developments and sit at the forefront of digitisation. The answer of this report is a resounding yes, should the right conditions be met.

The prize of the Digital Powerhouse

The North has a solid foundation to build upon and an enthusiastic tech community with the right ideas and determination. Sage UK, Boohoo and Trident are home grown companies that exemplify what is possible. The task now is to ensure experiences like theirs are not rarities but rather the norm, and that the region's nascent tech clusters move towards maturity. A fully charged Digital Powerhouse would be one that matches the performance of other leading tech hubs around the world – on startup rates, productivity performance and innovation activity, among other measures. This is no easy task but is a prize worth striving for:

- Raising employee **productivity** in line with the national average for the tech industry would create an extra £5.7bn in GVA.[17]
- Increasing the rate of **self-employment** in the digital economy in line with the rest of the UK would result in over 9,700 more tech founders.[18]

These ambitions will only be met once several 'creative conditions' are in place – four of which are already under the spotlight:

Talent – Successful tech clusters depend on a pool of highly skilled workers – not only coders and programmers but also people with sales and marketing expertise. The UK's digital economy is expected to require an extra 760,000 digital workers between 2015 and 2020.[19] The government's long-term response has been to introduce compulsory coding within schools, while at a local level several upskilling initiatives have been launched. Examples include Northcoders, which runs coding boot camps for entry-level software developers, and Career Hacker, a new platform using Big Data to help students, teachers and careers advisers keep up with the North's industry trends.[20] The region is fortunate to already have

15. Evans, P. and Forth, P. (2016) *Navigating a world of digital disruption*. Boston Consulting Group Perspectives.

16. Ibid.

17. Average GVA per tech worker in the North is £34,919, compared with £55,073 for the UK as a whole – a gap of £20,154. The £5.7bn figure was arrived at by multiplying £20,154 by the number of tech workers in the North – 283,515. Sources: Annual Population Survey data (2014) and the Annual Business Survey data/Business Structure Database (2014), both cited in Tech City UK and Nesta (2016) Op cit.

18. The current rate of tech self-employment in the North is 0.41%, compared with 0.55% for the rest of the UK. Closing the gap would mean increasing the North's rate of tech self-employment by 0.14% in a workforce of 6.93 million. This equates to 9,700 extra tech founders. Source: Annual Population Survey data.

19. Development Economics and O2 (2015) *2.3 million digital workers required by 2020 to power the UK's digital economy* [press notice].

20. For more information see https://northcoders.com/ and https://careerhacker.uk/

a number of well-respected computer science university departments that can be drawn upon for talent.

Infrastructure – Access to superfast broadband, affordable workspace and a modern transport system are basic ingredients for a thriving tech startup ecosystem. Although Northern cities have been waylaid by a history of underinvestment, the state of the region's infrastructure has improved in recent years, and several major projects are in the pipeline. The HS2 investment, electrification of the Midland Mainline railway and the creation of the Transport for the North partnership are all promising developments. So too are the recent announcements by the chancellor to build an HS3 line and widen the M62 road link between Leeds and Manchester. Meanwhile, several cities have ambitions to introduce 'ultrafast' broadband (at 1GB speeds), opening up new avenues for digital innovation. By 2017, 150,000 premises in Hull and East Yorkshire will have access to Fibre-to-the-Premises (FTTP) broadband.

Finance – Banks, grant-making bodies, angel investors and venture capitalists (VCs) are all essential players whose capital injections keep tech clusters in motion. Although the biggest VCs and wealthiest angels are based in London, the North is home to a modest but expanding investment community. The tech investment firm GP Bullhound established its Manchester office in 2014, while Newcastle-based Northstar Ventures now has over £95m under management. Added to these are accelerators like Dotforge operating in Sheffield, Leeds and Manchester, and Ignite in Newcastle and Manchester, both of which offer equity-based funding to startups. Tech North is also leading the creation of a co-investment fund that aims to catalyse private investment in the North, allowing easier access to finance for the tech community.

Culture – Studies show that clusters perform best when there is a tight-knit community of businesses and a culture of openness and collaboration.[21] Northern cities fare strongly in this regard. Sheffield Digital, Silicon Drinkabout in Leeds and Creative Kitchen in Liverpool are among the many networking groups that bring people together to encourage collaboration and support, and in many cases promote the local tech scene. The North also boasts several vibrant incubators and co-working spaces, such as Baltic Creative in Liverpool, as well as major tech festivals like FutureEverything and Thinking Digital. This is not to mention the wider cultural and heritage assets that draw talent to the region, from the nightlife of Newcastle to the great outdoors of the Peak District.

The missing condition

Finance, infrastructure, talent and culture are the bedrocks of a digital economy, and they are rightly taking centre stage in efforts to build the North's Digital Powerhouse. However, this report argues that we also need to pay attention to a fifth creative condition: **market opportunities**. By this we mean the ability of tech businesses to find clients

21. See for example Nathan, M., Vandore, E. and Whitehead, R. (2012) *A Tale of Tech City: The Future of Inner East London's Digital Economy*. Centre for London.

and develop digital products and services that meet their needs. As important as the aforementioned factors are, ultimately the survival and growth of digital businesses in the North rests on them winning contracts and having paying customers. Focusing on market opportunities would signal a step-up in the nature of business support from initiatives that boost the **supply** (of tech businesses) to those that stimulate **demand** (for their products and services).

Evidence indicates tech businesses would benefit from such a focus. A recent survey undertaken as part of Tech City UK and Nesta's Tech Nation 2016 study found that many UK tech firms believe they are being held back by a weak economic climate.[22] The figures are particularly high for several Northern cities, with 25 percent of tech businesses in Hull and 36 percent of those in Sheffield and Rotherham citing a poor economic climate as a concern. The sentiment is echoed in the findings of the UK's Small Business Survey. Its latest results show that 37 percent of businesses in the ICT industry – another way of framing the digital economy – believe they are weak at entering into new markets, and 24 percent say they have difficulty introducing new products and services.[23] The problem is particularly acute for tech companies in the North as they appear more dependent on revenue from customer sales to finance growth, rather than investment finance.

In this report we look at how tech businesses across the North can connect more effectively with the wealth of market opportunities on their doorstep. The region has almost one million businesses and is home to several large corporates – including Sky, Asda, BAE Systems, The Co-operative Group and First Direct – a number of whom could be considered potential clients.[24] As many opportunities exist in the public sector, with health services, education providers, housing associations and other bodies all tendering for products and services that the region's tech firms could provide. Alongside these more direct business opportunities, the report considers how tech businesses can make better use of the knowledge held by universities, science parks and other businesses, so as to help them innovate and develop the next generation of digital products and services.

Our ultimate argument is that the North's aspirations for a Digital Powerhouse can be best met by focusing on demand, and by encouraging tech businesses to orient themselves to mainstream market opportunities.

Next generation clusters

While the purpose of this report is first and foremost to identify ways of supporting the North's digital economy, the wider population has as much to gain from **collaborative innovation**, where multiple parties generate new products and services for mutual advantage. Local public services have the opportunity to be at the forefront of digitisation – from

22. Tech City UK and Nesta (2016) Op cit.

23. Department for Business, Innovation and Skills (2016) *Small Business Survey 2014: All business data*. BIS. The figures refer to all respondents who said they are 'very poor' or 'poor' at the activity in question.

24. Department for Business, Innovation and Skills (2015) *Business Population Estimates 2015*. BIS. The Business Population Estimates show that together the three Northern subregions have 1,050,105 private sector businesses.

delivering new educational learning tools in the classroom, to introducing telecare systems across GP surgeries. In the same way, putting digital tools at the disposal of local businesses promises to raise productivity and give firms a competitive edge over their rivals. Not just in retail and media, but in advanced manufacturing, life sciences, logistics and energy production – all sectors where the North punches above its weight. In this way, the region can become a test-bed for innovation.

Collaboration does not have to stop there. Should partnerships yield results, the next logical step would be to take locally-born and locally-tested innovations onto the world stage. A local manufacturer could showcase the machine sensor technology of a home-grown IoT startup it has worked with, while NHS commissioners could champion among their peers the pioneering technology they have purchased from a Northern HealthTech company. Around the world, hundreds of conferences, trade shows and high-level meetings are drawing together influential leaders in the public and private sectors – and these present the ideal opportunity to spread the word about Northern tech innovations. Local clients of tech businesses should fly the flag for them internationally, recognising that it will be in their benefit if the North is seen as a global centre of tech excellence.

Collaborative innovation of this kind marks a departure from the usual way of 'doing tech'. The archetypal cluster is one where tech businesses operate in siloes, untethered from the cities in which they operate. Silicon Valley – which sets the bar for all clusters – is often seen as at the extreme end of this disconnect. Measured against the number of IPOs and multi-million dollar businesses, the Californian hub is unbeatable, and the city's highly skilled workers have certainly benefited in the form of plentiful jobs and high wages. Yet for the everyday citizen of San Francisco, and for the businesses and public services that operate in its shadow, the benefits are less obvious. Not every cluster is so detached from its surroundings, but there is a general tendency to consider only the amount of wealth generated by digital economies rather than how that wealth is created and distributed.

The starting point for this report is to claim that **the North's Digital Powerhouse can forge a different path** – one where tech businesses are tightly woven into the fabric of their cities, where public services and surrounding businesses are ready and willing to co-innovate, and where all citizens have an incentive to throw their weight behind creating a prosperous digital economy. We hope our report provokes a conversation about how this vision can be realised, and that it articulates the potential prizes that are at stake. We begin by exploring opportunities for collaboration in the private sector, before moving onto public sector partnerships and finally the potential for wider knowledge exchange.

Box 2: How to read this report

This report should be read as a **prospectus of opportunities** for new partnerships. Each of the three main chapters focuses on one aspect of collaboration and considers the following questions:

- **What are the opportunities for tech businesses?** (eg a fast-growing retail industry, desire for efficiency savings in the NHS, or potential partnership with a university).
- **What are the credentials of local tech businesses?** (eg strong e-commerce talent in Manchester, or HealthTech expertise in Leeds)
- **What are the barriers to collaboration?** (eg strict procurement procedures, or risk-averse corporate buyers).
- **How can these barriers be broken down?** (eg via matchmaking services or innovation vouchers).

The report is clearly segmented so that readers can go directly to the information most relevant to them. Health technology officers will be most interested in the section on public sector collaboration, corporate executives might gain more from the section on private sector partnerships, and university outreach staff are likely to benefit most from the last chapter on knowledge exchange.

The report draws upon and complements the findings of the Tech Nation 2016 report, compiled by Tech City UK and Nesta. Whenever data is cited in the report, we explain in the footnotes where this information originates.

Box 3: Why seven cities?

For the sake of brevity and clarity, our data analysis focuses on seven locations with the greatest tech activity: Liverpool, Manchester (including Salford and Trafford), Sheffield (including Rotherham), Leeds, Hull and Newcastle (including Durham). We recognise that the North's digital economy is not limited to these clusters, and wherever possible have sought to highlight tech companies arising elsewhere – from drone manufacturers in Wigan and telecare providers in Airedale, through to makers of EdTech tools in Barnsley and developers of loan management software in Harrogate.

Tech Cluster Fact Sheet

Data sourced from Tech Nation 2016

Liverpool

Digital GVA
£269m

Digital economy jobs
19,535

Advertised digital salary
£42,153

Digital employment growth (2011–14)
+7%

Advertised salary growth (2012–15)
+16%

Prominent sectors

- IoT and connected devices
- App and software development
- E-commerce and marketplace
- Gaming

Manchester

(includes Salford and Trafford)

Digital GVA
£1.7bn

Digital economy jobs
51,901

Advertised digital salary
£45,204

Digital employment growth (2011–14)
+13%

Advertised salary growth (2012–15)
+18%

Prominent sectors

- EdTech
- Digital advertising and marketing
- FinTech
- E-commerce and marketplace

Sheffield and Rotherham

Digital GVA
£273m

Digital economy jobs
14,313

Advertised digital salary
£42,058

Digital employment growth (2011–14)
+3%

Advertised salary growth (2012–15)
+18%

Prominent sectors

- E-commerce and marketplace
- Hardware, devices and open source hardware
- App and software development
- Enterprise software and cloud computing

Leeds

Digital GVA
£671m

Digital economy jobs
23,734

Advertised digital salary
£47,959

Digital employment growth (2011–14)
+7%

Advertised salary growth (2012–15)
+29%

Prominent sectors*

- E-commerce and marketplace
- App and software development
- Digital advertising and marketing
- Digital media and entertainment

Hull

Digital GVA
£189m

Digital economy jobs
6,070

Advertised digital salary
£37,258

Digital employment growth (2011–14)
+2%

Advertised salary growth (2012–15)
+14%

Prominent sectors

- E-commerce and marketplace
- App and software development
- Hardware, devices and open source hardware
- Data management and analytics

Sunderland

Digital GVA
£107m

Digital economy jobs
3,675

Advertised digital salary
£38,999

Digital employment growth (2011–14)
+17%

Advertised salary growth (2012–15)
+26%

Prominent sectors

- Telecommunications and networking
- Gaming
- Hardware, devices and open source hardware
- App and software development

Newcastle and Durham

Digital GVA
£764m

Digital economy jobs
22,237

Advertised digital salary
£44,068

Digital employment growth (2011–14)
+5%

Advertised salary growth (2012–15)
+27%

Prominent sectors

- Social networks
- Data management and analytics
- E-commerce and marketplace
- Gaming

Sources

Digital GVA
Annual Business Survey/BSD (2014)

Digital economy jobs
Annual Population Survey (2014)

Advertised digital salary
Burning Glass analysis (2015)

Digital employment growth
Annual Population Survey (2014)

Advertised salary growth
Burning Glass analysis (2015)

City data sourced from Tech City UK and Nesta's Tech Nation 2016 report

*Leeds prominent sectors information provided by Leeds Data City

Analysis by TECH NATION From TECH CITY

In partnership with Nesta

Private Sector Collaboration

With the flurry of media commentary surrounding social networking sites like Facebook and sharing economy platforms like Uber, we could be forgiven for believing the digital economy is primarily about consumer-facing businesses. Yet the column inches these companies take up belies the fact there is equally significant innovation happening up stream in business-to-business supply chains. From AgriTech that controls the distribution of fertiliser on farms, through to sensors that monitor machinery in factories, the potential for digital innovation to augment production in all corners of the private sector is considerable.

Attuned to the possibilities, many corporates have begun to partner with tech businesses and buy in their expertise. In some cases, this means purchasing off-the-shelf digital products (eg CRM software), while in others it means commissioning tailor-made tech solutions. At the more intense end of the collaborative spectrum, companies with capital are investing in fledgling tech startups or acquiring firms and their talent outright. Why would corporates go to this trouble rather than innovate in-house? According to the US academic Clayton Christen, large incumbent businesses often struggle to generate ground-breaking innovations on their own because they are focused on meeting the needs of existing customers through incremental change.[25]

The scope for tech businesses to collaborate with private sector firms is as great in the North as anywhere else. The region boasts close to a million businesses, including 600 large companies employing more than 500 people.[26] Among the major corporates with a presence in the region are Sopra Steria, Barclays, Sky, Siemens, BAE Systems, Asda and The Co-operative Group. Barclays is reported to spend £3bn on technology across their operations, while the Co-operative Group spends £400m – some of which may already flow to Northern companies.[27] However, the opportunities for collaboration are far from exhausted. The UK as a whole ranks 15th out of 29 European countries on a measure of digital integration among businesses, indicating substantial room for improvement. [28]

25. Christensen, C. (1997) *Innovator's Dilemma: When new technologies cause great firms to fail*. Harvard University Press.

26. Department for Business, Innovation and Skills (2015) *Business Population Estimates 2015*. BIS.

27. For more information see www.cio.co.uk/cio100/2014/barclays and www.cio.co.uk/cio100/2014/cooperative-group/

28. Based on data collected as part of the European Digital Economy & Society Index (DESI). For more information, visit https://ec.europa.eu/digital-single-market/en/desi

This chapter argues that it is within the North's gift to become a world leader in private sector-led collaborative innovation. In doing so, we home in on a handful of sectors in the region and discuss how they might benefit from working more closely with surrounding tech clusters. These industries were chosen according to several factors, including their total output, growth rate, and perceived readiness for digitisation. Table 2 below lists the top 20 sectors in the North by overall turnover, clearly showing that retail, manufacturing and logistics are three large markets that deserve closer attention from the tech community. The North's media industry is not as large in terms of total output, but is significant relative to the size of the sector in other UK regions.

Table 2: Top 20 sectors in the North by overall turnover

Industry	Turnover (£m)
Wholesale trade, except of motor vehicles	95,549
Retail trade, except of motor vehicles and motorcycles	73,145
Wholesale and retail trade and repair	27,372
Manufacture of food products	21,540
Manufacture of C3:D23 vehicles, trailers and semi-trailers	17,482
Specialised construction activities	16,086
Gambling and betting activities	14,916
Manufacture of coke and refined petroleum	14,673
Manufacture of chemicals and chemical products	14,430
Construction of buildings	13,802
Telecommunications	12,850
Warehousing and support activities for transportation	12,813
Food and beverage service activities	10,812
Activities of head offices; management consultancy activities	10,646
Land transport and transport via pipelines	10,076
Office administrative, office support and other business support	9,221
Architectural and engineering activities	9,174
Manufacture of fabricated metal products, except machinery	9,104
Computer programming, consultancy and related activities	8,555
Legal and accounting services	8,174

Retail and gambling Manufacturing Logistics

Source: RSA analysis of Annual Business Survey data (2013).

Retail and gambling

When it comes to sheer size, few sectors measure up against retail. It is the biggest industry in the North and continues to grow – by 7 percent in turnover between 2008/09 and 2012/13.[29] Retail trade is worth £73bn in turnover to the region's economy, while wholesale retail contributes

29. RSA analysis of Annual Business Survey data (2013).

£95.5bn.[30] According to Cisco's analysis, retail is also an industry ripe for digitisation (see Table 3). E-commerce tools, customer relationship management (CRM) software and digital marketing services are nothing new in the world of retail, but they are becoming more sophisticated thanks to Big Data and improved analytical tools. New technologies including anti-theft gadgets, inventory management tools and beacon tech – devices that push signals and information to customers in store – promise to further boost the capabilities of retailers.

Just as the North has a sizeable retail sector, so too does it have the talent to positively disrupt it. Nationally significant clusters in e-commerce exist in Newcastle, Manchester and Sheffield, while large digital advertising and marketing clusters have taken root in Manchester and Leeds. Rotherham-based Linktagger specialises in beacon and NFC (Near Field Communications) hardware, which, among other uses, enables retailers to send special offers to people as they shop. In Salford, a business called Formisimo has developed analytics software to help online retailers uncover pain points in their web forms and improve sales conversion rates. Meanwhile in Manchester, a company called Gnatta has created award-winning 'omni-channel' CRM software to seamlessly align all communication activities between vendors and their customers.

The gambling sector is another strong suit for Northern cities. It ranks in the top 20 industries by turnover in all three Northern regions, and its considerable growth rate shows little sign of petering out.[31] Overall the sector is worth £14.9bn in turnover to the North, and is nearly twice the size of the legal and accountancy trade.[32] BetFred is headquartered in Warrington, Sky Bet in Leeds, Tombola in Sunderland and Bet365 in Stoke. As with the wider retail industry, there is clear potential for betting companies like these to make use of the digital expertise in nearby tech clusters. The application of digital tools, however, will pose further ethical dilemmas for an industry already faced with accusations of being indifferent to problem gambling. How advocates of BetTech approach this challenge will be a litmus test for the community-conscious vision of a Digital Powerhouse.

"The North of England was the global powerhouse of the industrial revolution, and the legacy of this is the largest pan regional cluster of knowledge intensive supply chain activity in the UK… As we embrace the era of 'software eating industry', through the process of digitising our supply chains, we can play a major role in shaping and driving the adoption of the innovations which will define the 21st century."

Lee Strafford

Manufacturing

International competition has made it increasingly difficult to maintain a strong industrial base, as shown recently in the problems facing the Tata steel mills. Yet while the steel industry may be under pressure, the UK is still home to world class manufacturers in automotives, pharmaceuticals and life sciences. Manufacturing remains particularly important to the North, contributing £150.5bn in turnover to the economy and employing 805,500 people.[33] Regional specialisms span food production (eg Cranswick in Hull), textiles (eg James Dewhurst in Manchester), chemicals (eg Kerling in Runcorn), and automotives (eg Nissan in Sunderland). The North has also nurtured a number of advanced manufacturing clusters, including groupings of aerospace businesses in Lancashire,

30. Ibid. Excluding the sale of motor vehicles.

31. According to RSA analysis of Annual Business Survey data (2013), the turnover of gambling and betting activities in the North grew by 7.1% between 2008/09 and 2012/13.

32. The turnover of the North's legal and accountancy sector was £8.2bn in 2013 (Annual Business Survey).

33. RSA analysis of Annual Business Survey data (2013).

robotics companies in Yorkshire and developers of graphene-based solutions in Manchester.

What does manufacturing look like in the digital age? The implications of digitisation for heavy industry are as profound as they are for services. New machine learning software can help engineers predict when their tools are likely to need replacing, while sensors on the factory floor can highlight faults or idle activity in process lines. Machine transmitters and computer interfaces have been around for more than a decade, but their price has fallen to such a point that most factory equipment can now be affordably monitored. Digitisation has also led to the development of new machine types, including additive tools that build products up layer by layer using 3D modelling software. Such is the excitement around the so-called 'Industrial Internet' that Siemens has launched a corporate venturing fund specifically tasked with backing startups that disrupt traditional models of manufacturing.

The factory floors of James Dewhurst in Manchester or Prince's Foods in Liverpool may seem a world away from the polished offices of the surrounding tech community, but there is ample opportunity for col laboration. 2M Automation is a Manchester-based company that creates automation solutions for factories, and recently worked with Nissan in Sunderland to design a fluid conveying system for a new machine. The region is also home to a vibrant community of IoT enthusiasts, some of which, like Pimoroni in Sheffield, are creating monitoring devices and sensors that can be applied in a factory setting. Nearly every Northern city also has a makerspace, housing tinkerers and entrepreneurs that are modifying digital fabrication tools and product modelling software that could be prominent in the foundries of the future. There is even scope for the region's cyber security firms to help local manufacturers protect their growing suite of digital enabled machinery.[34]

Table 3: Industries ranked by their potential for further digital disruption – according to Cisco

Technology products and services	1
Media and entertainment	2
Retail	3
Financial services	4
Telecommunications	5
Education	6
Hospitality and travel	7
Manufacturing	8
Healthcare	9
Utilities	10
Oil and gas	11
Pharmaceuticals	12

Cisco's ranking of industries according to their digitisation potential is based on third party data and a survey undertaken with industry leaders around the world. More details on the methodology can be found in Cisco (2015) *Digital Vortex: How digital disruption is redefining business.*

34. The North West Cyber Security Cluster was founded in 2014 to foster links between Northern cyber security firms and surrounding businesses.

Logistics

Logistics is what might be called a 'silent sector' – indispensable to the functioning of a healthy economy but mostly hidden from view. Included under this banner are road, air and rail haulage firms, port authorities, warehousing businesses and public transport providers. The North has a relatively large logistics base, being home to major businesses such as Eddie Stobart (Carlisle), the Bibby Line Group (Liverpool) and Harrison Solway (Hull). Sheffield boasts one of the biggest warehouse locations in the country – Logistics Hub UK – with Asda, BMW and Amazon all running distribution centres on site. The region also has eight major ports and four major airports.[35] Altogether, logistics accounts for £30.5bn of private sector turnover in the North, a figure that grew by 11 percent between 2008/09 and 2012/13.[36]

Logistics is not an industry that appears on the verge of a digital revolution, yet recent developments in tech have opened up new avenues for innovation. New digital tools and products are being used to improve inventory management, boost fuel efficiency, enhance insurance estimations and streamline route optimisation. Internet connected devices, for example, allow logistics firms to track the precise location of their goods, while sophisticated GPS systems crunching real time traffic data can help delivery drivers map out the fastest route to their destination. Added to these modest innovations is an emerging field of AutoTech that is transforming vehicles under the bonnet, connecting hundreds of car parts to computers in a bid to improve efficiency and passenger safety. Unilever, which has recognised the potential for digital innovation in transport, wants to reduce emissions from its global logistics network by 40 percent from 2010–2020.[37]

Can the North's tech clusters bring similar innovations to the region's logistics firms? A pioneering business in Sheffield gives cause for optimism. The Floow uses cutting edge telematics technology to improve vehicle insurance services. In practice this means asking the driver to download an app to their smartphone or to install a 'black box' into their vehicle to monitor driver behaviour. The Floow supply their services to a number of leading insurers worldwide, and recently secured a deal to receive and process data directly from OEM equipment mounted on Renault and Nissan vehicles. Another company called Nomad Digital in Newcastle provides tech solutions for rail companies, including WiFi systems, devices that monitor train equipment and passenger information displays. Overall, the digital credentials that make Northern tech clusters well suited to transform manufacturing are the same that put them in a good position to improve logistics: specialisms in IoT, expertise in hardware, and talent in software and cloud computing.

"Liverpool has a massive port and logistics cluster, as well as a booming retail sector. I can guarantee that if large players in either of these industries took the leap and decided to work with one of our dynamic tech companies, they would be seriously impressed by their innovation potential."

Kevin McManus, Liverpool Invest

35. Major airports are those with more than a million passengers a year. See Civil Aviation Authority (CAA) statistics.

36. RSA analysis of Annual Business Survey data (2013). 'Logistics' refers to ABS data on 'transport and storage'.

37. Scottish Enterprise (2014) *Opportunities in sustainable logistics*.

Box 4: The private sector opportunity in numbers

- **15th** – The UK ranks 15th (out of 29 countries) in an Europe-wide league table looking at the integration of digital technology among businesses, indicating room for improvement.
- **600** – The North is home to 600 very large businesses (defined as firms with more than 500 employees).
- **£150.5bn** – The North's manufacturing industry turns over £150.5bn every year.
- **8** – The North has 8 major ports, including the Port of Liverpool which recently benefited from a £1bn investment.
- **1 in 20** – Manchester's MediaCityUk accounts for 5 percent of total employment in Salford.

Media

Media has made a mark on the local economies of Northern cities. Encompassing TV/film production, publishing and broadcast activity, the media industry generates £2.9bn in turnover across the region and employs 41,000 people.[38] It has been more than four years since the BBC moved to Salford, and in that time Greater Manchester's constellation of media companies and talent has mushroomed. MediaCityUK alone accounts for 5 percent of total employment in Salford, with a further 1,700 extra jobs set to be created by 2034.[39] Only recently, the city authorities announced an investment package that will see The Space Project (a film production studio in Manchester) double in size. Yet Manchester is not the only area in the North with a media base. Leeds is home to the BBC's Yorkshire HQ, Sky TV's Technology Hub, and Made TV, an independent TV station.

Media was one of the first sectors to be disrupted by digitisation. Newspapers were pushed online, TV made available on demand, and broadcasting of all kinds transformed by CGI and sophisticated post-production tools. As dramatic as these changes seem, however, the potential for digital innovation in media is far from exhausted. Virtual reality, augmented reality and speech-to-speech translation are among the important technologies coming into view. On top of these are the infinite possibilities of enhancing user experience (UX) and visual design. Every newspaper and TV broadcaster is in a battle to stay on trend, including by personalising content and allowing viewers and readers to access content on multiple devices. Only recently The New York Times launched its own virtual reality app to simulate immersive new scenes around the world.

The North's media industry can respond to these technological trends using the talent on its doorstep. Both Manchester and Leeds play host to nationally significant digital entertainment clusters, as well as to vibrant digital advertising and marketing communities. Home grown startups are well-equipped to create compelling content for local media companies

38. RSA analysis of Annual Business Survey (2013) and Annual Population Survey (2015) data. Our definition of the media industry draws on the following Standard Industry Classification codes: 58, 59 and 60, which includes publishing, gaming, motion pictures, TV and radio, among other activities.

39. BBC Trust and KPMG (2015) *Response to the Department for Culture, Media and Sport's Charter Review consultation.*

like the BBC – augmenting traditional formats with new games, apps, websites and music. They can also lend vital insights in UI and UX design, search engine optimisation and virtual reality. The latter is a growing strength of Northern clusters, with businesses such as Smashed Crab Studio and VISR in Hull developing new VR experiences. Such is the importance of tech startups to innovation that the BBC chose to create its own startup incubator called Worldwide Labs.

Manchester-based Apadmi is a good example of a local tech firm that has given media companies an edge to their work. Past projects include developing the official app for the *X Factor*, creating The Guardian's Witness app for citizen journalism, and supporting the user experience element of BBC Radio's award-winning platform – in particular the novel 'scrolling dial' that allows users to browse the entire radio schedule. Not far from Apadmi's office is Fast Web Media, another tech business supporting major media companies. They recently worked with BBC Sport to boost the site's internet traffic, making editorial changes and identifying commonly used search terms to increase the ranking of BBC webpages on search engines.

"Manchester has a sixty-year history of being at the very forefront of broadcasting production. This is a global industry and the opportunities it offers to tech startups and SMEs are hugely significant, particularly in terms of supply chain contracts, skills development and access to new markets."

Sue Woodward, The Sharp Project

Box 5: The scope for digitisation in other Northern sectors

Life sciences – The North's life sciences industry turns over more than £11bn and employs over 36,800 people.[40] AstraZeneca, Bristol-Myers Squibb, Eli Lily and GSK are all major companies with a presence in the region. A good example of a local tech startup innovating in this sector is eLucid mHealth, which has developed software and a device to automatically dispense the correct dosage of drugs to patients. Another is C4X Discovery, a spin-out from the University of Manchester that has created new software platforms to aid the design and discovery of novel drugs. The North has excellent R&D facilities to aid companies like these, including Reckitt Benckiser's £100m Innovation Hub in Hull, and a soon-to-established open innovation community for IoT businesses in Alderly Park.

Finance – Leeds has the second largest banking centre in the UK, employing 28,800 people. First Direct and Yorkshire Bank are based in the city, and RBS, HSBC and TD Waterhouse have significant operations in the area. This, coupled with expertise in data management analysis, makes the region well placed to incubate FinTech companies. Nostrum Group, an automated loan management software provider based in nearby Harrogate, is an example of a high growth FinTech company to be born out of Yorkshire.[41] Further North in Durham, a company called Atom Bank will soon launch a suite of new financial services to challenge conventional banks, while in Sheffield PIP Payments have created a tech solution that allows people without a bank account to shop online.

40. Department for Business, Innovation and Skills (2015) Bioscience and health technology database: annual report. BIS.

41. For more information see www.nostrumgroup.com

Aerospace and defence – The North West has the 4th largest aerospace cluster in the world, accounting for over 25 percent of aerospace production in the UK and employing 12,700 people in Lancashire alone.[42] Major companies include Aircelle and BAE Systems – the latter with an R&D budget of £1.26bn. The cluster is known for its expertise in unmanned aerial vehicles (UAVs), having built and tested the Taranis, the world's most advanced drone. Opportunities exist for the region's tech businesses to service this high-tech aerospace and defence industry, just as Silicon Valley has significant links to the defence industry in the US. Suave UAV Enterprises, for example, is a tech company based in Wigan that developed a 'vision engine' enabling UAVs to assess, and respond to, their immediate environment.

Energy – Over 76,000 people are employed in the North's energy sector.[43] The region's nuclear industry is particularly significant, counting Cumbria's Sellafield facility and Heysham's power plants as two major assets. The North also has a growing offshore windfarm industry, which was recently given a boost when Siemens chose to invest £160m in new wind turbine factories in Hull and East Riding. For tech companies specialising in data analytics, hardware and IoT, the region's energy base represents a potentially lucrative market. Drones, for example, are now being used to monitor the state of oil rigs, while Big Data is being applied to model how ports can be used more efficiently in the process of building new wind farms.

Barriers to collaboration

Whether it is retailers partnering with developers of CRM software, car manufacturers linking up with makers of telematics technology, or media houses working with pioneering VR startups, the possibilities for collaborative innovation in the North are numerous. However, several barriers stand in the way of progress:

1. The benefits of digital innovation can be subtle and slow burning – According to a survey by Cisco, just a quarter of global business leaders describe their approach to digital disruption as proactive.[44] Part of the problem is that some businesses are preoccupied with trying to serve the needs of existing markets, and may see digital innovation as an expensive distraction from that task.[45] It does not help that traditional performance metrics such as return on investment (ROI) are ill equipped to capture the long-term impact of new digital tools.[46] Even when leaders do buy into the benefits, they may face an uphill struggle trying to convince junior staff to adopt an external innovation. These barriers are often more acute within small and medium sized businesses, which do not have personnel in house who can systematically identify new digital innovations or understand how they might boost their bottom line.

2. Traditional client arrangements squeeze out new entrants – Experience matters in the tech industry. Buyers of digital products and expertise

42. For more information see www.lancashirelep.co.uk/the-lancashire-offer/key-business-sectors/aerospace.aspx
43. New Economy (2014) *The North West's Energy Assets*. Manchester: New Economy.
44. Cisco (2015) *Digital Vortex: How digital disruption is redefining business*.
45. Christensen, C. (1997) Op cit.
46. Mocker, V., Bielli, S. and Haley, C. (2015) *Winning Together: A guide to successful corporate start-up collaborations*. London: Nesta.

have implications when it comes to winning contracts. Buyers of digital products and expertise have a tendency to call upon long-standing and larger tech firms. In some cases, this is because buyers lack faith in the ability and maturity of new entrants. A KPMG survey found that 44 percent of corporates cite a lack of maturity as a reason not to work with tech startups.[47] Even when there is goodwill to work with fledgling tech companies, buyers can find it difficult to pinpoint the right partner in a sea of startups (and vice versa). Other stumbling blocks include excessively long lead times in the bidding process and unsympathetic payment terms.

3. Buyer and seller do not always speak the same language – A number of our interviewees described a problem whereby tech businesses create a product before understanding whether a real need for it exists. This is symptomatic of a broader disconnect between the objectives of tech firms and those of prospective clients – something not limited to the North but apparent across the UK. Whereas a young startup may want to change the world or win plaudits with a trailblazing innovation, corporate buyers may be more focused on continuity or low-risk expansion. Efforts to find common ground between buyers and sellers are also occasionally stymied by the poor pitching abilities of founders and the lack of sales talent.

Case study inspiration

For all the talk of open innovation and porous organisational borders, the reality is that partnership work is far from straightforward. As we have seen, collaboration is particularly difficult for the tech community, whose ambitions, language and culture may be out of sync with those of larger clients – especially corporates. Below are two promising initiatives that attempt to bridge the divide:

Tech Co-operatives

Summary – Tech co-operatives vary greatly in their shape and size, but all are democratic businesses owned and operated equally by their members. Being in a co-op helps tech workers to manage periods of feast and famine, sharing jobs when they are inundated and receiving work when business is lagging. They also allow tech workers to group together to win larger contracts, and help boost the quality of bids through the crosspollination of ideas.

Achievements – The Tech Co-operatives Network in North America is testament to the growing popularity of co-ops in the digital economy. What began with just an email list of a few enthusiastic freelancers in 2004 now has over 20 member co-operatives.[48] This includes Electric Embers, a co-op providing open source internet hosting for non-profits, and Boston TechCollective, a grouping of tech experts that offers computer repair services to households and SMEs, as well as free weekly IT workshops.

Lessons learned – Establishing a tech co-operative is a challenging and time-intensive project. However, the Tech Co-operatives Network has proved invaluable in providing guidance for would-be collectives, in particular by leveraging the expertise of seasoned members to support newcomers. Having an umbrella body of this kind has also helped to demystify the idea of co-operatives in a sector that is better known for its maverick entrepreneurs than its collective movements.

47. KPMG (2014) *Corporates and startups: Hip, but not happening*.
48. For more information see http://techworker.coop/about

Corporate accelerators (L Marks programme)

Summary – Corporate accelerators are an increasingly popular method for companies to connect with innovative tech startups. Investment fund L Marks has helped a number of global brands create bespoke initiatives, including John Lewis (J Lab), DPD (Last Mile Labs) and William Hill (WHLabs). Through these accelerators, startups pitch and develop solutions to stubborn challenges facing the company in question. Each team chosen to participate receives investment, workspace, mentorship, access to experts and, ultimately, the chance to pilot their idea and see it commercialised.

Achievements – Several cutting edge start-ups have been nurtured through L Marks's corporate accelerators. Last year, John Lewis invested in all the participants on its programme, including Peeple, makers of an IoT camera device that allows homeowners to virtually look through their peephole while not at home. DPD crowned as their 2015 winner a company called Pie Mapping, which developed a system that enables DPD's linehaul managers to visualise the location of their fleet in real-time. Overall, £2 million has been invested in the startups taking part in L Marks accelerators.

Lessons learned – With their reach and reputations, companies like William Hill, DPD and John Lewis were unlikely to have difficulty connecting with startups. But their experience with the L Marks programme shows that accelerators can drastically speed up the pace of innovation. Accelerators enable corporates to find solutions to the precise challenges they are facing, rather than be pitched products and services that are tangential to their strategies. Moreover, the competitive element of these programmes leads to better quality ideas as participants vie with one another for the top prize.

"Support from accelerators like Collider and large companies like Unilever is vital for tech startups like ourselves. Still real and live, but like a trapeze with a safety net – if you get it wrong in their safe environment you'll live to get feedback and try again. Having access to large brands and learning to navigate the vastness of their processes is a positive any small business can benefit from."

Carl Wong, LivingLens

Action points

Broaching deeper connections between the North's tech businesses and its traditional industries will be no easy task, and is likely to require a cultural shift among businesses that may take many years to realise. However, several actions can be taken today that would foster better conditions for collaboration:

- **Introduce Tech Taster vouchers** – To give local firms a better sense of how tech businesses can aid their work, business support organisations in the North should consider introducing vouchers that businesses can cash-in for tech innovation support. These could be modelled on the Creative Credits scheme that was trialled in Manchester and which linked local SMEs with nearby creative firms.[49]

- **Establish a Digital Powerhouse Contract Portal** – To help buyers connect with sellers of tech services, partners in the North should explore the possibility of creating a portal that collates

49. Creative Credits was a business–to–business voucher scheme designed to encourage SMEs to innovate in partnership with creative service providers. As part of a pilot in the Manchester City Region between 2009 and 2010, SMEs received Creative Credits worth £4,000, which they could use to purchase a variety of services from local creative businesses. For more information see Bakhshi, H. (2013) Creative Credits. London: Nesta.

private and public sector contracts in one place. This could also be a gateway for prime tech suppliers (eg Cisco) to publish sub-contracting opportunities to smaller tech firms.

- **Champion the tech co-operative model** – To help smaller tech firms pool limited resources and benefit from economies of scale, digital groups in the North should consider working with Co-ops UK to introduce founders to the idea of tech co-operatives. Anyone wishing to start a co-operative should be encouraged to share their experience with other tech founders in the region.

- **Kickstart new corporate-backed accelerators** – To provide tech businesses with the best specialist support, Northern tech groups, together with Tech North, should consider identifying corporates that may be interested in backing accelerators specific to their area, as John Lewis, William Hill and DPD have done. The North's vibrant retail tech, BetTech and aerospace technology communities might profit from a new accelerator. Shorter, 48-hour hackathons solving specific corporate issues could also be beneficial.

Public Sector Collaboration

Just as digital innovation has become a priority for the private sector, so too is it becoming essential to the public sector. Part of the reason is economic: local authorities, health services, education providers and transport systems all face acute financial pressures in the wake of severe public spending cuts. Councils across the North have had to manage budget reductions of almost a third, with Manchester City Council alone forced to find savings of £309m since 2010.[50] Yet the attraction of digital innovation lies as much in improving outcomes for service users and citizens as it does in making efficiency savings. From new telecare systems that link patients with their GPs, to e-government initiatives that allow people to fill in their tax returns online, the scope to use digital products to improve people's day to day lives is vast.

Below we explore the opportunities for digitisation in several public sector areas, and consider how the region's tech businesses might serve the needs of local services.

Healthcare

Across the world, healthcare is taking up an ever greater proportion of public expenditure – and the UK is no different. Total public spending on the NHS, social care and other health services grew from 6.2 percent of GDP in 1997 to 8.8 percent of GDP in 2013.[51] There is a desire among clinicians, patient groups and the government alike to see more of this money channelled into digital innovation (tech currently accounts for £4.6bn of the NHS budget[52]). The Department of Health has stated its ambition to creation a 'paperless NHS' by 2020, and all NHS Trusts have been asked to create a Local Digital Roadmap setting out how they can help to realise this goal. Other initiatives include the Nursing Technology Fund, which supports nurses to make better use of digital technology, and the Digital Maturity Assessment, which provides a framework for assessing the extent to which healthcare services are making effective use of digital tools.

Not all of these digital products and services must be groundbreaking innovations. A large proportion of healthcare spending – whether in hospitals, GP surgeries or social care services – will continue to go on so-called 'bread and butter' technology needs. This includes IT systems,

50. For more information see www.manchester.gov.uk/budget
51. ONS (2015) *Expenditure on Healthcare in the UK: 2013*.
52. NHS Protect (2015) Guidance for NHS health bodies on the security and management of NHS assets. London: NHS.

website management and patient records software. But there are also many transformative technologies coming into play. Wearable tech allows the monitoring of patients in their own homes, online platforms bring patients together to share advice on treatments, and 3D printers may soon make bespoke prosthetics a reality. The Internet of Things, which underpins many of these new developments, is expected to boost the UK healthcare market by £48.5bn over the next decade.[53]

The North is fortunate to be at the forefront of this HealthTech movement, with a particularly strong cluster emerging in Leeds and the surrounding area. The city region is home to NHS England, the NHS Data Spine, the Health and Social Care Information Centre and the Yorkshire and Humber Academic Health Science Network. Leeds also counts the health businesses EMIS and TPP as two of its residents. In nearby Bradford, a Digital Catapult was established in 2014 with the goal of nurturing HealthTech businesses in the area, and the government recently gave the green light to a Digital Health Enterprise Zone, which as well as offering tax concessions will connect local HealthTech firms with university facilities, technology and patients willing to test their treatments. eLucid mHealth and Sleepstation are two examples of start-ups in the North that have managed to break into the nation's lucrative healthcare markets.

The challenge is to broker more relationships between tech businesses like these and the region's own healthcare services, which include 80 NHS Trusts and 68 Clinical Commissioning Groups (CCGs), as well as nearby local authorities which spend a large proportion of their budgets on social care. A good example of an existing partnership can be found in West Yorkshire, where locally-based business Immedicare provides a telecare service linking care homes in Airedale with clinicians in the nearby hospital. Another example is the Advanced Digital Institute (ADI) in Bradford, which created a 'meds companion' supporting patients to take their medicines on time – a device that is now being trialled with the Bradford Clinical Commissioning Group. The Northern Health Science Alliance (NHSA), which brings together health services and researchers from across the region, could be the ideal forum to foster more of these collaborations.[54]

Table 4: Public expenditure on key services in the North

Health	Education	Transport	Housing and community	Social protection	Public order	Local government spending on services
£31.2bn	£21.6bn	£4bn	£3.3bn	£60.9bn	£6.9bn	£36.8bn

Source: The Treasury's Public Expenditure Statistical Analyses (PESA) (2013–14).
Social protection refers to welfare payments including pensions, unemployment benefits and housing support.

53. Cisco (2015) *The Internet of Everything: Unlocking the opportunity for UK startups*.
54. For more information see www.thenhsa.co.uk/about.php

Education

Technology is also amplifying the work of educators. Wearable e-learning devices, augmented reality, virtual reality, personalised learning, robotic toys and parent-teacher communication apps are all trends coming into view. Class Dojo is a messaging app that allows teachers to send updates to parents, translating messages into several languages where parents are non-native English speakers. Another tool called Knewton helps teachers create tailor-made lessons for every student by monitoring how they respond to different content and learning materials – be it games, videos or literature. Equally impressive is an app called Learner Mosaic, which bridges the gap between online and offline learning. After observing how children react to particular tasks, it notifies parents of their strengths and weaknesses along multiple dimensions (eg colour recognition and empathy) and gives advice on what they can do to support their children through non-digital means.

"There are huge opportunities for the North to lead the way in the digitisation of public services. With the support of local tech businesses, we can create a world class healthcare system, a social care sector that truly responds to people's needs, and a local government that matches the ambitions of local communities."

Simon Hanson, The Federation of Small Businesses

Although London and Cambridge have dominated the digital learning market for many years, the North is home to a number of businesses making headway in this sector. Manchester, Liverpool, Sunderland, Newcastle and Durham all count EdTech as a specialism. Shoofly is a business just outside Sunderland that creates educational games, apps and other e-learning devices. Their one-stop-shop service for accessing learning materials – School360 – is used by 197 schools and over 5000 teachers nationwide. Osborne Technologies in Barnsley has created a suite of educational products, including EntrySign, a device to monitor teacher and pupil movements within schools, and My Romo, a robot that introduces the basics of coding to children. Other startups in the region have focused on the market for careers brokerage, including Geek Talent – a winner of Tech North's Northern Stars award – which helps recruiters find talent in STEM subjects.

While each of these companies has clients around the country and further afield, there are clear opportunities for Northern businesses to collaborate more with educational organisations on their doorstep. The region has over 7,500 primary and secondary schools, and close to 1,050 FE and Sixth Form colleges – many of which could benefit from a dose of technological expertise.[55] Schools in the UK already spend £900m on EdTech.[56] The academisation of schools also promises to give headteachers and governors more freedom to experiment with new learning devices in the classroom. Yet it is not only schools that can benefit from the region's EdTech businesses. Other potential clients include museums, art galleries and employment service providers, such as Avanta and G4S that operate in Manchester. Good practice on local collaboration can already be found in the region. Optimum, a Doncaster-based firm, supports several schools in the Yorkshire area with its Otrack service, which allows teachers and governors to track pupil attainment and progress.

55. According to the Department for Education, the North is home to 7572 primary and secondary schools, and 1052 16–18 educator establishments. For more information see www.education.gov.uk/schools/performance/index.html

56. Moules, J. (2015) UK Start-ups take slice of £130bn educational technology market [article] Financial Times, 21st October 2015.

Box 6: The public sector opportunity in numbers

- **£4.6bn** – The NHS spends £4.6bn on technology every year.[57]
- **16th** – The UK ranks just 16th (out of 29 countries) on an Europe-wide league table assessing the sophistication of digital public services across member states.[58]
- **£900m** – UK schools spend £900m a year on technology.
- **2%** – The average cost to a council of online interactions with citizens is 2 percent of the cost of face-to-face interactions.
- **28%** – Only 28 percent of the UK public think councils are confidently embracing technology.

Smart Cities

Whereas the impact of technological innovations is visible on a daily basis in health and education, it takes greater imagination to see how they could transform the nature of infrastructure services. Yet the changes being wrought by digitisation in transport, waste management, energy and other forms of infrastructure spending are just as significant. Few trends illustrate this better than the Smart City agenda, which champions the use of sensors and deep analytics to monitor and improve the delivery of core services – from traffic management and refuse disposal, through to street lighting and city cleaning. Barcelona, which is among the world leaders in the use of Smart City applications, has put sensors to use in designing new bus routes, monitoring the water requirements of parks, and speeding up emergency service response times.[59]

Several clusters in the North now service this fledgling market. In 2014 the Universities of Liverpool and Liverpool John Moores launched a £15m incubator with an explicit focus to nurture sensor-based businesses. With its history of engineering and manufacturing, Sheffield has also built a name for itself in the IoT market that underpins Smart City initiatives, sporting Pimoroni as a local firm known globally for distributing electronic parts for sensor-based devices. Meanwhile, Sunderland Software City was selected by the government-backed Digital Catapult and Future Cities Catapult to be a 'Boost' partner, tasked with showcasing the best and brightest IoT ideas developed by companies in the North East. Possibly the most talked about startup to have emerged in the North's sensor-related industry is Cocoon, based in Leeds, which makes a security device that uses innovative audio technology to detect criminal activity.

Given the relevant expertise of tech businesses in the region, it would be sensible to connect them with Northern public bodies who are kick-starting their own Smart City efforts. One of the largest initiatives underway is Manchester's CityVerve Project, which will use £10m of government money to trial a series of IoT-enabled activities, including smart lighting, talkative bus stops and smart air-quality monitoring. Other cities in the region are seeking to transform their infrastructure services in the same vein, creating a potentially lucrative market for tech businesses.

57. Evenstad, L. (2015) Spending review: Osborne gives NHS £1bn for technology boost [article] Computer Weekly, 25th November 2015.

58. Based on data collected as part of the European Digital Economy & Society Index (DESI). For more information, visit https://ec.europa.eu/digital-single-market/en/desi

59. For more information see http://smartcity.bcn.cat/en

"The next generation of transport infrastructure will require service-improvement programmes that exploit the latest developments in technology. There is a real opportunity for the North's Digital Powerhouse to be at the forefront of these changes. Tech businesses understand better than most how to create a great user experience, and local transport providers could be tapping into their expertise to take their offer to the next level."

Si Ho, Transport for Greater Manchester

Public spending on transport in the region amounts to £4bn, and this budget is likely to grow as the pan-regional Transport for the North body gets fully up and running.[60] One of its first projects will be to introduce an Oyster-style smart ticketing system across Northern cities.

Local government

Nearly every local authority has ambitious plans to transition more of its services online, allowing residents to pay their council tax, apply for events licenses, and find information about housing benefit entitlements, among other possibilities. The search for cost savings is a major driver. Research by the Society of Information Technology Management (Socitm) across 120 local authorities found that face-to-face interactions with residents costs on average £8.62, compared with £0.15 for every web-based transaction.[61] Another driver is transparency, with calls for local authorities to open up more of their accounts and data to public scrutiny. Harrow Council, a local authority at the forefront of these changes, plans to move every service online in the next 5 years, aided by a new MyHarrow tool that allows residents to track progress and receive updates on outstanding enquiries.

The digital infrastructure that lies behind these services is being developed by a number of tech businesses across the region. Most Northern clusters have a strong grouping of software companies, including the North East, which boasts more than 2,300 firms in the city and surrounding area.[62] EvaluAgent, based in Middlesbrough, specialises in workforce engagement software for call centres, while Sunderland-based Orcuma creates CRM case-management tools for clients in the public sector – including Durham County Council. A clear example of how tech businesses can aid the digitisation of council activity can be seen in Sheffield, where local business Switchstance created a software application to help Sheffield City Council manage the end-to-end process of recruiting and placing apprentices in firms with the best fit.

Although the market is relatively crowded – particularly with big players like Cisco and IBM – there is scope for greater collaboration between local tech businesses and the North's local authorities. Indeed, digital services in councils still leave much to be desired. According to a PwC survey, only 28 percent of the UK public believe councils are confidently embracing technology, and only 38 percent say they are satisfied with the digital access they have to council services.[63] New players that can bring an innovative service to the table should therefore be welcomed. Moreover, while council budgets are facing historic cuts, it is likely that the money for digital services (including that for outside procurement) will remain in place, being seen as a source of savings rather than expenses. Newcastle City Council continues to spend £8.6m on traditional ICT every year, while Manchester reportedly has an annual budget of £30–35m.[64]

60. The Treasury's Public Expenditure Statistical Analyses (PESA) (2013–14).
61. Cited in Cabinet Office (2012) *Government Digital Strategy*.
62. Sunderland Software City's latest research shows that the North East region has 2,322 software businesses. Publication forthcoming.
63. PricewaterhouseCoopers (2015) *Rising to the digital challenge: plugging the digital gap*. PwC.
64. Newcastle City Council (2014) *2016 Proposal and Integrated Impact Assessment: Informing our approach to fairness*; and CIO 100 (2016) Bob Brown interview. Accessible here: www.cio.co.uk/cio100/2016/manchester-city-council/

Barriers to collaboration

Clearly there is no shortage of opportunities for partnership working between tech businesses and public sector organisations in the North. However, the reality is that only a fraction of these are ever acted upon. Three barriers in particular are a hindrance to collaborative innovation:

"The Government has to make efficiencies year on year and these can be realised by working with tech startups and SMEs rather than the usual large IT suppliers. Northern businesses are well placed to provide much needed digital innovation to the region's public sector, particularly within the £31 billion health and social care market."

Liz Whiteley, Methods

1. The complexity of procurement procedures

The government has made several changes to public procurement processes. Pre-qualification questionnaires were abolished for all contracts under the EU threshold, a new legal requirement was introduced forcing public sector organisations to pay invoices within 30 days, and it was agreed that most contracts above £25k would be advertised on the Contracts Finder platform.[65] But procurement remains a complex arena for many tech businesses. A 2015 techUK survey of 170 SME tech businesses found that 67 percent believe procurement processes are onerous, indicating that recent changes do not go far enough.[66] One problem is that some companies are still required to submit 3 years' worth of audited accounts, while another is the tendency for the public sector to undertake very large tenders. On the occasions when small tenders for specific work are floated, there is often a stipulation attached that the winners must work with larger suppliers, which puts off small companies who fear their intelligence and staff may be appropriated.

2. Limited appetite for innovation in the public sector

Commissioners in local government, education, the NHS and elsewhere do not always have the commercial acumen or technical knowledge to design appropriate contracts.[67] A techUK survey of civil servants found that only 20 percent believe their department has the right skills for managing IT suppliers.[68] A deeper seated issue is the conservative approach that some commissioners take towards risk and experimentation. Over two thirds (71 percent) of civil servant respondents to the aforementioned survey said internal culture was the biggest obstacle to change.[69] There is also hesitation among frontline service staff to adopt new tech. A study of teachers, for example, found many to be ill-equipped or reluctant to make use of digital tools in the classroom.[70] This demonstrates the multiple layers of stakeholders that need to be engaged for collaborative innovation to work.

3. Low awareness of opportunities among tech businesses

Even when public sector bodies are willing to partner with new suppliers, it can often be challenging for tech businesses to connect with them. Both Contracts Finder and G-Cloud – a platform allowing public sector organisations to buy off-the-shelf cloud IT services – have made it easier to find and secure clients. But these schemes are far from perfect, and many tech

65. Lord Young (2015) *The Report on Small Firms 2010–15*.
66. techUK (2015) *Procuring for Innovation and Growth: Making the case for British based SMEs*.
67. Reform (2016) *Cloud 9: The future of public procurement*.
68. techUK (2015) *Delivering better public services through tech*.
69. Ibid.
70. Anthony P. and Bamfield, L. (2015) *The New Digital Learning Age*. The RSA.

advocates have voiced concerns about their profile and take-up.[71] Another challenge is that public sector organisations release scant data about their objectives and procurement history, leaving tech businesses with only a basic understanding of what public organisations are looking for and the likelihood of them winning business.[72] It is also worth noting that many tech firms are put off by solution-focused procurement where the 'answer' to a given problem is already strictly spelled out up front by commissioners.

4. The stickiness of proprietary software

Public sector organisations are often wedded to proprietary software – such as Microsoft Office products – where the underlying source code cannot be modified. While this has its proponents, it often locks organisations into using the same supplier for long periods, since any alteration may require extensive retraining and possible outlay on new equipment. In contrast, software built on open source platforms – where the underlying source code is freely modified – is easier to change because there is likely to be a suite of similar software packages built on the same code. Not only does this mean the software is often cheaper for public sector organisations to use, it also gives new software developers a chance to break into the market.

Case study inspiration

Whether it is the complexity of procurement procedures, lack of commercial acumen among commissioners, or scarcity of useful data on procurement outcomes, tech businesses in the region face several obstacles that prevent them co-innovating with the public sector. These barriers are not necessarily insurmountable, however, as shown by the following global and local case studies:

FastFwd, Philadelphia

Summary – FastFwd is an open innovation competition in Philadelphia that invites entrepreneurs to devise tech-based solutions to the city's biggest challenges, such as gang violence, youth unemployment and access to housing. Describing itself as an 'urban innovation refinery', FastFwd selects ten applicants every round and helps them to develop their ideas through a 12 week support programme and $10,000 stipend. Throughout this incubation period, the teams have the opportunity to sound out their ideas with city officials and invite feedback from other innovators involved in the programme.

Achievements – FastFwd's first competition in 2013 saw three of the final ten teams go on to win city contracts worth between $30,000–35,000. Jail Education Solutions created a new tablet-based education and skills training system for prisoners, while Textizen tweaked its existing text messaging platform to link ex-offenders with their case managers. The latter is thought to have improved parole meeting attendance by 40 percent.[73] Alongside holding further competitions, the city leaders have made a concerted effort to 'institutionalise' these open procurement methods across the public sector.

71. Data from the Government Digital Service (GDS) shows that two thirds of councils have never used G-Cloud. Donnelly, C. (2015) *Barriers to adoption: Why are local councils holding back on G-Cloud?* [article] Computer Weekly, August 2015.

72. Reform (2016) *Cloud 9: The future of public procurement*.

73. For more information see http://mayorschallenge.bloomberg.org/ideas/fastfwd/

Lessons learned – FastFwd demonstrates the value of problem-focused procurement methods that invite experimentation, rather than solution-focused methods that only seek delivery of existing ideas. Participants in the first competition also commented that FastFwd's ability to 'open doors' for them and secure meetings with commissioners was nearly as important as the accelerator itself.[74] Similar schemes have since emerged in Barcelona (the Barcelona Open Challenge), London (Tech Londoners) and Sheffield (Sheffield Smart Lab).

NHS Hack Day

Summary – NHS Hack Days bring together tech specialists, service users, clinicians and others to create tech solutions to pressing challenges experienced in the NHS – from addressing loneliness among patients to managing the correct choice and dosage of medicines. Following the typical 'hack' model, participants group into teams and work on their ideas over the course of a weekend. At the end of the event, teams present their refined ideas and receive feedback from judges and other attendees.

Achievements – Twelve NHS Hack Days have taken place to date, three of them in Northern cities. Ideas to have emerged include Balance, a new tool to help clinicians and patients reach shared decisions on treatment choices, and Locamotor, a platform designed to match bank staff looking for work with vacant slots in hospital rotas. The organisers have also coordinated work on several long-term projects, such as Open BNF, which provides health professionals with access to drug dosage information.

Lessons learned – NHS Hack Days are ostensibly about creating useful digital tools, but the power of these events lies as much in their ability to inspire and start conversations. The organisers want healthcare professionals to come away feeling more comfortable with digital innovation, for career developers and recruiters to have a better understanding of the digital talent out there, and for policymakers to see what can be done quickly with limited resources at their disposal.

Dotforge Health & Data

Summary – Dotforge is a pre-seed startup accelerator focused on tech-for-good companies. Having run two pilot programmes in 2015, Dotforge recently created a specialist stream of support to accommodate the high demand from HealthTech startups. The new Health + Data programme is geared towards tech businesses with solutions in self-monitoring, early stage screening, remote monitoring and medicines adherence. Successful applicants are offered £15–20k of investment on a convertible loan, plus three months of support, mentoring and office space.

Achievements – The Dotforge Health + Data stream began in early 2016, and it is therefore too early to judge its impact. However, the experience of Dotforge's previous accelerator programmes give cause for optimism. Over 300 teams applied to these schemes and 20 graduated, including businesses in HealthTech, EdTech and the social impact 'tech for good' space. From this cohort, six teams have received follow up funding, either from VCs or angel investors, while seven are currently in negotiations with corporates and investors.

74. Reyes, J. (2014) FastFWD, Philly's public safety accelerator, rethinks itself [article] Technical.ly, 1st October 2014.

Lessons learned – Tens of accelerators have sprung up in the UK over the last decade, but what sets Dotforge apart from many others is that it specialises in a particular industry, knowing the sectoral strengths of the region in which it operates. In this case, Leeds was chosen because of its HealthTech cluster. The accelerator is also notable for its rich network of partners, which includes a major health firm (EMIS), investor (Mercia Fund) and academic expertise (Yorkshire AHSN).[75]

TravelSpirit, Transport for Greater Manchester

Summary – Launching in 2016, TravelSpirit will be an infrastructure platform with a 'commons of code' that developers can use to build open source transport software. In layman's terms, TravelSpirit aims to be for transport apps what Wordpress is to websites. Tech businesses will be allowed to dip into freely accessible source code to build new products and services, which can then be sold on to municipalities or commuters.

Vision – Plans for TravelSpirit are still being drawn up by leading members of the consortium (see below), but the idea already has backing from Tech North, and the UK's Department for Transport (DfT) and Department for Business, Innovation & Skills (BIS). The team behind TravelSpirit see it being used in a number of ways, including to develop bike sharing apps, carpooling schemes, journey planners and ticketing systems – all products that can be sold to buyers in the North as well as abroad.

Implications – TravelSpirit intends to demonstrate that, with the right infrastructure in place, products built on open source code can be a viable alternative to the proprietary software developed by big suppliers. Buyers of digital products in health, education and local government should pay close attention to the outcomes of TravelSpirit, should the principles behind it be transferable to their own sector.

Travel Spirit consortium: Accenture, Mydex CIC, TransportAPI, Simply Connect, The Landing, Manchester Metropolitan University, University College London, Institute of Engineering & Technology, MaaS Finland, IDM Südtirol, Transport for Greater Manchester (TfGM) and the emerging West Midlands Combined Authority (WMCA).

Action points

How might collaboration between tech businesses and the public sector be strengthened? Below we set out a number of ideas for organisations in the region to take forward.

- **Make the North a digital sandpit for experimental tech** – To draw attention to the region and highlight its tech expertise, Northern tech clusters should look at ways they could be proving grounds for experimental technologies. Central government, public services and corporate technology teams could be invited to trial emergent innovations in Northern cities, for example driverless cars, robotics in social care, or the use of blockchain in welfare payments.

75. AHSN stands for Academic Health Science Network.

- **Establish digital immersion events** – To improve the public sector's understanding of the digital economy, public service teams should consider organising 'immersion events' with nearby tech communities where they can share procurement knowledge and learn about local needs and strengths.

- **Move towards 'problem-based' commissioning** – To ensure procurement is inclusive and invites experimental ideas, public sector commissioners should consider the option of problem-based commissioning. Unlike solution-focused procurement, the answer is not defined at the outset and applicants are instead encouraged to re-think issues from the bottom up. Tenders should ideally have input from experts who know the tech terrain, and briefs should preferably be written with the guidance of tech companies.

- **Open up data on KPIs and procurement results** – To help tech businesses better understand what the public sector wants, local authorities and public services should should consider releasing on their key performance indicators (KPIs). They may also wish to publish information on their procurement history, including the average size of contracts, the duration of contracts, and the types of businesses that have secured contracts with them in the past.

- **Create a 'Procurement Powerhouse' social enterprise** – To help public sector organisations connect more easily with local suppliers, Northern entrepreneurs should consider working together to establish a new social enterprise that acts as a matchmaking agent. This could seek to emulate the work of the North East Procurement Organisation (NEPO), which undertakes high-value commissioning on behalf of 11 councils in the North East.

- **Encourage the use of open source software** – To loosen the grip that proprietary software providers have on the public sector, tech advocates in the North should champion the use of open source software and the tech businesses building it. The North should also back infrastructure platforms like TravelSpirit, which could be a springboard for the region's startups.

Knowledge Exchange

The last two chapters demonstrated the potential for Northern tech clusters to strengthen public and private sector supply chains. Manchester's e-commerce cluster was mapped onto the region's retail industry, Liverpool's IoT community was held up as a source of ideas for local manufacturing, and Leeds's vibrant HealthTech scene was highlighted as a potential supplier to nearby health services. In this chapter we take a step back and consider how tech businesses can make better use of surrounding knowledge assets in order to develop more pioneering products and services. The end result of this form of collaboration is not sales or investment opportunities, but rather intellectual property and product ideas.

At first sight it may seem as though the region's tech clusters have the cards stacked against them in terms of research support. The government and research councils spend only 7 percent of their R&D budget in the North, compared with 37 percent in the South East and 15 percent in London.[76] Yet look closer and it is possible to see a vast amount of latent knowledge that could be wielded for research and product development. Not only is the region home to world-class universities and science parks, it also has a network of businesses – large and small – that could share their intelligence and data. There is also the tech community itself, whose collective body of expertise and experience is not to be underestimated.

Table 5 highlights a number of the North's key institutions (excluding universities). The rest of this chapter looks at how these and other knowledge assets might be better used by the region's tech clusters.

Universities

The North is home to 29 universities, 7 of which are in the Russell Group and 3 of which rank in the world's top 100 higher education institutions (HEIs).[77] To put this into context, there are more world class HEIs in the region than there are in Spain, Italy and France combined. A number of these universities have well-respected computer science departments. The Universities of Leeds, Newcastle, Liverpool John Moores and Sheffield rank in the top 10 UK HEIs for paper citations in the field of information economics, while York, Manchester and Sheffield are in the top 10 for paper citations in Big Data.[78] Overall, Northern universities educate 520,000 students at any one time, with 78,000 alumni graduating every academic year.[79] Manchester alone is host to almost 100,000 students.

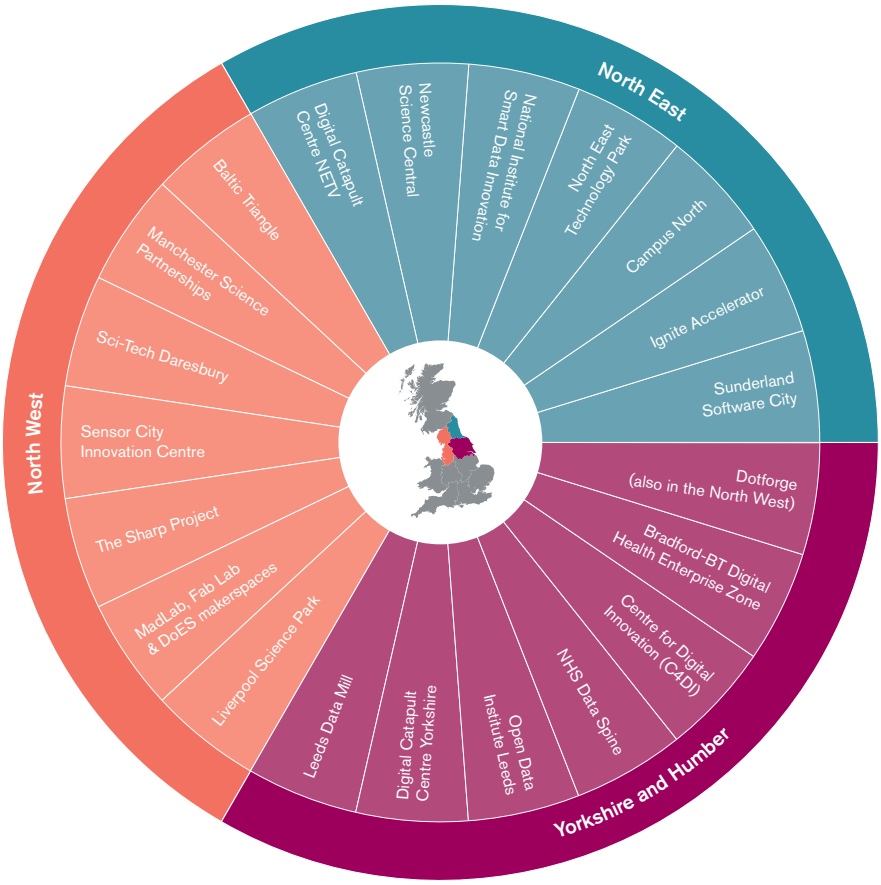
76. RSA analysis of UK Gross Expenditure on Research and Development data (2013).

77. According to the Times Higher Education World University Rankings. The three universities are the University of Manchester, Durham University and the University of Sheffield.

78. Department for Business Innovation and Skills (2013) *The Witty Review: Encouraging a British Invention Revolution: Sir Andrew Witty's Review of Universities and Growth*. BIS.

79. Cox, E. (2015) *Rhetoric to Reality: A Business Agenda for the Northern Powerhouse*. IPPR.

Table 5: Examples of knowledge assets in the North



It is difficult to overstate how much of an asset the university knowledge base is to the region's digital economy. Evidence shows that the specialisms of universities often shape the trajectory of nearby tech clusters.[80] Nesta research, for example, has found a link between the prevalence of gaming industries in an area and the presence of a games department in a local university.[81] Knowledge Transfer Partnerships (KTPs), student placements and consultancy work are some of the ways universities can collaborate with tech businesses. A good example of a recent partnership is that between Manchester Metropolitan University (MMU) and a Stockport-based logistics company called ServicePower. Through a KTP, ServicePower worked with researchers at MMU to develop a quantum computing programme that could optimise the fastest routes for vehicle delivery.[82]

Northern universities already perform well on interactions with local businesses. Five of the region's HEIs rank in the top 10 UK organisations for consultancy research with SMEs.[83] But there is potential

80. BVCA (2013) *Tech Country: Looking beyond London in search of Britain's technological future*.

81. Mateos-Garcia, J., Bakhshi, H. and Lenel, M. (2014) *A map of the UK games industry*. London: Nesta.

82. For more information see www.mmu.ac.uk/news/news-items/4204/

83. Department for Business Innovation and Skills (2013) *The Witty Review: Encouraging a British Invention Revolution: Sir Andrew Witty's Review of Universities and Growth*. BIS.

to go further, deepening these connections and bringing on board tech businesses that may otherwise have researched alone. We know, for example, that universities in the region could do more to boost their offer on continued professional development.[84] There may also be scope for universities to create discreet programmes specifically to support the local digital economy. Inspiration can be taken from MMU's Centre for Digital Innovation, which hosts a TV and radio studio, 3D printing facility and teaching space. The involvement of the Universities of Liverpool and Liverpool John Moores in a £15m 'sensor tech' incubator is another demonstrator of what is possible.

Box 7: Science parks

The North has several high-tech science parks, including Liverpool Science Park, Sci-Tech Daresbury, York Science Park, Newcastle's Science Central and the Manchester Science Partnerships (MSP) group, which has several sites dotted throughout the North West. Each science park offers workspace, high quality equipment and onsite expertise, often imported from nearby universities. Nearly 80 percent of companies in Daresbury collaborate with a university or the research organisation on site, while 60 percent collaborate with other business tenants.[85] Increasing efforts are being made to link these science parks with the region's tech clusters. The MSP group, for example, is working with GMPTE and other Manchester partners to run an open innovation programme for IoT businesses as part of the City Verve project. Daresbury, meanwhile, hosts several pioneering tech firms, including Perceptive Engineering – makers of predictive control software that improves the efficiency of manufacturing and wastewater treatment – and Optis – developers of software products that help engineers visualise lighting and display systems.

Corporates

Universities are not the only vehicles for knowledge exchange. More than 600 very large businesses (with 500+ employees) are based in the North, all of which have ideas and expertise that may be of use to surrounding tech companies. The private sector invests approximately £2.7bn in research and development in the North every year, twice the amount spent in London (see Table 6). Knowledge exchange between tech clusters and corporates can range from the short-term and light touch – for example startup guides and mentoring – through to the long-term and intense – such as incubation and staff secondments. Unlike the collaborative innovation discussed in the chapter on private sector supply chains, no money changes hands and the advantages for corporates reveal themselves over a longer period.

What does knowledge exchange of this kind look like in practice? A good example comes from the work of Rabobank, which in partnership with the London accelerator Startupbootcamp is connecting its employees with fledgling FinTech companies looking for financial expertise.[86] Google is another multinational company with strong intentions to support tech businesses. Its Campus space in London provides access to

84. Ibid.
85. These figures were given to the RSA in communications with Daresbury staff.
86. Bannerjee, S., Bielli, S. and Haley, C. (2016) *Scaling Together: Overcoming barriers in corporate-startup collaboration*. London: Nesta.

thought-provoking tech talks, as well as a 'device lab' where developers can test their applications on multiple devices. On the hardware side, Intel run regular hack events that make valuable connections between tech startups and the company's expert engineers. Intel is currently running an Internet of Things Roadshow giving training to makers in their new micro-computer 'Dev Kits'.

Corporate activity of this kind is already visible throughout the North's tech clusters. In 2014 Santander opened its own incubator in Liverpool, while last year Barclays did the same in Manchester with its new Rise co-working space, which supports tech startups of all kinds. In Leeds, the medical business EMIS will soon be providing health expertise to a new cadre of recruits on the Dotforge Health & Data accelerator. What makes all these examples significant is the degree of corporate commitment involved – bolt-on CSR schemes they are not. Looking to the future, a key task will be to encourage and enable locally-grown, medium-sized firms to play a similar role. A good demonstrator project can be seen in Leeds, where the Yorkshire Post has teamed up with Leeds Beckett University to form a co-working space called Leeds Digital Hub.

Table 6: Northern R&D expenditure across different sectors

Business		Higher education		Government and research councils	
Total	% of UK spend	Total	% of UK spend	Total	% of UK spend
£2.7bn	14%	£1.4bn	18%	£0.16bn	7%

Source: RSA analysis of ONS data on UK Gross Expenditure on Research and Development (GERD) (2013).

Data

A third form of knowledge exchange is data flows. The world's store of data roughly doubles in size every year, creating more of the raw material that fuels the work of tech companies – including those in the North. Callcredit is a Leeds-based company that harvests and analyses data for retail businesses, Albatross in Cheshire uses health data to help the NHS predict its expenditure more accurately, and Opta in Leeds crunches and packages sports data for broadcasters like Sky. Partly in a bid to boost commercial applications of data, the government has opened up 15,000 public datasets from government departments and organisations such as the Met Office and Companies House. As a result, the UK is ranked 1st out of 86 countries on the Open Data Barometer.[87] Tech businesses now have access to nationwide information on everything from hospital infection rates to local crime statistics to school performance results.

With central government leading the international pack in opening up their data, attention is now turning to the activities of local government and public services. Information on council spending, benefit claims, property usage and road maintenance are examples of local datasets that

87. For more information see www.opendatabarometer.org/report/analysis/rankings.html

could be crunched by tech businesses for research and commercial purposes. Several initiatives have already emerged in Northern cities to collate and connect such data with local innovators. The Leeds Data Mill was established to champion open data in the city, and runs training courses in how to tap into publically available information. In the same vein, Greater Manchester's Data Synchronisation Programme has worked to release the most useful of the city's datasets. Developers have since used the data to create apps that incentivise exercise, encourage recycling and measure streetlight energy use.

Box 8: The knowledge exchange opportunity in numbers

- **3** – The North has 27 universities, 3 of which rank in the world's top 100 HEIs.
- **x2** – Approximately £2.7bn is spent on R&D by businesses in the North – twice the amount spent in London.
- **262** – Leeds Data Mill publishes 262 datasets with information on the city – covering everything from council spending to waste collection to road traffic accidents.
- **77%** – 77 percent of tech founders in Newcastle, Durham and Hull say local networks are an important benefit of being situated in their cluster.
- **9,432** – 9,432 people have taken part in digital economy Meetup groups in Manchester.

But public sector data flows are only half the story. Equally exciting is the prospect of opening up the datasets of private sector companies to tech businesses. The North East and Tees Valley Digital Catapult Centre has an explicit remit to encourage greater data sharing between businesses, and it recently partnered with local car manufacturer Nissan to connect its quality assurance data with the surrounding software community. The Catapult Centre also worked with Barclays on a competition that saw local tech firms crunch the bank's data in a bid to solve several organisational challenges. In Leeds, an EPSRC-backed National Consumer Data Research Centre is encouraging large retailers to share their datasets (such as on sales and loyalty card schemes) and is helping e-commerce businesses mine them for useful insights.

Community

While universities and businesses are important sources of knowledge, some of the richest ideas and insights pass between tech founders, developers and other people in local tech scenes. Evidence shows that firm performance is linked with effective networking – not the careerist and transactional kind but that which is founded on genuine interest, mutual support and sometimes friendship.[88] Taking part in organised gatherings, digital festivals and online platforms are all ways founders and their teams can engage in constructive criticism and friendly debate. Chance encounters are equally important, whether they happen at co-working spaces or the many bars dotted throughout tech clusters. Significantly, the larger

88. See for example Dodd, S. D. (2007) 'Mumpsimus and the Mything of the Individualistic Entrepreneur' in the *International Small Business Journal, 25(4)*.

and more diverse a tech community is, the greater the pool of 'collective genius' to be tapped.

The North is fortunate to have several vibrant tech communities. Networking groups include Sheffield Digital, Silicon Drinkabout in Leeds and Creative Kitchen in Liverpool. Data from the events platform Meetup shows that nearly 1,200 people have taken part in digital economy groups in Newcastle and Durham, 1,500 in Liverpool and 1,950 in Leeds (see Table 7). Hull Digital started in 2009 with just 10 people meeting in a coffee shop, and now has 957 members. Added to these groups are a growing number of tech-focused festivals, such as Thinking Digital in Newcastle, FutureEverything in Manchester and Leeds Digital Festival. Co-working spaces like Newcastle's Campus North have also taken off, and last year the chancellor promised to invest millions in three tech hubs in the North: an eight-floor space in Manchester (Forward), a six-floor hub in Leeds (Futurelabs) and a tech hub in Sheffield (MakerHub).[89]

Table 7: Meetup activity in Northern tech clusters

Cluster	Unique Meetup participants	Top Meetup specialisms
Liverpool	1,498	E-Commerce; Makers, Hackers & IoT; Games Development
Manchester	9,432	E-Commerce; HealthTech; Data Infrastructure
Sheffield and Rotherham	912	Software Development; Makers, Hackers, & IoT; Entrepreneurship
Leeds	1,949	Open Source; Web Development; Mobile Development
Hull	869	Digital Media & Marketing; Data Infrastructure
Newcastle and Durham	1,176	E-Commerce; Data Infrastructure; Digital Media & Marketing

Source: Meetup data originally accessed by Nesta and documented in Tech Nation (2016).

Do tech businesses in the North value these communities? The findings of the recent Tech Nation survey suggest so. 77 percent of founders in Newcastle, Durham and Hull said local networks are an important benefit of their cluster, while 67 percent of founders said the same in Liverpool.[90] The challenge for the North is to expand and deepen these networks further, plugging more of the region's tech founders into its rich ecosystem. Tech North's new Founders' Network is a good start, and will frequently bring the region's founders together to benefit from

89. Goodfellow, C. (2015) *Budget 2015: Government announces startup incubator investment for the North* [article] BusinessZone, 18th March 2015.

90. The Tech Nation survey received 1797 responses and was conducted between 15th September and 11th October 2015. For more information see Tech City UK and Nesta (2016) *Tech Nation 2016*. London: UK.

"A strong and inspiring tech community is at the heart of what has happened in Hull over the past 5 years. From Hull Digital's inception in 2009 to the opening of the new C4DI building, it is clear how important this is. Simply put, people are stronger together and this creates more opportunities, more collective knowledge plus business growth and jobs."

Jon Moss, C4DI

peer-to-peer knowledge sharing and skills-based workshops.[91] Another move should be to encourage more of the region's seasoned entrepreneurs to share their 'elder wisdom' with fledgling founders. Lindsay West and David Keel, both from Hull, are two examples of entrepreneurs who head up global companies and are paying it forward through mentoring, incubation and events for nascent Hull-based startups. Another goal should be to foster connections between people looking to partner on a venture. Research suggests that having a co-founder can tip the scales in an entrepreneur's favour.[92]

Barriers to knowledge exchange

While knowledge may be abundant, it is not necessarily easy to retrieve. Universities can be labyrinths, corporates are often difficult to negotiate with, and huge amounts of data remain locked away in servers and spreadsheets. Here are three among many barriers to accessing useful intelligence:

1. Universities have different priorities and IP procedures – Around 90 percent of HEIs now have designated 'entry points' for businesses seeking to collaborate, and there will soon be an online brokerage tool to help firms find the right research support from across the UK's universities.[93] Yet there is still room for improvement, according to last year's Dowling Review.[94] Too much pressure is put on university technology transfer (UTT) offices to generate a quick return on intellectual property, rather than invest in long-term commercialisation partnerships. Universities have been known to encourage companies to licence IP to other businesses at an early stage, rather than develop their own products over time. Another problem is the onerous contractual agreements that tech firms have to negotiate, for example when dealing with IP, indemnities and warranties. This is one reason why – as the Dowling Review points out – the cost of collaborating with universities appears to be higher in the UK than in comparable countries.

2. Data is underappreciated and often unintelligible – Central government has made great strides in opening up its datasets for commercial use, yet local government and private companies have not kept up. One problem is that some organisations, particularly SMEs in the private sector, underestimate the value of the data they create, whether that be administrative (eg point-of-sale receipts) or reference data (eg product bar codes).[95] Organisations may also wish to withhold data because of concerns about commercial confidentiality or user/client privacy. An Ipsos MORI poll found that 60 percent of people lack confidence in the ability of companies and public data bodies to keep their data secure.[96] Even

91. For more information see http://technorthhq.com/founders-network/
92. Dellot, B. (2013) *Disrupt Inc*. London: RSA.
93. Department for Business, Innovation and Skills (2015) *The Dowling Review of business-university research collaborations*. London: BIS.
94. Ibid.
95. Open Data Institute. *How to make a business case for open data*. Available: theodi.org/guides/how-make-business-case-open-data
96. Ipsos MORI (2012) *Understanding Society: Evolving public services, evolving public opinion*. London: Ipsos MORI.

when councils, public services and businesses are willing to share their data, it is not always presented in a timely manner or useable format.

3. Fears about aiding competitors can lead to secrecy and isolation – The most forward thinking corporates appreciate that innovation is a long-term game, and that sharing knowledge with up and coming tech firms will yield benefits over time. Barclays, Rabobank, Intel and Microsoft all assist tech startups that could one day turn into competitors, but they realise that to ignore them would be to risk not bringing them on side and missing first refusal on their innovations. However, not all firms take such an enlightened stance. Some corporates demand that tech businesses sign elaborate non-disclosure agreements before they can meet for the first time.[97] The same tendencies towards secrecy often exist between tech founders, with some entrepreneurs avoiding incubators, pitching sessions and meet-up groups for fear of inadvertently sharing their ideas with a potential competitor.

Case study inspiration

As stubborn as these barriers may appear, they are neither inevitable nor unmanageable. As the case studies below reveal, data can be opened up, secrecy can be subdued and the maze that is university procedures can be cut back and more easily navigated.

Swirrl

Summary – Based in Manchester, Swirrl helps organisations release their data in a format that is machine readable and easy to understand. PublishMyData is Swirrl's software-as-a-service data publishing platform, which helps public sector organisations share their data effectively, in a well-defined, interconnected, machine-accessible, clearly structured and documented form, ready for analysis and application. Swirrl provides additional services including custom apps, visualisations, training and open data consultancy. The aim is to open up data to a range of users: the data-owning organisation itself, partner organisations and businesses.

Achievements – Swirrl has worked with several local authorities and public bodies to open up their data, including the Department for Communities and Local Government (creating OpenDataCommunities.org), the Scottish government (http://statistics.gov.scot) and Hampshire County Council (HampshireHub.net). Closer to home, Swirrl supported the creation of Greater Manchester's Data Synchronisation Programme (see above) by hosting its data and training council officers. An accompanying hackathon saw nine teams from across Europe create apps using local council data. Swirrl is now working with Trafford Council in the EU funded OpenGovIntelligence project, which will support taking forward the GM Datastore, helping local government across Manchester with data-driven decisions.

97. Bannerjee, S., Bielli, S. and Haley, C. (2016) Op cit.

Lessons learned – Swirrl's USP is that 'everything is taken care of' for clients wishing to release their data. The team help organisations identify their data, upload it onto Swirrl's user friendly cloud-based platform, and train staff in how to manage the platform going forward. Swirrl also make efforts to build enthusiasm for the data's possibilities among potential users. Its work with the Scottish government saw it create several tutorials to help people understand how to make the most of what was being published.

Barclays Rise

Summary – Rise, in partnership with Barclays, is a global community of start-ups and corporates working together to create the future of financial services. After testing the concept in London, Barclays opened its second Rise site in Manchester, before expanding to New York, Cape Town and Tel Aviv, with sites in Mumbai and Vilnius coming soon. Rise Manchester is a 200 member capacity co-working club, partnered with Central Working. The site provides access to meeting spaces, talks, mentorship, hackathons and a free state of the art events space. The Manchester community is connected to the Barclays UK technology HQ in Cheshire, as well as to the corporate and wealth head office located nearby. The local Barclays workforce (3,500 strong) contribute with mentoring and attendance at key events

Achievements – Since its inception, Rise in Manchester has nurtured a close-knit network of tech businesses and support organisations.[98] A key achievement has been hosting on-site startup accelerators, including the Dotforge Social Impact Accelerator and the soon-to-launch Ignite Accelerator. Rise has also provided opportunities for startups to work with Barclays on open innovation proof of concepts, including Hello Soda, a data analytics company providing insights to improve credit decision-making and reduce fraudulent activity.

Lessons learned – The experience of Barclays shows that thoughtful collaboration trumps knee-jerk competitive responses. While it may seem counterintuitive, sharing knowledge with startups operating in the same market can pay dividends for corporates over time. For example, the Barclays Accelerator programme in London (one of multiple locations) featured startup Cutover, who were then onboarded as a supplier to the Barclays Radbroke Team. New ideas seep into the organisation, the horizons of employees are broadened, and the business as a whole gains multiple entry points into new and fast-changing markets.

SETsquared Partnership

Summary – The SETsquared Partnership is a long-standing enterprise partnership between the universities of Bath, Bristol, Exeter, Southampton and Surrey. SETsquared specialises in growing high-tech start-ups through its incubation programme and other business acceleration services. These include high profile Investment Showcase events in London, where member companies pitch their technology to investors; an Open Innovation Programme which brokers relationships between large corporates and member start-ups; and a regular series of 3-day Entrepreneurship Programmes which aim to give entrepreneurs the tools they need to run a successful high-tech venture.

98. More info can be found at www.thinkrise.com

Achievements – In 2015 SETsquared Partnership was ranked the number one university business incubator in the world. Since its inception 14 years ago, it has supported more than 1,000 hi-tech startups, raised more than £1bn of investment and supported the creation of 9,000 new jobs. Among its success stories are Ubiquisys who were acquired by Cisco in 2013 for $310 million and the crowd-funding platform Crowdcube which has raised over £100 million of funding.

Lessons learned – SETsquared demonstrates that a group of universities can achieve more than the sum of its parts. Between them, the five partner HEIs have 7,400 academics, 10 percent of the UK's total patents and 8–10 percent of the higher education research budget – all of which allows for economies of scale. A good example of collaboration is the ICURe Innovation to Commercialisation – piloted by SETsquared and funded by InnovateUK and HEFCE – which funds university researchers with commercially-promising ideas up to £50K to 'get out of the lab' and validate their ideas in the marketplace.

Action points

Inspired by these case studies and informed by our earlier analysis, we put forward several recommendations designed to open up knowledge assets in the region:

- **Organise a '600 that Share' movement** – To make the most of corporate insights and intelligence, tech advocates in the North could encourage the region's 600 very large businesses to pledge to do more in supporting their local tech community. The pledge should link to a manifesto of practical steps, such as sharing data or arranging secondments.

- **Establish a 'Founder of Founders' award** – To recognise community collaboration, a new Founder of Founders award could be given to business owners who do the most to support their fellow entrepreneurs. This could be embedded within an existing programme of prizes like the annual Northern Digital Awards, or be weaved into Tech North's Founders' Network.

- **Pool the resources of university outreach teams** – To benefit from economies of scale, the outreach teams of Northern universities should consider joining forces and offering a single unified offer to local tech businesses (and other firms). Inspiration can be taken from the SETsquared Partnership, which has set a gold standard for university business services.

- **Consider a 'what works' review of tech business support** – To better understand what tech businesses need in order to thrive, tech advocates in the North should consider undertaking a 'what works' review that harvests the opinions of founders from across the region. The aim would be to identify how existing business support can reduce common pain points in the entrepreneurial journey.

Next Steps

Picture the North's Digital Powerhouse 10 years from now. Tech businesses have become woven into the fabric of public service delivery, transforming teaching, healthcare and local government in the process. Tech clusters have meshed with nearby industries, boosting innovation in sectors ranging from aerospace and media, through to logistics and finance. And universities and corporates have opened their doors to collaboration, channelling information, insights and data to fuel the work of local tech firms. Above all, the region has shrugged off any doubts that it has what it takes to compete on the global stage. It has a self-belief that attracts talent and investment the world over.

This is not a fantasy scenario. As our report shows, the North's digital economy already has pockets of brilliance and is increasingly anchored in the surrounding community. But further progress will only be made with concerted effort on all sides – with greater action and fewer words, and with more robust insight and less reliance on instinct. It is true that much will be determined by the government's decisions on education, infrastructure investment and spending patterns in public services. Yet it would be wrong for the North to resign itself to a course charted by others. With the right ideas and determination, the region's tech clusters can harness the full breadth of the world-class assets at its disposal – including its rich network of private and public sector supply chains, universities, science parks, data stores, digital communities and cultural heritage.

Here is a reminder of our proposals, all of which will be explored in the coming months:

- **Introduce Tech Taster vouchers** – The introduction of vouchers should be considered as a way of allowing businesses to get a taste of what tech could do for them.

- **Establish a Digital Powerhouse Contract Portal** – A portal could be created that collates both private and public sector contracts in one place, establishing a Northern hub of commercial opportunities for tech companies.

- **Champion the tech co-operative model** – Tech co-operatives should be promoted in the North as a means of helping tech firms band together and achieve economies of scale.

- **Kickstart new corporate-backed accelerators and hack days** – Northern tech groups, together with Tech North, should consider identifying corporates that may be interested in backing accelerators and hack days specific to a subsector of the digital economy (eg FinTech and HealthTech).

- **Make the North a testbed for experimental tech** – Northern tech clusters should look at ways they could be proving grounds for experimental technologies (e.g. the use of robotics in social care or blockchain technology in the welfare system), enabling the North's tech clusters to provide cutting edge solutions to a forward-thinking marketplace.

- **Establish digital immersion events** – Public service teams should consider organising events with nearby tech communities in order to share procurement knowledge and better understand local needs and strengths.

- **Move towards 'problem-based' commissioning** – Public sector commissioners should consider the benefits of problem-based commissioning, which does not define solutions from the outset.

- **Open up data on KPIs and procurement results** – Local authorities and public services should consider releasing their data on procurement history and key performance indicators (KPIs) so as to help tech communities understand the opportunities available.

- **Create a 'Procurement Powerhouse' social enterprise** – Northern entrepreneurs should consider creating a social enterprise to link public sector buyers with tech businesses in the region, providing a sustainable solution to matchmaking.

- **Encourage the use of open source software** – Partners in the North should champion the use of open source software to enable collaborative innovation, opening software markets up to more local competition.

- **Organise a '600 that Share' movement** – The region's 600 very large businesses could be encouraged to pledge to do more to support their local tech community.

- **Establish a 'Founder of Founders' award** – A Founder of Founders award could be given to business owners who do the most to support their fellow entrepreneurs.

- **Pool the resources of university outreach teams** – The outreach teams of Northern universities should consider joining forces to present a single unified offer to local tech businesses.

- **Commission a 'what works' review of tech business support** – A 'what works' review could be undertaken to better understand how the region's business support offer might be improved for tech businesses.

Appendix

Methodology

This report draws heavily upon the analysis undertaken by Nesta and other partners for the 2016 Tech Nation report, which looked at the growth of the digital economy across the UK. Wherever possible we have sought to employ the same datasets, including those relating to the Annual Population Survey and the Annual Business Survey. Some of the data featured in this report is drawn directly from the Tech Nation paper, and some derived from original RSA data mining. Whenever data is cited in the report, we explain in the footnotes where this information originates. Our definition of the Northern region encompasses the North West, North East and Yorkshire and Humber.

Our report uses the same Standard Industry Classification (SIC) codes and Standard Occupation Classification (SOC) codes as Nesta to identify data relevant to the digital economy (see below). However, these codes are imperfect labels of digital economy activity, and they struggle in particular to show how the tech business population breaks down by subsector. For example, there are no SIC or SOC codes that can reveal the numbers of FinTech, HealthTech, e-commerce or data analytics companies.

To aid this task, we have drawn upon information gathered by a company called GrowthIntel, which uses Big Data to generate predictive marketing intelligence. GrowthIntel's innovative methodology involves analysing the text found on thousands of company websites to identify where they sit within the digital economy. This information provides invaluable insights into the relative presence of different digital subsectors across the UK, such as FinTech, EdTech and online gambling. Our report also uses labour market data from a company called Burning Glass Technologies, which analyses millions of job postings to understand occupational trends, skill gaps and salary changes in different industries. A full explanation of the methodologies used by these Big Data companies can be found in the Tech Nation 2016 report.

Alongside the quantitative research, the RSA and Impact Hub worked with Tech North to run stakeholder workshops in Manchester, Leeds and Hull. These were designed to explore the challenges and opportunities facing Northern tech clusters, and to better understand the region's key assets – be they universities, science parks, big businesses or otherwise. Following on from the workshops, we interviewed several experts across Northern clusters, including corporate leaders, business mentors, seasoned entrepreneurs, university advisers, incubator directors and investment managers.

SIC codes used in analysis

1136 – IT and telecommunications directors
2133 – IT specialist managers
2134 – IT project and programme managers
2135 – IT business analysts, architects and system designers
2136 – Programmers and software development professionals
2137 – Web design and development professionals
2139 – IT and telecommunications professionals not elsewhere classified
3131 – IT operations technicians
3132 – IT user support technicians
5242 – Telecommunications engineers
5245 – IT engineers

SOC codes used in analysis

26.20 – Manufacture of computers and peripheral equipment
58.21 – Publishing of computer games
58.29 – Other software publishing
61.10 – Wired telecommunications activities
61.20 – Wireless telecommunications activities
61.30 – Satellite telecommunications activities
61.90 – Other telecommunications activities
62.01 – Computer programming activities
62.02 – Computer consultancy activities
62.03 – Computer facilities management activities
62.09 – Other IT and computer service activities
63.11 – Data processing, hosting and related activities
63.12 – Web portals
95.11 – Repair of computers and peripheral equipment

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