MARCH 15, 2019

A DIGITAL SECTOR STRATEGY FOR CAMBRIDGESHIRE & PETERBOROUGH

CW (CAMBRIDGE WIRELESS) & ANGLIA RUSKIN UNIVERSITY

This report is intended solely for information purposes. While we have made every attempt to ensure that the information contained in this report has been obtained from reliable sources, CW and Anglia Ruskin University are not responsible for any errors or omissions, or for the results obtained from the use of this information. All information in this report is provided "as is", with no guarantee of completeness, accuracy, timeliness or of the results obtained from the use of this information, and without warranty of any kind, express or implied.

You are free to share, copy, distribute, transmit and adapt this report with the attribution: “Digital Sector Strategy for Cambridgeshire & Peterborough, 2019”

INTRODUCTION FROM THE CHAIRMAN 3

EXECUTIVE SUMMARY 5

TOP LEVEL RECOMMENDATION CHART 7

METHODOLOGY 8

BACKGROUND 11

CONDITIONS FOR DIGITAL SUCCESS 17

TALENT AND SKILLS 19

TECHNOLOGY INFRASTRUCTURE 29

SUPPLY CHAIN 36

HIGH IMPACT NETWORKING 40

ENTREPRENEURSHIP 46

INVESTMENT AND FINANCE 50

APPLICATION IN INDUSTRY 55

INTERNATIONAL - FOREIGN DIRECT INVESTMENT AND INTERNATIONAL TRADE 60

KNOWLEDGE TRANSFER 69

DRIVING REGIONAL PRODUCTIVITY THROUGH TECHNOLOGICAL INNOVATION, ADOPTION & INCLUSION

INTRODUCTION FROM THE CHAIRMAN

The Digital Sector Strategy represents a unique evidence base founded in primary research and secondary data, and extensive consultation with experts. It builds on strong foundations that already exist in Cambridgeshire & Peterborough, and our recommendations aim to further enhance this region as the global centre of cutting-edge and inclusive technology innovation. We will create and adopt the technologies of tomorrow, offer businesses exceptional talent at all levels and provide a highly networked ecosystem that has global impact, helping to establish the region covered by the Cambridge and Peterborough Combined Authority (CPCA) as the preferred base for firms from across the world.

CPCA has set a target of doubling its economic output as measured by GVA over 25 years, which means an annual growth rate of 2.81%. This is an ambitious target, and is above the average growth rate for the last 3 years (2013-14 to 2016-17) across all sectors of 2.25% (CBR). The creation and widespread adoption of digital technology are essential to achieving this ambitious goal. The recommendations set out in this Digital Sector Strategy will stimulate an already strong ICT sector in Cambridgeshire & Peterborough and will, we believe, provide a major contribution to meeting this growth target.

The digital sector is a significant part of the region's economy and has more than twice the employment in digitally intensive sectors compared to the rest of the country[1]. Cambridgeshire and Peterborough's digital sector represents 8.84% of the region's total business turnover and 8.22% of employment[2], compared to a national share of 3.5%. But, more than this, digital is an enabling sector whose products and services offer increased productivity to all other industries – including two of the region's most important: agriculture (centred on the rich land of the Fenlands) and manufacturing (the largest sector in the region totalling 23% of business turnover)[3]. We aspire for Cambridgeshire & Peterborough to be an area where digital technologies that are created here support every city, town, village and business to become prosperous in their own rights.

The Digital Sector Strategy's aims are to:

1. Significantly increase the contribution of the technology sector to the region's GVA;
2. Stimulate faster growth in other sectors through early and easy adoption of cutting-edge technology;

---

[1] *The Digital Sectors After Brexit*, Frontier Economics for techUK. Note that 2014 employment figures show 3.5% of the total UK workforce on 'Digital Producing' industries, this compares to 8.22% of employment in the Information Technology and Telecoms industries within the Combined Authority in 2014/5 according to CBR figures], 2.35 times more.

[2] CBR 2016-17

[3] The same Frontier Economics report states that 'Digital Using' parts of the national economy represent 6.7% of all employment, adding this to the 'Digital Producing' figure of 3.5% means that over 10% of all employment in the UK is due to the digital industries.

3. Ensure that the benefits of technology-based business growth is spread beyond the Greater Cambridge cluster and across the entire region;
4. Support the overarching aim of the Combined Authority in making Cambridgeshire & Peterborough a leading place in the world to live, learn and work.

The report has been developed according to a number of principles, agreed by the Commission, that should be borne in mind when reading these pages:

1. Each area within CPCA is different. Each will want activities tailored to its micro-economy and business culture, and each requires its own benchmark for what needs to be attained. This report offers actionable recommendations, but it is down to the deliverer to make these recommendations specific, measurable, actionable, realistic and timely - and localised.
2. We wish to build a flourishing marketplace. In a perfect economic environment market forces should theoretically suffice to promote higher productivity. However, where the market is functioning imperfectly, due to lack of information, network effects, spillovers, or other causes, this strategy recommends actions that local Government might take to help to create the conditions where enterprise can thrive.
3. Digital technology can increase productivity but it needs be conducted in a manner that is sustainable, equitable and that enhances quality of life among citizens of Cambridgeshire and Peterborough.

Networking has been identified as an essential underpinning for every one of the key domain areas covered in the strategy. The astonishing growth of the Cambridge sub-region has been enabled in part by a culture of business-driven networks, where local organisations nurture ecosystems of expertise and mutual support. The Commission believes that it is important to foster a similar approach, albeit adapted to the unique demands and business culture of individual districts, and we suggest that practical steps can be made to quickly grow and support networking activity for the Digital Sector.

Having reviewed the evidence, the Commission believes that this region is well-placed for digital success. With Greater Cambridge at the area’s heart as an unparalleled centre of technological innovation, the region’s manufacturing and logistics hubs offering a clear pathway for IoT and robotics testbeds, and Fenland offering great potential for trialling advanced agri-tech services, the potential for digital GVA growth is unmissable. But we must not be complacent. The Public and Private sectors need to act now to install the digital infrastructure, ensure talent pipelines, and create networking and knowledge transfer systems so that we can compete effectively. The rest of these pages provide recommendations to that end.

David Cleevely,

Chair of The Digital Sector Strategy Group

EXECUTIVE SUMMARY

Cambridgeshire & Peterborough's digital sector is a valuable contributor to the region's economy, delivering almost 9% of the region's revenue and over 8% of its employment. Furthermore, it is the fastest growing knowledge intensive sector, increasing 10.4% in the three years to 2017 (compared to 6.6% for the knowledge intensive sector as a whole). The vibrancy and technological expertise of the region's digital sector is a significant reason for the region's international attractiveness, and it can boast double the % of ICT jobs from foreign direct investment projects to the national average (47% compared to 21, DIT statistics).

This success needs to be recognised and celebrated alongside the considerable contributions of other regional priority sectors, such as Life Sciences.

The digital sector is not without its challenges. At the time of writing Brexit is a threat, particularly to the already critical supply of skilled talent. The region's digital and built infrastructure is struggling to match the ambitious growth plans of local Government and businesses. Furthermore, the sector's stellar growth has focused on Greater Cambridge and risks being choked unless steps are taken to deliver affordable housing and fluid transport systems. And despite historic success with foreign direct investment, the region faces missing out to more organised regional competitors for international attention.

Opportunities should not be missed to encourage digital businesses to take advantage of establishment elsewhere in the region, and to nurture closer links with other important regional sectors, such as agriculture, manufacturing and logistics. This represents a significant opportunity to influence regional GVA: since it is not just the digital sector that benefits from the growth, but all vertical markets who can increase efficiency and deliver advanced benefits to customers through the adoption of cutting-edge technology products and services such as big data, artificial intelligence, robotics and next generation connectivity solutions.

To this end, a Digital Sector Strategy has been pulled together to help the public and private sector capitalise on the existing strengths of Cambridgeshire & Peterborough's digital sector. Throughout, we have been aware that the continued growth will only happen if the collective efforts of the business community can be harnessed. We also recognise that the CPCA and National Government can have a substantial convening power, and provide essential, targeted, pump priming funding that can enable these efforts to succeed.

There are detailed recommendations against each of the nine domains covered in this report. However, these can be condensed into six key areas:

1. **Networking** is a solution for businesses to meet potential suppliers, partners and customers. It enables knowledge transfer and the inspiration of new ideas. It generates demand for a new technology. It is the best way to introduce new businesses and international interests to a local technology scene. For these reasons, networking has emerged throughout the development of this report as an essential underpinning for each of the domain areas. The highly developed

Greater Cambridge culture of business-driven networks, where local organisations nurture ecosystems of expertise and mutual support, is one to be learned from and the methodology deployed across the region but always according to the unique demands and business culture of individual districts. Such a programme will require the expertise and contacts of existing networking firms, the support of local community influencers, and seed funding from the Combined Authority to de-risk delivery

2. The supply of a sufficiently **skilled workforce** across all levels of the digital sector is critical to the success of this region. Businesses already perceive a talent shortage, and this is only going to increase as vertical industries adopt increasing quantities of advanced technologies into their processes. Attention is needed by both the public sector and the business community to the development not only of STEM skills but also their creative use. We need to focus on the region’s young people, on the retention of existing talent, and the upskilling of the adult population to enable all citizens to thrive in a digital world.
3. The region needs to act now to make its **digital infrastructure** internationally competitive and to provide the platform needed for local businesses to innovate. To attract cutting-edge businesses and significant international investments, we need to demonstrate world-class digital ambitions, with an aspirational target of at least 1GB/s broadband speeds across the region by 2022. No future infrastructure or housing project in the region should take place without installing the requirements of ultra-fast internet connectivity.
4. Cambridgeshire & Peterborough’s GVA growth targets do not exist in isolation. The digital sector operates in an increasingly connected, collaborative and competitive national and **international environment**. We have great strengths, but when seeking foreign direct investment from firms also looking at California, Shenzhen and Singapore we need to do far more to stand out. The region needs to develop a professional and strategic approach to increasing and retaining foreign direct investment, as well as supporting local intermediary organisations to develop relationships with overseas technology hubs and encouraging partnerships and networking between companies.
5. The colocation of businesses and the provision of affordable **space** within which start-ups can seed and grow is essential for the establishment of effective knowledge transfer systems, accelerating the growth of the digital sector and increasing its impact on vertical markets. We support the idea of creating sector-led business hubs outside of the city of Cambridge that enable effective – and affordable – clustering of similar technology businesses alongside potential customers and partners. We also recommend an evaluation of the use of public buildings and empty high street premises with a view to establishing more vibrant co-working spaces and digital skills zones throughout the region.
6. Finally, the region has a huge opportunity to cement its position as global centre of expertise in the development and commercial exploitation of **Artificial Intelligence technology**. This strategy urges the coordination of public and private sector energies to ensure this opportunity is grasped.

TOP LEVEL RECOMMENDATION CHART

Domain area	Recommendation(s) for public sector	Recommendation(s) for private sector
Artificial Intelligence	CPCA to tailor specific actions and priorities to cement the national leadership position of the region for the national AI Grand Challenge.	Private sector and investors to play their part in the development of a regional AI strategy.
Talent & Skills	Ensure high quality digital education and training opportunities, ranging from digital literacy, advanced programming skills up to doctorates, as well as reskilling programmes, are available and accessible for young people, teachers and adults throughout the region.	Develop a region-wide culture of employer engagement in education to support the development of STEM skills in the next generation and showcase potential career routes with a scheme that involves the participation of employers.
Technology Infrastructure	Deliver a step-change in technology infrastructure ambitions by with aspirational targets of 1Gb/s broadband speeds across the region by 2022. Put in place internal processes that will support the private sector in turning Cambridgeshire & Peterborough into a world-class smart region at pace.	Inspire demand for advanced technology infrastructure by bringing citizen and business communities together and raising awareness of next-generation infrastructure capabilities through networking and workshops. Campaign for faster and more ambitious roll-out.
Supply Chain	Sponsor a researched programme of networking activities that helps the region to increase understanding of the value chains of digital businesses and to help remediate potential gaps and bottlenecks in the local supply market.	Provide more opportunities for digital businesses to meet local suppliers, and vice versa, through targeted face to face networking opportunities and intra-regional programmes.
High Impact Networking	Ensure appropriate physical space, connections and channels are available for businesses to network by transforming underutilised public infrastructure into co-working spaces or learning zones and supporting landlords in installing co-working spaces in high street spaces.	Established networking firms to deliver high quality events across the region while collaborating to build a comprehensive ecosystem of business development and knowledge transfer.
Entrepreneurship	Ensure the presence of high-quality, supportive spaces for start-ups to grow across the region, along with financial stimulus that encourages growth in desired areas, for example business establishment in non-Cambridge hubs, or digital businesses focused on products/services for Manufacturing / Agriculture / Logistics.	Established networking firms and universities to deliver knowledge sharing programmes across the region that match different stages of start-ups, from birth to scale-up, along with networking and mentoring opportunities.
Investment & Finance	Create a CPCA Digital Innovation Fund (similar to the Northern Powerhouse Investment Fund), supported by the British Business Bank, for digital start-ups with a particular focus on convergence activities and hubs outside Cambridge city.	Increase the visibility and accessibility of financial information & support throughout the region.
Application in industry	Conduct a study to understand the value chains of digital businesses and potential gaps and bottlenecks in the local supply market. Share this information publicly.	Establish Leadership Councils for Technology in Manufacturing, Logistics and Agriculture that identify opportunities and blockers and generally accelerate the deployment of technology in industry.
International: Foreign Direct Investment and trade	Build a compelling Greater Cambridge cluster brand and marketing programme that promotes the Cambridge value proposition and strategically targets major investments complementary to the regional technology ecosystem, ensuring that an effective inward investment sales and fulfilment function is being delivered across the region.	Support local intermediary organisations to develop relationships with overseas technology hubs and encourage partnerships and networking between companies. Encourage large regional technology companies to participate in outbound missions to demonstrate the expertise of the region, alongside cohorts of new exporters.
Knowledge Transfer	Develop Launchpads where the applications of new digital technologies and solutions can be trialled. These Districts should feature the latest technology infrastructure, should be accessible for start-ups and should focus on industries that are important to the Combined Authority economy, such as Manufacturing or Agriculture.	Working with existing communities for technology / industry, deliver more inter-sector networking opportunities across the region that connect industry with the technology community and academia.

METHODOLOGY

The recommendations within this strategy are evidence-based and leverage both primary and secondary, quantitative (facts, reports, databases, survey) and qualitative (survey, meetings, interviews, reports) sources of data.

COMMISSION

The Commission provided scope to the strategy, input and qualified ideas within the separate focus areas and provided comment and sign-off on the overall strategy document. The Commission was selected to be representative of the domains under consideration.

Commission		Supporters	
David Cleevely (Chair)	Raspberry Pi	John Hill	CPCA
Anne Bailey	Form the Future	Steve Clarke	CPCA
Richard Baker	GeoSpock	Daniel Thorpe	CPCA
Jon Bradford	The Bradfield Centre	Secretariat	
David Connell	University of Cambridge	Eleanor Brash	CW (Cambridge Wireless)
Peter Cowley	The Invested Investor	Bob Driver	CW (Cambridge Wireless)
Professor Diane Coyle	University of Cambridge	Dr. Jan Storgårds	Anglia Ruskin University
Dr Matthew Day	Anglia Ruskin University	Amy Wilson	Anglia Ruskin University
Professor Emanuele Giovannetti	Anglia Ruskin University	William Davies	Anglia Ruskin University
Noelle Godfrey	Connecting Cambridgeshire		
Faye Holland	Cofinitive		
Henk Koopmans	Huawei UK R&D		
Stephen Pattison	Arm		
Heather Richards	Transversal		
Shailendra Vyakarnam	Cranfield University		
Ann Wardle	Opportunity Peterborough		

SECONDARY DATA

The report references publications and data that are considered complementary to this strategy's primary data and provide a representation of the existing state of the digital sector in the region.

We are particularly grateful for the support of the Cambridge University Centre for Business Research, whose quantitative data, which informed so much of the CPIER report, also provided much of the underpinning for this report.

BUSINESS SURVEY

A survey was conducted between Monday 3 December 2018 and Friday 11 January 2019 to ascertain regional priorities, needs, obstacles and recommendations. There were 106 respondents from 94 different organisations in the following districts within the CPCA geography:

- **Greater Cambridge** – 39 respondents
- **Peterborough** - 17 respondents
- **Fenland** – 2 respondents
- **Huntingdonshire** – 6 respondents
- **South Cambridgeshire** – 23 respondents
- **East Cambridgeshire** – 6 respondents
- **External (but neighbouring) to CPCA** – 11 respondents

The survey assessed 11 key "domains", identified by the Commission and detailed later in this report. These domains are:

- Entrepreneurship
- Investment & Finance
- High Impact Networking
- Knowledge Transfer
- Links within the UK
- Talent & Skills
- Foreign Direct Investment
- International Trade
- Application in Industry
- Digital Infrastructure

Two of these domains (Foreign Direct Investment & Links within the UK) were later merged with two other domains (International Trade & Knowledge Transfer respectively). The results of the survey were analysed according to the dimensions of the business that responded. In particular:

1. The geographic location was filtered according to six areas: Greater Cambridge, East Cambridgeshire, Fenland, Huntingdonshire, South Cambridgeshire and Peterborough
2. The business position within the technology supply chain: ie whether a business is a creator, supplier, buyer, or unconnected.

These details are elaborated through this report and provide an essential component in our development of a tailored digital strategy that allocates resources efficiently, according to real existing needs, where intervention exerts the strongest impact. The insights have been explored and qualified by the Commission.

SCOPE

1. **Definitions.** For the scope of this strategy, we define digital technology as:
    a) The development and supply of software, hardware and connectivity solutions
    b) The promotion of digital literacy and the ability for consumers and business to benefit from new digital services
    c) The demand for, and application of, new digital technology innovations into industry.

    We recognise that CPCA is developing separate strategies for life sciences, advanced manufacturing and agriculture. These sectors are users of ICT and digital technologies and major players in the knowledge intensive sector; however we are primarily focused on increasing the effectiveness of businesses within the ICT sector.

2. **Geography.** For the purpose of analysing the secondary datasets, this strategy has defined the Cambridgeshire and Peterborough regions as the postcodes within the six local authority districts that make up the Combined Authority area.
3. **Infrastructure.** We understand that housing and transport is being considered as part of a separate review. This strategy will not make recommendations in that area, other than to stress at the outset that if the digital sector is to thrive, necessary physical infrastructure must be in place to support high quality growth.
4. **Brexit.** Several domains under consideration in this Strategy are significantly impacted by Brexit, for example Talent & Skills, or Foreign Direct Investment. The outcome of Brexit is, at the time of writing, unclear. Recommendations related to Brexit-related challenges will not be made in this strategy other than to ask of local Government that they consider its implications and work with local business to smooth the transition to a post-Brexit Cambridgeshire & Peterborough.

BACKGROUND

Cambridgeshire and Peterborough Combined Authority (Mayoral) was formed in 2017 and consists of five district councils: Cambridge City, East Cambridgeshire, Fenland, Huntingdonshire, and South Cambridgeshire, one unitary authority, Peterborough, and one county council, Cambridgeshire.

The region broadly breaks into three distinct economic zones: the agricultural richness of the Fenlands that manages 50% of the UK's Grade 1 land; the young and rapidly expanding manufacturing hub of Peterborough and the technology (including digital & life sciences) centre of Greater Cambridge and South Cambridgeshire which produces the highest number of patents per 100,000 people in the UK[4].

A key feature of the region is that that there is no substantially developed large city, and therefore the region lacks the digital, transport and office infrastructure which highly urban environments offer. Around a quarter of the population lives in market towns such as Wisbech (pop. 32,489), St Neots (31,165), Yaxley (9,174) and Sutton (3,816)[6], the remainder in the main hubs of Peterborough, Huntingdon and Cambridge or in surrounding villages and countryside.

Economic growth has been, to date, higher in Cambridgeshire & Peterborough than in the rest of the East of England or the UK; this has been driven primarily through business expansion in Cambridge and South Cambridgeshire. Technology multinationals are investing in the area, including most recently Amazon, AstraZeneca and Samsung. According to the 2018 Tech Nation Report, companies are investing in the Greater Cambridge region due to the prevalence of highly skilled talent, its world leading academic institutions and its prized culture of knowledge transfer. Yet availability of talent is also flagged in the report as a key issue for the area – because the growth rate of supply does not match that of demand and because competition is exacerbated by the world-wide appeal of the existing local talent pools.

CPCA - Largest companies[5]	Turnover 2016-17
Marshall Motor Holdings PLC	£1.90Bn
Illumina Cambridge Limited	£1.51Bn
Osprey Acquisitions Limited (Anglian Water)	£1.24Bn
Hilton Food Group PLC	£1.23Bn
Arm Limited	£1.18Bn
Qualcomm Technologies International, Ltd.	£1.16BN
Mundipharma Medical Company Limited	£554M
Hexcel Composites Limited	£498M
G'S Group Holdings Limited	£444M

Across all sectors, the largest home-grown companies come from outside the digital sector, with Manufacturing (Marshall's), Utilities (Anglian Water) and Agriculture (Hilton Food, G's) featuring highly. The productivity of these organisations are, however, greatly influenced by new digital technologies created by the ICT sector such as sensors or artificial intelligence.

---

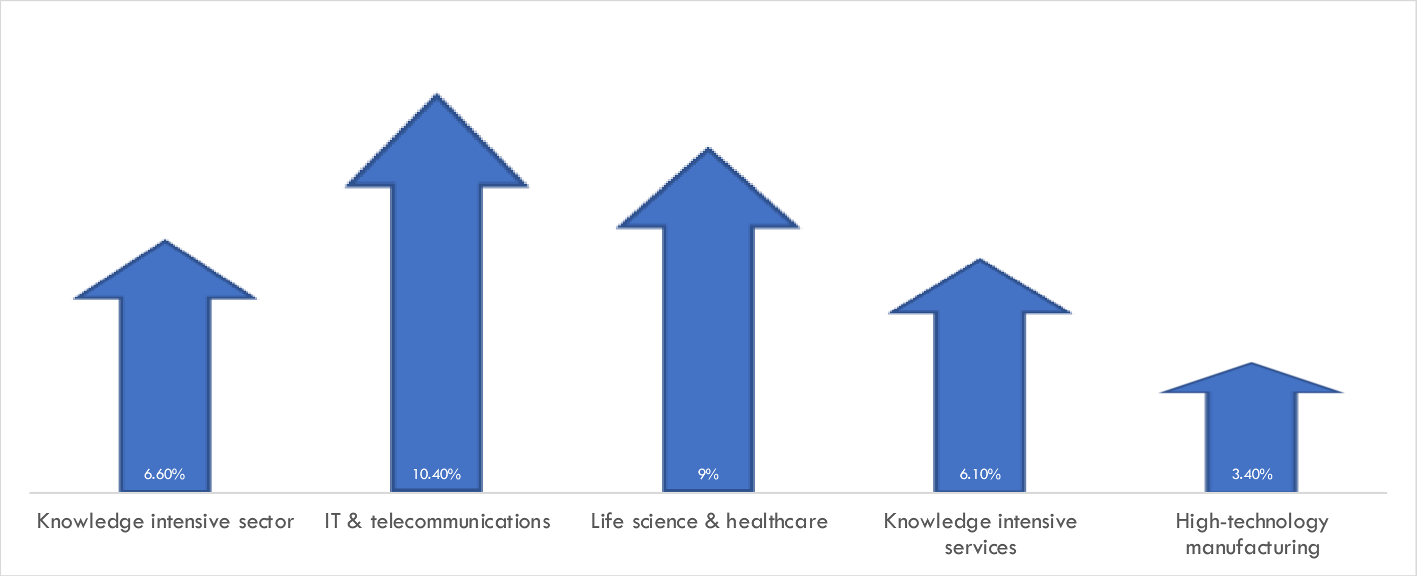
[4] Centre for Cities, Cities Outlook 2018

[5] Data from Cambridge Cluster Map, based on CBR. List includes companies headquartered, or with offices, in Cambridgeshire & Peterborough.

[6] Data from 2011 census and refers to Build Up Areas

Nationwide, the digital sector contributed £130.5bn to the UK economy in 2017, accounting for 7.1% of UK GVA and increasing by 7.3% since 2016. This is faster growth than the GVA for the total UK economy, which increased by 4.8% since 2016[7]. Employment in the digital sector in 2017 comprised of 1.5 million jobs, a 16% increase on 2011. This compares to a 9% increase in the total number of jobs in the UK[8]. Regionally, the digital sector is the fifth largest revenue generator, accounting for 8.22% of total employment and 8.84% of turnover (CBR).

From CBR data we can see that the average growth rate of the Knowledge Intensive sectors in the CPCA areas in the past three years was 6.6%. The CPCA's disaggregated revenues growth rates of the different subsectors forming the Knowledge Intensive economy reveal a more nuanced dynamic: IT & telecommunications grew at 10.4%, life science & healthcare at 9%, high-technology manufacturing at 3.4% and Knowledge Intensive Services at 6.1 %. So, the largest subsector, high technology manufacturing, is also the one that grew at the lowest rate in the past years, and IT & telecommunications grew the fastest. 44.4% of ICT and Telecommunications employment for the region is centred in Greater Cambridge.



The figure below details the distribution of the turnover of the CPCA knowledge intensive sector, in 2017, subdivided by district. Focussing on the IT & telecommunications subsector, it shows that over 56% of the sector turnover in 2016-17 was based in Greater Cambridge and 23% in South

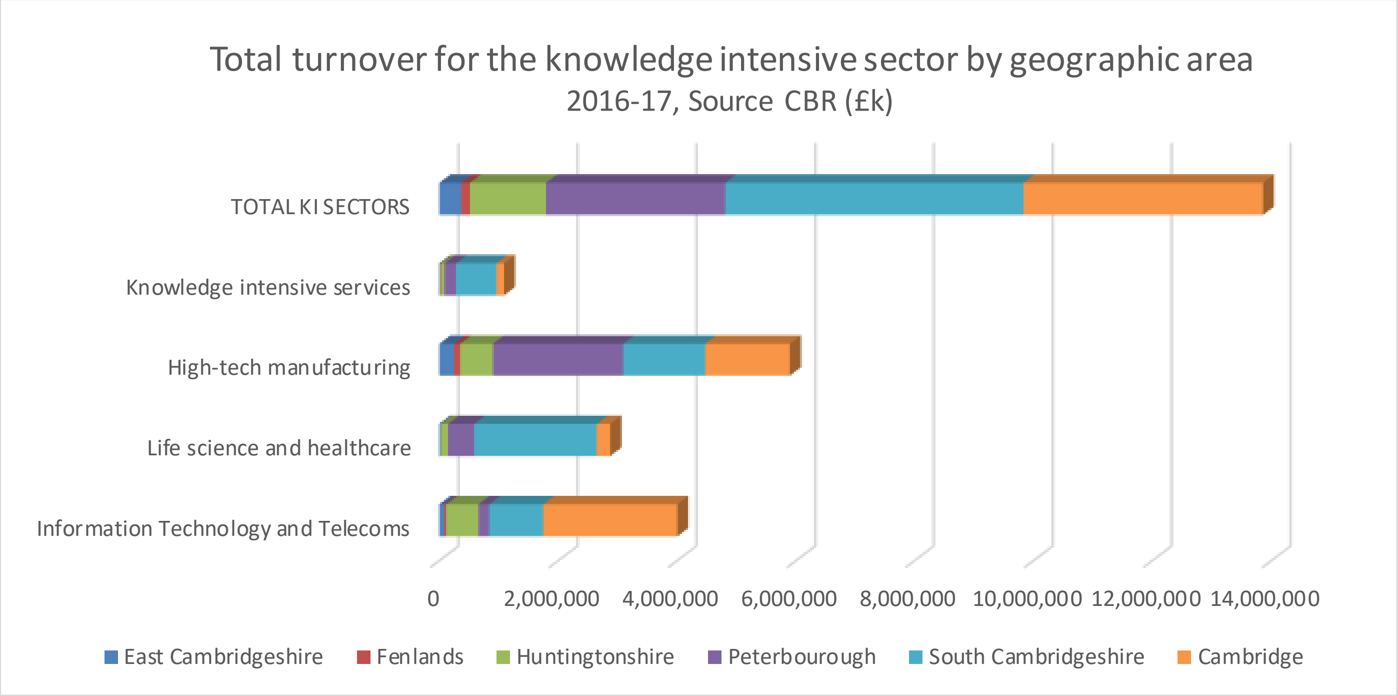
---

[7] DCMS Sectors Economic Estimates 2017: GVA

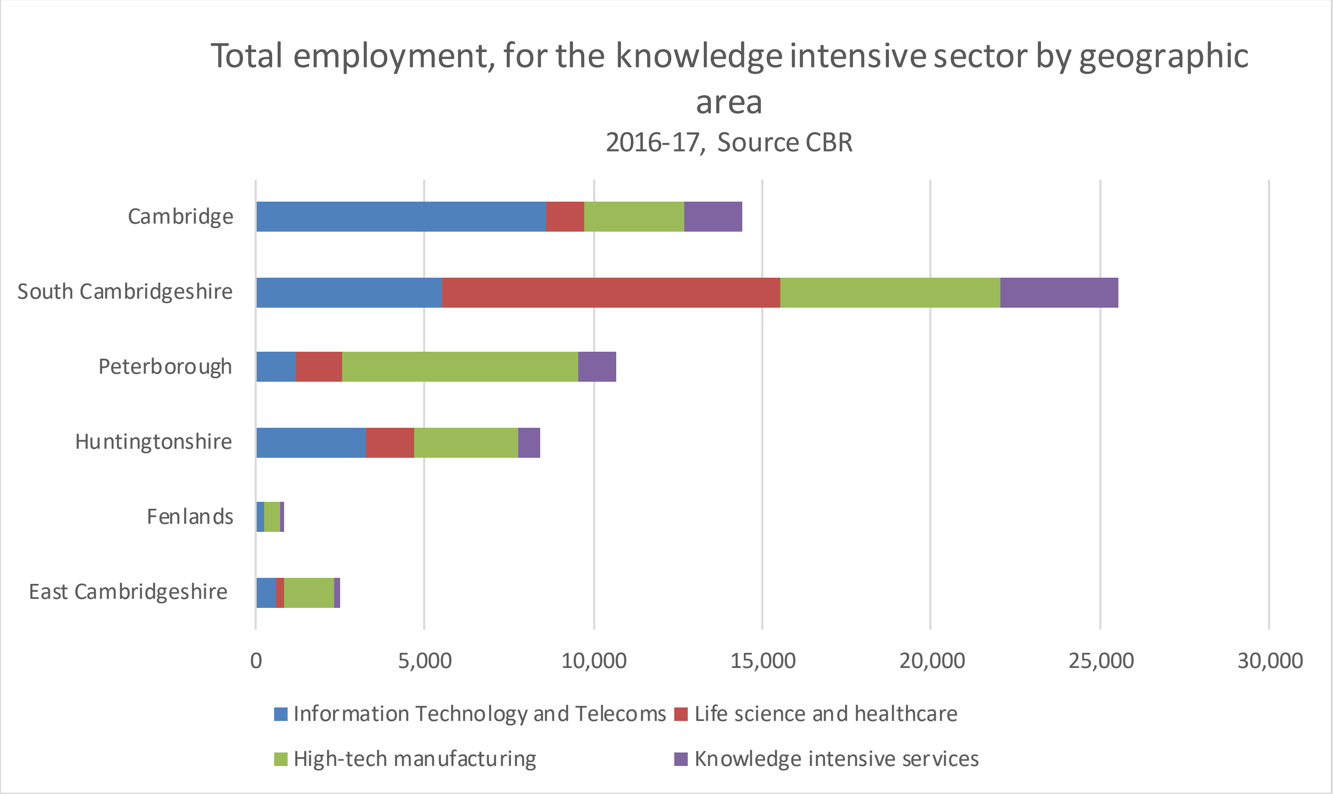
[8] DCMS Sectors Economic Estimates 2017: Employment

Cambridgeshire while only 1% was generated in Fenland (as highlighted in the subsequent pie charts).

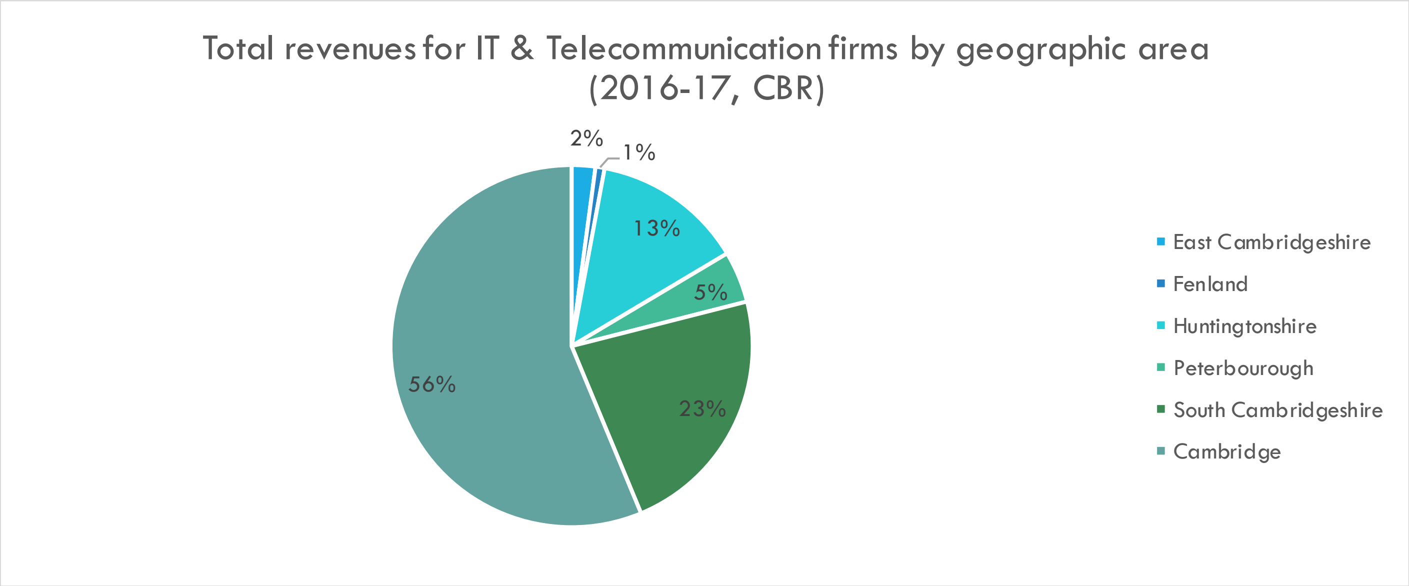
From the same graph, we can see that across all knowledge intensive industries, 29% of revenue during the same time period was generated in Greater Cambridge and 36% South Cambridgeshire, with still only 1% from Fenland. Peterborough claims a significant portion of knowledge intensive revenues (22%) due to the prevalence of high-technology manufacturing in the region.

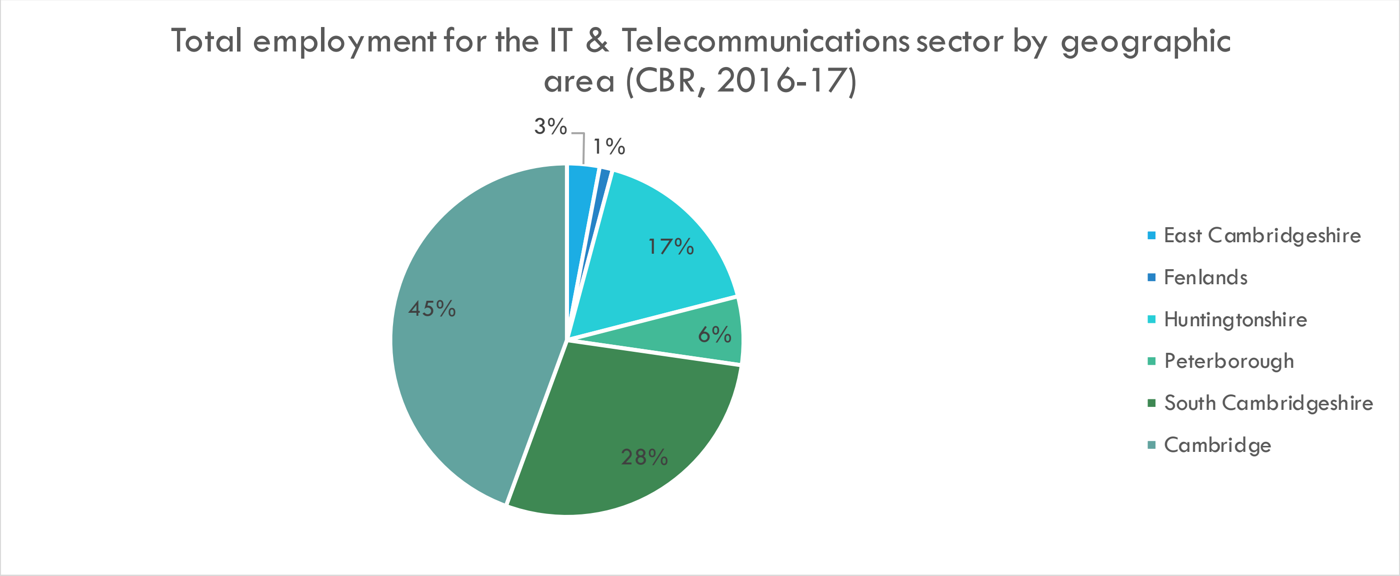

Total turnover for the knowledge intensive sector by geographic area
2016-17, Source CBR (£k)

The table below shows employment figures by sector, broken down per region.



Extracting the data for just the IT & Telecommunications sector as the focus of this report, it can be seen that Greater Cambridge and South Cambridgeshire combined drew in 79% of total regional revenues for the ICT & Telecommunication sector, while Fenland produced 1%.





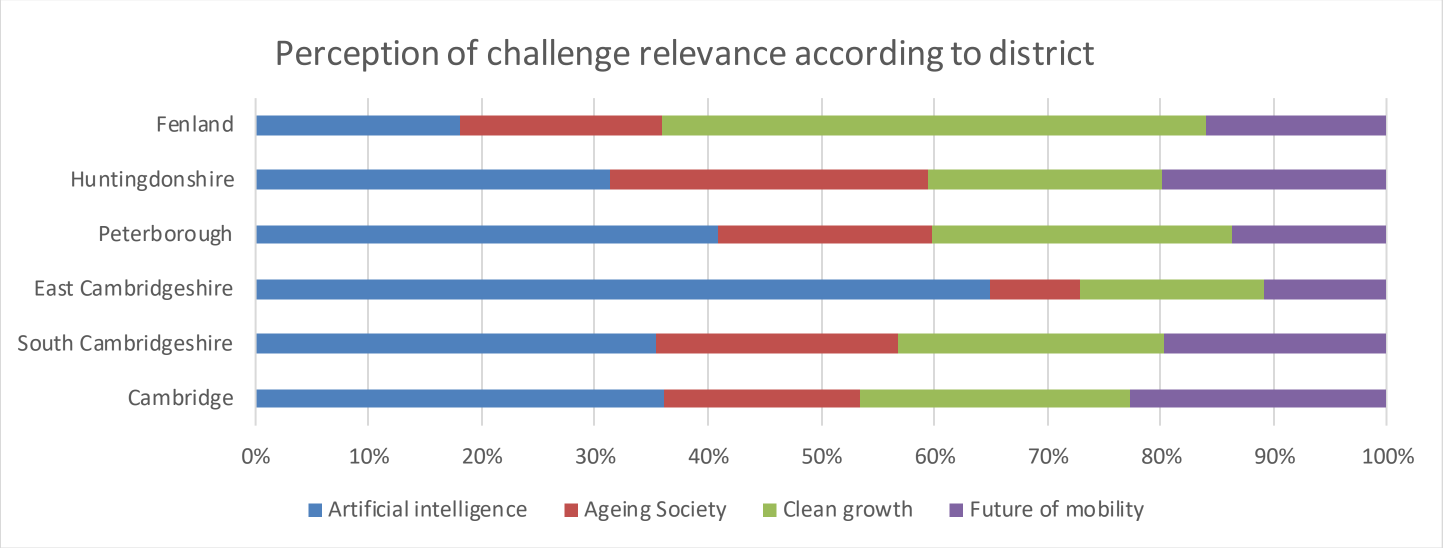
THE GLOBAL TECHNOLOGY SECTOR IN 2040

Cambridgeshire & Peterborough is well-positioned to be a global powerhouse in technology development and adoption. The region's unique portfolio of assets includes world-class academic institutions, a highly qualified pool of talent, a hub of multinational R&D centres and excellent facilities and support for networking. The opportunities for collaborating with Fenland's agricultural firms and Peterborough's manufacturing businesses are substantial.

However, maintaining this position in a rapidly developing global marketplace depends on the community understanding where this industry might be in 25 years' time, so that we can invest now in preparing the conditions for digital success.

In Autumn 2012, The Department for Business, Innovation and Skills announced an investment of £600M in the eight great technologies that support UK science strengths and business capabilities. These technologies were selected because the UK already has world-leading research in these areas, they have a range of applications across a spectrum of industries and they have the potential for the UK to be at the forefront of commercialisation. They include big data, satellites, robots & autonomous systems, synthetic biology, regenerative medicine, agri-science, advanced materials and energy storage.

This was followed in 2018 by the selection of four grand challenges that form the centrepiece of the Government's Industrial Strategy: Artificial Intelligence (AI) and data, ageing society, clean growth and the future of mobility. Within the Digital Sector Strategy Business Survey, respondents believed that Artificial Intelligence was the Grand Challenge against which Cambridgeshire and Peterborough is best able to align itself, although in Fenland there was a preference for Clean Growth. These findings clearly reflect the current specialisation of these two areas; Greater Cambridge with its high presence of businesses in the digital technology sector, and Fenland with its focus on agriculture expressing the potential this sector has for clean growth.



It is estimated that embedding AI and Data Science across the UK, while displacing some existing jobs, skills and professions, will create thousands of good quality jobs and drive growth to the tune of adding £232bn to the national economy by 2030[9]. Artificial intelligence was also the UK's fastest growing sector, with investment hitting a record £736m last year at an increase of 47 per cent compared to 2017[10]. Certainly, the prowess of this region in AI is demonstrated by the continued and significant overseas investments by global Tech giants, with Samsung and JD.com being just the latest examples, alongside homegrown players such as Darktrace, Prowler.io, Geospock, Speechmatics and many more.

If CPCA is to select a Grand Challenge against which the region could competitively align itself, the combination of the region's strength in artificial intelligence and the high growth potential of the market makes AI the obvious choice.

Nationally significant steps have been taken to develop an Office for Artificial Intelligence, with an Artificial Intelligence council which brings together respected leaders in the field from across academia and industry.

Regionally there is a great opportunity to coordinate world beating academic Innovation Research Centres along with globally significant corporate giants to encourage the development of new applications of AI, interoperability between AI systems, and to identify barriers to growth, and opportunities for collaboration on common issues - for example on data trust and ethics.

We recommend that the Combined Authority takes further advice on tailoring specific actions and priorities from this and other related strategy reports to boost and cement the national leadership position of the region in the Artificial Intelligence Grand Challenge.

---

[9] Industrial Strategy, November 2017

[10] Artificial Intelligence Industry in the UK 2018, Deep Knowledge Analytics

CONDITIONS FOR DIGITAL SUCCESS

At the outset of this research project, the Commission agreed to categorise results to eleven domain areas, each of which are deemed to be central to the creation of a highly productive digital sector and have been used as the foundation for our research.

Entrepreneurship **ENT**	Links within the UK **UK**	Export Strategy **EXP**
Investment & Finance **INV**	Talent & Skills **TAL**	Adoption within Industry **IND**
High Impact Networking **NET**	Foreign Direct Investment **FDI**	Digital Infrastructure **DIG**
Knowledge Transfer **KNO**		Supply Chain **SUP**

The Government's Industrial Strategy outlines five foundations of productivity: People, Place, Innovation, Ideas, Business Environment. Each of these relates to one or more of the domains under analysis in this report, as outlined in the table below.

	ENT	**INV**	**NET**	**KNO**	**EXP**	**FDI**	**TAL**	**UK**	**IND**	**DIG**	**SUP**
People	🟦		🟦	🟦			🟦				
Place			🟦					🟦		🟦	
Innovation	🟦	🟦							🟦		
Ideas	🟦	🟦	🟦	🟦			🟦		🟦		
Business Environment	🟦	🟦	🟦		🟦	🟦			🟦	🟦	🟦

Of course, none of the domains stand alone, as these five foundations of productivity provide the key linkages amongst them. Innovations, and their impact on productivity, often emerge from the ICT-centric innovation ecosystems composed by people, carrying ideas, interacting in business environments that are rooted in places[11]. Stimuli to one domain have the potential to generate multipliers and ripple effects in closely related areas. To this end, it is important to consider how the domains inter-relate and to consider where resources might be most effectively applied to have the most significant impact.

The table below models the relationships between domains and suggests that investment in High Impact Networking, Talent & Skills, Digital Infrastructure and Application in Industry have the potential to deliver the most wide-reaching effects:

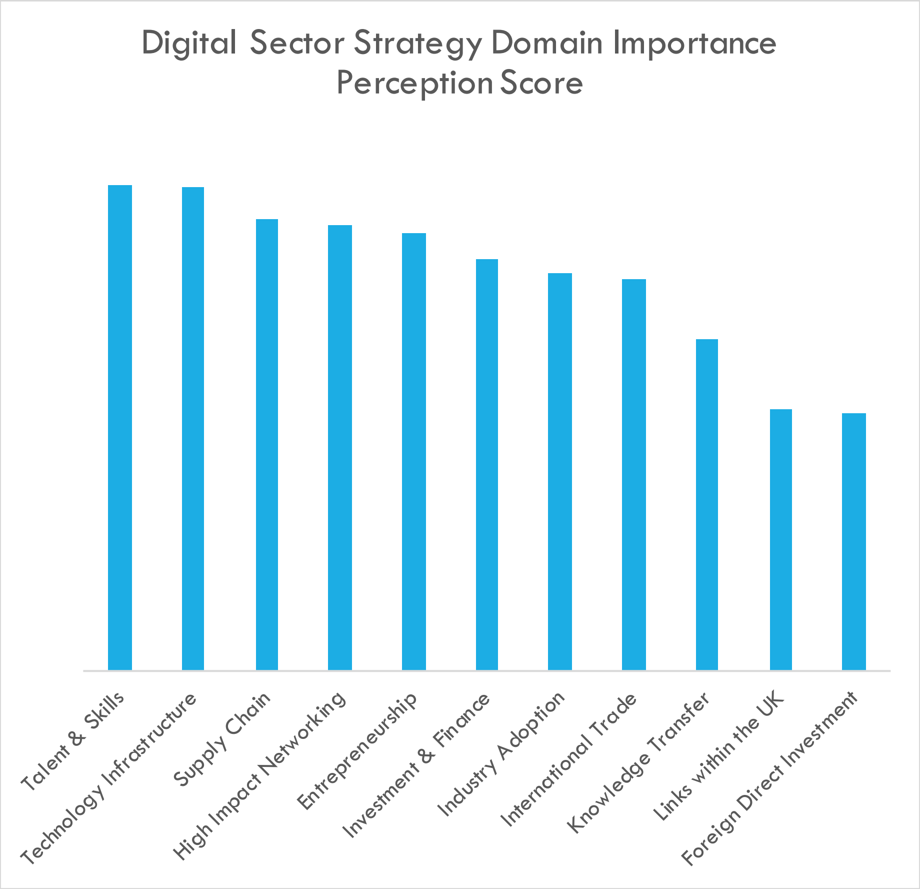
Recommendations applied to this domain…	**…will have a positive impact on this domain**										
	ENT	INV	NET	KNO	EXP	FDI	TAL	UK	IND	DIG	SUP
ENT	⬛	🟦	🟦	🟦	🟦	🟦			🟦		🟦
INV	🟦	⬛	🟦	🟦			🟦				

---

[11] Giovannetti, E. (2017) "Digital Divide and Digital Multiplier: A Paradigm Shift through Innovation", in Lehr, W. and Sharafat, A, eds. "ICT-Centric Economic Growth, Innovation and Job creation" *International Telecommunication Union*, Geneva, ISBN, 978-92-61-24411-8

NET	🟦	🟦	■	🟦	🟦	🟦	🟦	🟦	🟦		🟦
KNO	🟦	🟦	🟦	■		🟦					🟦
EXP	🟦		🟦		■	🟦					
FDI		🟦				■	🟦				🟦
TAL	🟦	🟦	🟦	🟦	🟦	🟦	■	🟦	🟦		🟦
UK			🟦	🟦			🟦	■	🟦		
IND	🟦		🟦	🟦	🟦	🟦			■		🟦
DIG	🟦	🟦				🟦	🟦	🟦	🟦	■	🟦
SUP		🟦							🟦		■

For each domain, an importance perception score has been obtained through the survey of 94 local businesses during which respondents were asked to select the three most relevant items for the future growth of the digital sector in the region. These are arranged by priority in the graph below:



Talent & Skills and Technology Infrastructure were perceived as having more significance than other domains, whereas Links within the UK and Foreign Direct Investment were perceived as less important. The Strategy team merged Foreign Direct Investment with International Trade to create an “International” chapter. Similarly, “Links within the UK” was merged with “Knowledge Transfer” as it was felt that the emerging themes were extremely closely aligned.

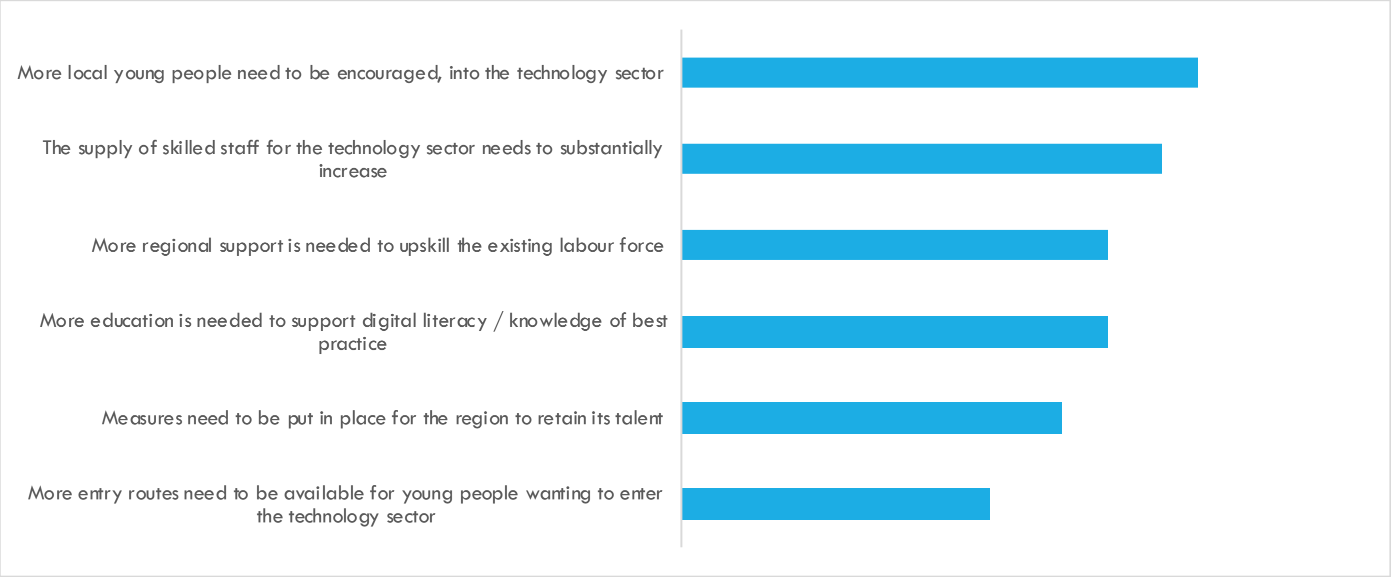
For each domain, evidence has been gathered from both primary and secondary resources.

A chapter is dedicated to each with our vision for where we should be, an overview of local perceptions uncovered in the Business Survey, recommendations for how this domain can be developed supported by a brief background on its current state in Cambridgeshire & Peterborough.

TALENT AND SKILLS

VISION

We believe that the region needs to deliver an economy for the modern world founded on significant investment in skills and education, where the digital labour force meets the needs of business at every stage of development. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
More local young people need to be encouraged, into the technology sector	4.57
The supply of skilled staff for the technology sector needs to substantially increase	4.53
More regional support is needed to upskill the existing labour force	4.47
More education is needed to support digital literacy / knowledge of best practice	4.47
Measures need to be put in place for the region to retain its talent	4.42
More entry routes need to be available for young people wanting to enter the technology sector	4.34

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA See Annex 1	INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA See Annex 2
It is important to understand the demand and supply of skills (SUP) in the region and the changing needs of now and future. Growing skills pool 'organically' is a long process, from school, to universities (KNO) and to the job market (IND). The respondents refer to very different types of talent needed in the region (UK), e.g. via apprenticeships, BSc, MSc, or PhDs but one pattern is that a skilled person is a 'specialist' in a certain topic of need, mostly in STEM subjects (DIG). Respondents widely talk about investing (INV) more in the youth but not to forget 'adult' groups and teaching the teacher. When it comes to locations where talent is	A closer look at the geographic distribution of the answers, to this question shows that all six domains related to Talent and Skills are perceived as significantly important for the Fenland, four of them were selected in Huntingdonshire, three in Peterborough, two in South Cambridgeshire and one each for Cambridge and South Cambridgeshire. In detail, reporting these hypotheses in a decreasing number of districts for which the issue of high relevance we have that: • "The supply of skilled staff for the technology sector needs to substantially increase" is of key relevance to every region.

or wants to be, Greater Cambridge (UK) will remain a magnet but the idea of offering a high quality and balanced life style of the work force is becoming a selling argument of a location. Brexit is bringing uncertainty in recruiting talent (FDI).	• "More education is needed to support digital literacy / knowledge of digital best practice" is a relevant issue everywhere apart from East Cambridgeshire • "More entry routes for young people wanting to enter the technology sector need to be available" is a relevant issue in all districts apart from East Cambridgeshire. • "More local young people need to be encouraged to enter the technology sector", was a priority for Fenland, Huntingdonshire, South Cambridgeshire and Peterborough • "More regional support is needed to up-skill the existing labour force" in Fenland, Huntingdonshire, and Peterborough • "Measures need to be put in place for the region to retain its talent better" is of key relevance in Fenland, Peterborough and Greater Cambridge

RECOMMENDATIONS	
For public sector	**For private sector**
Ensure high quality digital education and training opportunities, ranging from digital literacy, advanced programming skills up to doctorates, as well as reskilling programmes, are available and accessible for young people, teachers and adults throughout the region. • Review the capabilities of schools and colleges to deliver high quality STEM education and, where necessary, establish programmes to upskill and appropriately resource teaching staff and classrooms. • Use the £12M CPCA devolved budget to deliver accessible, high quality and consistent adult education programmes related to digital skills, or through employer-led initiatives incentivised by public funding. These programmes should cover both basic digital literacy and more advanced digital proficiencies. • **Combined Authority to encourage digital businesses to co-create a bid to form a local Digital Skills Partnership, aligned with UK Digital Strategy (by April 2019)** • Establish Peterborough University as a high quality higher education establishment that engages with local business to deliver skills in line with the regional economy and aligned to the latest technology trends. • Increase the availability and attractiveness of alternative routes into the sector for example through effective use of apprenticeship grants. • Provide high quality space that promotes digital skills generation, for example by building on the current work underway reforming libraries into skills and co-working zones. • Conduct an in-depth study to understand the extent and causes of digital exclusion / illiteracy across the area.	**Develop a region-wide culture of employer engagement in education to support the development of STEM skills in the next generation and showcase potential career routes with a scheme that involves the participation of employers.** • CPCA to identify employer engagement programmes that are already effective, and rally increased industry support to it through brokerage, facilitation and incentivisation (such an incentive programme is especially important for SMEs who struggle to financially validate youth and early career engagement, but can offer value). • As businesses are encouraged to participate more with schools, ensure schools have the resources and processes in place to channel business engagement. • Resource region-wide after-school provision for young people with activities that teach relevant STEM skills • Encourage diversity in STEM school volunteers. • Establish and promote an effective communication route between digital business and education to ensure that the curriculum supports the needs of business.

BACKGROUND ON TALENT & SKILLS IN CAMBRIDGESHIRE & PETERBOROUGH

The contribution of digital skills to the performance of the economy is substantial. Skills are the foundation of productivity. Cambridgeshire and Peterborough has a slightly higher than national average qualification level but if we break that down to a district level, there is a large amount of variation. The city of Cambridge has a much higher than average rate of citizens with an NVQ4 and above, while Fenland has a far lower than average proportion of citizens with NVQ1 and above, and 25% of the citizenship of Peterborough have no qualifications[12]. This, perhaps, is why in the Business Survey the respondents from Fenland stressed the importance of all hypotheses.

	Cambridgeshire And Peterborough (%)	Cambridge (%)	Huntingdon (%)	Peterborough (%)	Fenland (%)	Great Britain (%)
NVQ4 And Above	39.0	46.9	25.3	20.2	14.9	38.6
NVQ3 And Above	55.7	63.0	36.6	31.0	25.3	57.2
NVQ2 And Above	72.9	72.2	52.7	47.2	42.3	74.7
NVQ1 And Above	85.4	79.4	78.3	62.6	57.9	85.4
Other Qualifications	8.0	6.2	7.8	8.9	6.9	6.9
No Qualifications	6.6	12.2	21.2	25.0	31.2	7.7

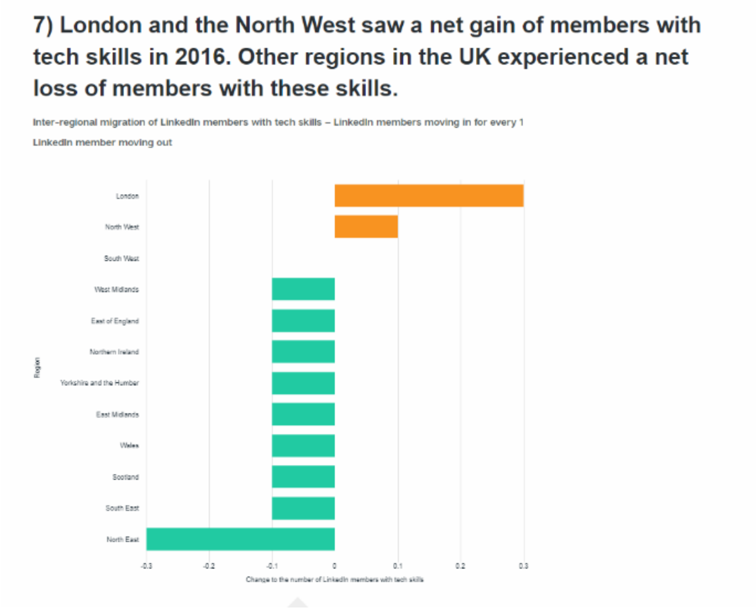
The Regeneris Skills report[13] identifies that education deprivation is concentrated in the north-eastern areas of the CPCA. Peterborough and Fenland in particular have acute and extensive challenges, with both featuring in the highest decile for education deprivation in England. There are also small clusters in Huntingdon and Greater Cambridge, although less significant in scale. By contrast, significant areas of Huntingdonshire, South Cambridgeshire and Greater Cambridge are in the lowest decile for education deprivation. This is broadly suggestive of a north - south split, with improved outcomes the further south one observes. It suggests that effort invested in improving Talent & Skills, starting with aspirations, for local young people should start in Peterborough, Fenland and relevant clusters in Huntingdon and Greater Cambridge.

The same report found that there is a smaller proportion of young people that are in full-time education in the CPCA area (24%), compared to England as a whole (33%). Though Cambridgeshire & Peterborough is known for its world-class further and higher education establishments, particularly those centred on Greater Cambridge, this is not necessarily translating into higher education participation amongst the resident population. There are also regional differences in 18-24 year olds in full time education.

---

[12] Nomis: Official Labour Market Statistics

[13]. link to be provided when released.



The only regions in the UK to experience a net increase in digital skills in 2016 were London and the North West – all other areas saw a net decrease[14]. With its proximity to London, and the often higher salaries and broader opportunities offered by the capital, Cambridgeshire & Peterborough needs to act fast to compete by ensuring that the region offers the highest quality of life along with attractive opportunities for training and career progression. This includes building the physical infrastructure to deliver affordable housing for young people and minimise commuting time. A critical indicator of the impact and lack of affordable housing and cost of leaving is provided by the very low ranking of Greater Cambridge for graduate retention; the city currently ranks 38th out of 44 cities studied by HESA. Improvements to this figure is challenging but also provides an opportunity for the non-Cambridge districts in CPCA that, if suitably integrated into the networked economy, will be able to provide an appealing basin of attraction for the present outflows of graduates.

The impact of Brexit on the recruitment and retention of digital talent is a threat. Research by TechUK conducted in 2016[15] revealed that 45% of digitally intensive job vacancies were filled by international workers, and a quarter of the employees in the software and computer industry are foreign-born, with the majority coming from the European Union. To ensure that Cambridgeshire and Peterborough's businesses can continue to recruit from the highest quality talent pool and maintain international competitiveness, local Government must prioritise supporting businesses to efficiently handle recruitment and retention challenges that arise from Brexit.

The 2016 Digital Skills Report showed that the shortage of digital skills represents a key bottleneck for industry and is linked to one in five of all vacancies. At that point, 72% of large companies and 49% of SMEs were suffering technology skill gaps. There is a clear mismatch in the types of skill offered by the labour market and those demanded. In different ways and to different extents, this trend is likely to be holding back the growth of technology and non-technology companies alike. The Report highlighted the following skills gaps:

---

[14] Tech Nation: Mobility of Talent

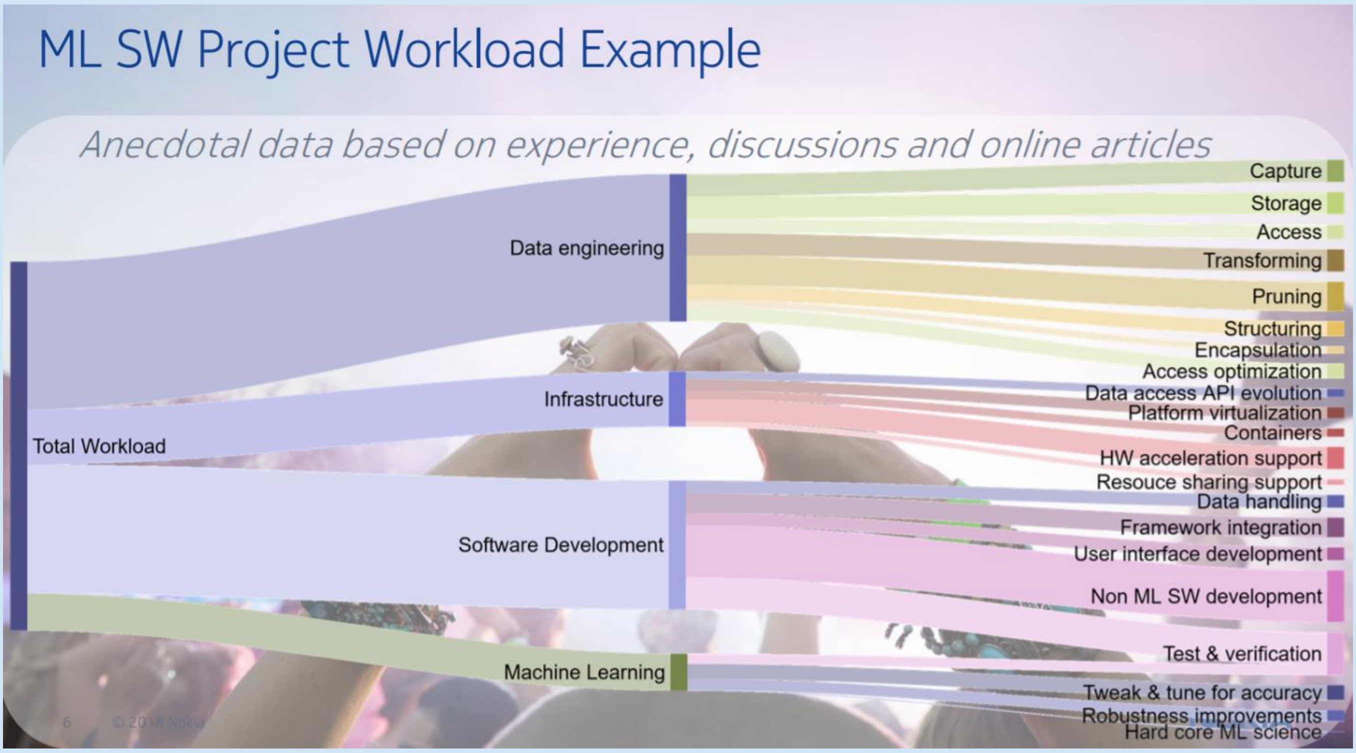
[15] The Digital Sectors after Brexit, TechUK, January 2017

- Software developer
- Senior programme developers
- Data analysts / big data developers
- Artificial intelligence developers
- Computer aided design
- Cyber security
- Mobile and cloud computing
- Technology specific skills (e.g. high level technologynical knowledge of communications networks)

An insight into skills requirements

Artificial intelligence and data processing are expected to be a central part of the digital economy of the future. With Samsung, Qualcomm, Microsoft and Amazon already establishing global artificial intelligence R&D operations in Greater Cambridge, alongside home grown talent like Prowler.ai and Darktrace, the region is well positioned to be the leader in this field.

This will require the region to be able to supply newer skills in addition to programming: data management. The East of England Science and Innovation Audit identified skills, particularly related to data, as a gap in regional provision that needs to be fulfilled. The slide below focuses on a machine learning software project workload, presented by Nokia at CW Technology and Engineering Conference 2018[16]. It demonstrates that the largest proportion of time on a machine learning project is spent on data capture, storage, access, transformation, pruning, structuring and encapsulation.

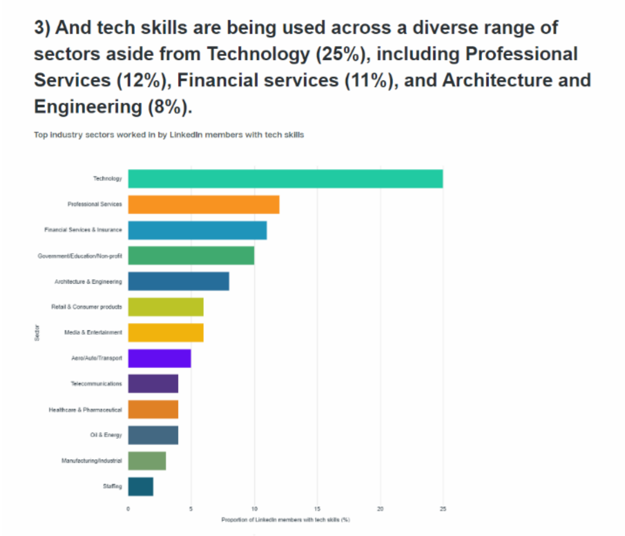


ML SW Project Workload Example

Anecdotal data based on experience, discussions and online articles

---

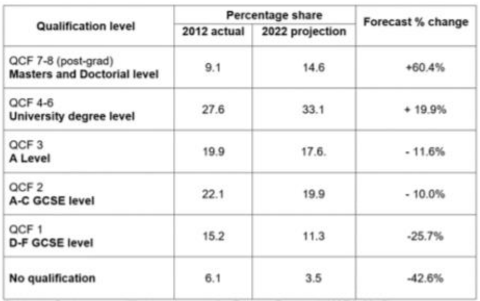
[16] Machine learning: What's in it for communications networks, Nokia, September 2018



3) And tech skills are being used across a diverse range of sectors aside from Technology (25%), including Professional Services (12%), Financial services (11%), and Architecture and Engineering (8%).

Top industry sectors worked in by LinkedIn members with tech skills

As more industries adopt digital technologies into their workflows, more strain will be placed on the supply of suitable talent leading to an ever increasing digital skills gap. Professional services, financial services and architecture/engineering are currently employing the highest numbers of digitally skilled professionals outside the technology sector (see chart, left)[17]. While these sectors are smaller within the Cambridgeshire & Peterborough economy compared to healthcare, manufacturing, retail and agriculture, it is still necessary to plan for an escalation in demand – especially given this strategy's goals related to convergence (see chapter on Adoption in Industry).



Qualification level	Percentage share		Forecast % change
	2012 actual	2022 projection	
QCF 7-8 (post-grad) **Masters and Doctorial level**	9.1	14.6	+60.4%
QCF 4-6 **University degree level**	27.6	33.1	+ 19.9%
QCF 3 **A Level**	19.9	17.6.	- 11.6%
QCF 2 **A-C GCSE level**	22.1	19.9	- 10.0%
QCF 1 **D-F GCSE level**	15.2	11.3	-25.7%
No qualification	6.1	3.5	-42.6%

Table 1 – Projected qualification demand for Eastern Region (UKCES 2015)

Source: Old Hall Associates Ltd Report to Peterborough Skills Partnership Group (July 2015)

In its Four-Year Plan, the CPCA identified that by 2022 the Eastern region will need 60.4% more masters and doctoral level qualifications and 19.9% more degree-level qualifications. This is a dramatic increase and will necessitate policies that retain talent, attract talent into the region, develop the needed skills and motivation within the region's young people and retraining the existing workforce.

The development of a supply of skilled programmers and other knowledge intensive workers to meet the needs of the digital economy is the main challenge facing the growth of the sector in Cambridgeshire and Peterborough today.

This Strategy recognises four different segments of digital users, each of which have their own skill levels and educational needs:

User group		Description	Education requirements
1	Digital Exclusion	The 11% of the UK population not connected to the internet and not using digital services on a regular basis.	• Connectivity, if not yet in place • Basic digital education
2	Basic	These are users who in their home or work life are able to securely use internet-connected devices for general browsing and communicating.	• General IT education
3	Workforce	These are users who use specialist digital services for home or work life, such as accountancy software, warehouse management tools, or photoshop.	• Regular information on new developments • Basic understanding of how programme works

---

[17] Exploring tech skills in the UK, Tech Nation

4	Professionals	These users design the tools used by the other user groups.	• Maths • Understanding of how computers work • Programming languages • Data management

We believe that it is imperative for the region to understand the extent of local digital exclusion and to support those without digital competencies or connectivity into the digital age through appropriate training and, where needed, infrastructure improvements. Too many services are moving to online models for individuals and businesses to maintain competitive efficiency without venturing online. An in-depth study which helps to ascertain the extent of digital exclusion and the impact on productivity, life chances and health and well-being in the CPCA area could be valuable, similar to one conducted to great effect by the Joseph Rowntree Foundation in Glasgow.

DIGITAL SKILLS
PARTNERSHIP

A clear recommendation made to the Commission was not to develop regional initiatives that were of necessity sub-scale but to align with nation-wide initiatives where possible. Digital skills development is a major focus area for national Government. The **Local Digital Skills Partnerships (DSP) programme** provides access to resources from national Government, extending from the commitment of the UK Digital Strategy, to improve digital capabilities across the entire skills spectrum, from online literacy to the advanced knowledge needed to work in the digital sector.

Lancashire, the South West and West Midlands are already piloting the DSP programme, and the national Government has invited all other Local Enterprise Partnerships and Mayoral Combined Authorities to submit expressions of interest to form a Local DSP pilot. A further three will be selected by **April 2019.** A Local DSP Playbook has been created as a central resource to help regions to establish and run a successful Local DSP.

We recommend that the Combined Authority works with relevant local parties to submit an application to form a local Digital Skills Partnership for Cambridgeshire & Peterborough.

However, this Strategy is primarily concerned with ensuring that appropriate IT skills are present in the workforce of Cambridgeshire & Peterborough's future. To this end, sufficient educational provision for both young people and adults needs to be accessible either through the school, college and higher education system, or through employer-led training. At the same time, businesses need to have a clear process for engaging with the education system and for signposting what skills and knowledge it needs its future workforce to develop. One route to achieving this is through the Digital Skills Partnership, see inset above, which is a localised, nation-wide programme of joint public / private sector engagement on education. Alternatively, a more ambitious programme could be the creation of a CPCA Digital Skills Task Force, consisting of business, education and public sector leaders, that generates and actions specific opportunities around the creation of digital skills among young people and adults; its mission would be to ensure that all businesses in the area are able to thrive through access to a consistent, high quality supply of talent.

YOUNG PEOPLE (PRE-18)

Providing high quality digital training to Cambridgeshire and Peterborough's young people provides a dual benefit. Firstly, a digital education with effective employability interventions can lead to the higher paid, more productive jobs of the Knowledge Intensive economy. Secondly, easing the recruitment challenges of local digital businesses by supplying a highly skilled digital workforce will improve their productivity.

To ensure that young people leave school with the skills that the digital economy values, we see that five important things must be in place

- **The curriculum must deliver what employers need.** To do this, employers need to feed back to schools through the appropriate mechanisms what they are lacking. The potential of T-Levels is recognised – as is the fact that despite there being a Digital route, no Cambridgeshire and Peterborough education providers are offering T-Levels within the first wave. The public sector needs to better signpost these feedback channels and encourage local digital companies to share their needs with the education sector.
- **Upskilling opportunities for teachers** – the Business Survey highlighted recommendations for ensuring that training opportunities are available to teaching staff in the region (of schools and higher education establishments) to ensure that the quality of education delivered is of the highest standard and in line with the skills and knowledge expected of business.
- **High quality extra-curricular provision must be available for activities that grow digital and soft skills (such as team work and creativity) within an inclusive environment**. Code Clubs and Robotics Clubs inspire young people and nurture their enthusiasm in a particular subject, as well as offering opportunities for soft skill development such as teamworking and creativity. The private sector needs to provide volunteers to support the teaching staff in delivery and to demonstrate available career paths. Diversity in volunteers should be encouraged.
- **Employers must engage with schools**. There are a myriad of programmes in the region supported by businesses such as Business in the Community, Form the Future and the Careers and Enterprise Company. The landscape can be confusing and inconsistent for both employers and schools, and it varies from district to district. It is far easier, for example, to generate STEM-based employer engagement in Greater Cambridge than in Fenland. Yet it is Fenland and East Cambridgeshire that has been identified by the Government as an "Opportunity Area" due to the low levels of academic achievement and social mobility – two factors which consistent employer engagement can help remedy. The Combined Authority needs to work with relevant organisations to identify employer engagement programmes that are effective and to rally increased support from local technology firms through brokerage, facilitation and, if needed to expand employer engagement to currently underserved areas, incentivisation.

- **A variety of career paths into the digital sector need to be supported by the business community.** The apprenticeship programme is subsidised by the Government and offers high quality on-the-job training without requiring that the employee take on the financial impact of a university degree; through apprenticeships it is possible for young people to develop competitive coding skills as well as effective soft skills. Anglia Ruskin University currently offers a digital apprenticeship programme, but uptake has been slow despite support from the likes of Bango and Aveva. Information needs to be easily available on the process for delivering apprenticeship programmes, and the Business Survey reflected the feeling that more (financial) support needs to be offered to SMEs so that they can take on interns or apprentices without losing efficiency.

ADULT (POST-18)

Adult education is an area over which the Combined Authority has budgetary control. With new technological advancements being deployed, the re-training and upskilling of adults to enable them to be more productive in their roles or move on to higher paid jobs, is of critical importance to increasing local productivity. Given the lead time for educating a young person to a digital-job-ready level, it is essential that the Combined Authority invests in and promotes digital retraining pathways for adults in parallel.

Adult education is available via part-time courses at, for example, Cambridge Regional College which has campuses in both Cambridge city and Huntingdon and offers courses in Software Programming and CyberSecurity Essentials. Meanwhile City College Peterborough offers IT Skills courses in its Adult Education portfolio and Peterborough Regional College offers courses on CAD and an Introduction to Programming. These courses are priced affordably and typically held at times that are convenient for workers.

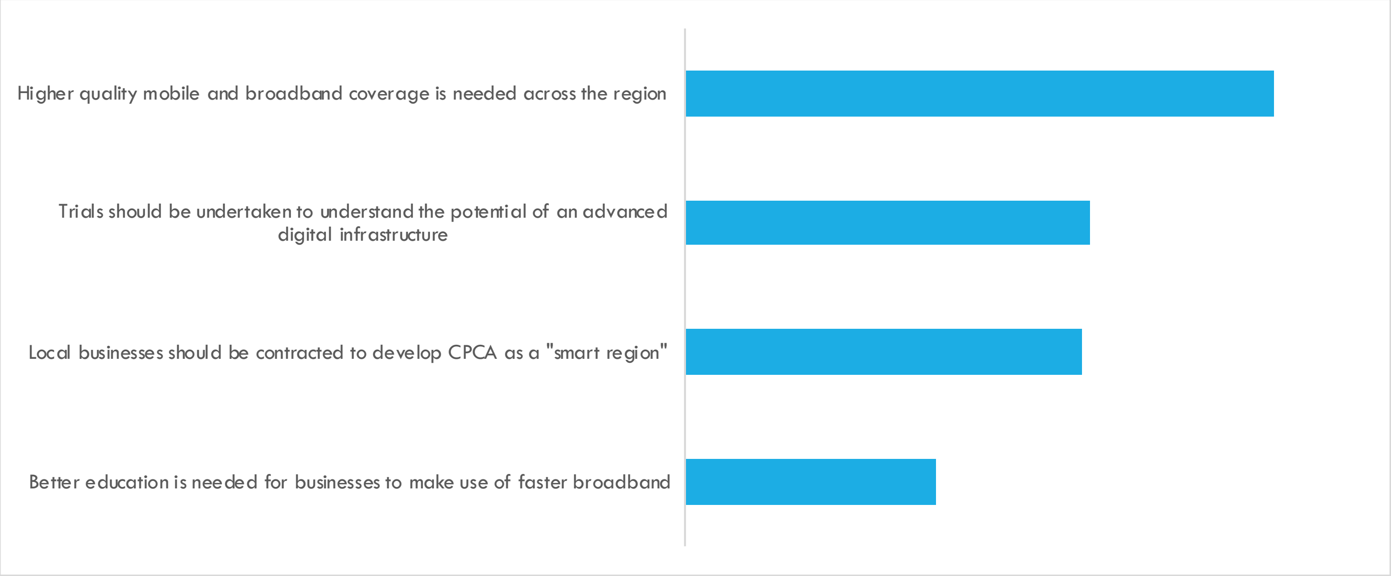
The role of Universities in part-time adult education could be enhanced. The University of Cambridge’s Institute for Continuing Education, for example, offers many humanities courses but not many computer science courses. Peterborough University has been identified by the Cambridgeshire and Peterborough Independent Economic Review as a growth opportunity for the region; this is especially important given Peterborough’s low qualification rate outlined above. We hope that the University aims from the start to support the adult education work of City College Peterborough and Peterborough Regional College while providing high quality education to young people and engaging with local business to deliver skills in line with the regional economy and the latest technology trends.

The Regeneris Skills Report concludes that employers across the CPCA area appear to be more willing to offer training to employees, in order to address skills shortages and recruitment problems, than national benchmarks, with over 70% providing some kind of training. There is also a greater propensity for firms to invest in on-the-job and online training compared to the average values for the whole England, although offsite training also plays a considerable role. Variance between Cambridgeshire and Peterborough is minimal, with employers in the latter generally more likely to offer some form of training. This level of private sector investment in employee personal development needs to be maintained at the least. The current plans for the adult education budget are to prioritise digital literacy, qualifications up to Level 3, and the development of skills for Health & Care, Logistics, Construction and Manufacturing. We support the goals of digital literacy, and would recommend adding IT & Telecommunications to this list of priority sectors.

TECHNOLOGY INFRASTRUCTURE

VISION

The Digital Sector Strategy's vision is that the CPCA region becomes a region where telecommunications and digital infrastructure is understood to be an absolutely vital underpinning of the economy, and where local government acts as a catalyst to accelerate demand, encouraging the entry of private sector supply side solution providers. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
Higher quality mobile and broadband coverage is needed across the region	4.42
Trials should be undertaken to understand the potential of an advanced digital infrastructure	4.04
Local businesses should be contracted to develop CPCA as a "smart region"	4.02
Better education is needed for businesses to make use of faster broadband	3.72

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA See Annex 1	INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA See Annex 2
There are several practical issues mentioned in the survey results such as lack of mobile phone coverage in rural areas, on train lines, fibre cable not reaching to where businesses are (IND), or into new built environment (TAL). CPCA region should be better than average in connectivity, a test bed for 5G (INV), networks available in public places. More competition is asked for reducing the price of being connected to fast networks (IND).	The Survey's answers provide some interesting evidence on how the different districts perceive the relative relevance of the proposed priorities and Technology infrastructure needs. A gradient emerges where Fenland considers all four options to be of key relevance, Peterborough also attributes relevance to all the four same priorities but with an overall slight less intensity. Greater Cambridge and Huntingdonshire focussed on two key issues and East Cambridgeshire on one. In more detail, • "Higher quality broadband and mobile coverage is needed across the entire region", was a top priority for all areas apart from East Cambridgeshire

	• "Local businesses should be contracted to develop CPCA as a "smart" region" is particularly relevant for the Fenland, Peterborough and Greater Cambridge • "Better education is needed for businesses to understand how to make use of higher quality broadband (e.g. video marketing)", was a priority for respondents in Fenland, Huntingdonshire and Peterborough, while • "Trials should be undertaken to understand the cross-sector potential of an advanced digital infrastructure", seems to be critically relevant for Fenland, Huntingdonshire and Peterborough.

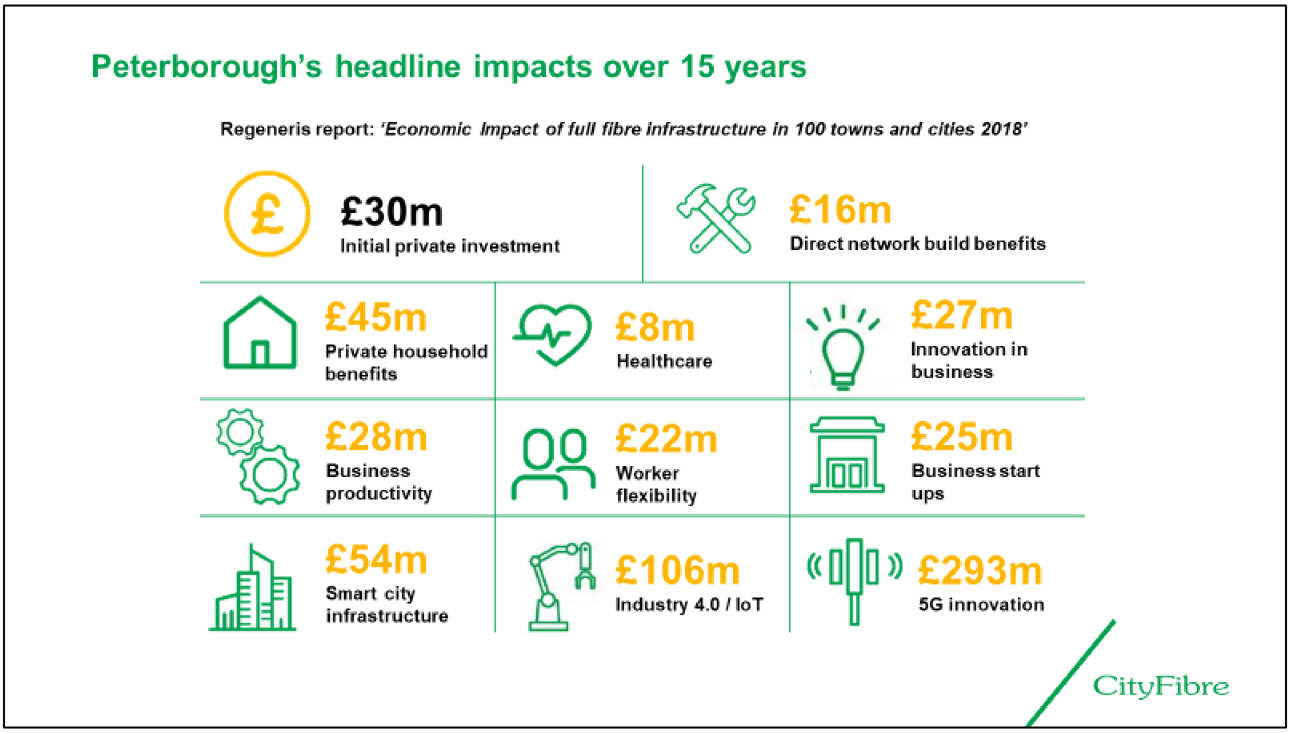
RECOMMENDATIONS	
For public sector	**For private sector**
Deliver a step-change in technology infrastructure ambitions with aspirational targets of 1Gb/s broadband speeds across the region by 2022. Put in place internal processes that will support the private sector in turning Cambridgeshire & Peterborough into a world-class smart region at pace. • Aspirational target Gb/s broadband speeds and 4G on all transport routes, business sites and dwellings by 2022. • Make next generation digital infrastructure an absolute requirement for all future transport, housing and commercial development projects • Review the efficiency of the structure, processes and regulations of local Government that affect the roll-out of full fibre infrastructure, mobile connectivity and smart city technology with a purpose to make public places more digitally immersive and accessible for citizens, visitors and businesses. • Combined Authority to continue to work with Connecting Cambridgeshire to explore how the Smart Cities programme is best extended out to and integrated across Market Towns • Provide the physical space and institutional goodwill for intelligent city technology innovation projects, making it as simple as possible for the private sector to trial new products and services. This strategy should prioritise the sourcing of technology from local firms and adopt an "Open Innovation" ecosystem approach e.g. citizen engagement, democratising data.	**Inspire demand for advanced technology infrastructure by bringing citizen and business communities together and raising awareness of next-generation infrastructure capabilities through networking and workshops. Campaign for faster and more ambitious roll-out.** • Grow the Digital Champion scheme to generate knowledge of and demand for Gb/s broadband schemes. • Work with local and national Government to deploy localised 5G testbeds and "Open Innovation Zones" that accelerate the development and adoption of new products, services and applications

BACKGROUND ON TECHNOLOGY INFRASTRUCTURE IN CAMBRIDGESHIRE & PETERBOROUGH

Today, digital infrastructures, and their interconnections, form the absolute foundations of the digital economy. A region that seeks to expand the productivity of its technology sector, such as Cambridgeshire and Peterborough, needs cutting-edge digital infrastructures to support and sustain that growth. Internet access is now widely seen as the fourth essential utility. It underpins our economic and social lives. It means that digital businesses can set-up and collaborate in an increasingly data-driven world, and users and citizens can enjoy a high quality of work and of life. Mobile internet connectivity enables commuters to work and communicate with stakeholders while on the move, it enables businesses to transfer the large volumes of data rapidly and, possibly, securely, and it enables a wide range of newly emerging working patterns that, while posing some key questions on the nature of working relations, are also surely delivering valuable repercussions across wellbeing, leisure and health.

Next generation digital infrastructures are formed over fibre networks rather than legacy copper networks and through 5G fixed wireless access. In the Future Telecommunications Infrastructure Review, the Government outlined targets for half the country to have full fibre connectivity (which will deliver GB/s rather than MB/s speed) by 2025 and full access to it nationwide by 2033. There are mechanisms in place to support this roll-out, including the Government's £67M Gigabit Broadband Voucher scheme, announced in March 2018, which supports businesses and business parks to access the new gigabit fibre networks.

The 2018 report by Regeneris Consulting for CityFibre on The Economic Impact of Full Fibre Infrastructure in 100 UK Towns and Cities explores ten impact areas where full fibre can add to GVA and employment, including productivity improvements, innovation, flexible working and new business start-ups. The two graphics below detail the potential benefits of full fibre to Peterborough and Greater Cambridge over fifteen years based on information from that report. This includes £726M in total estimated benefits to Greater Cambridge and £608M in Peterborough.



Peterborough's headline impacts over 15 years

Regeneris report: *'Economic Impact of full fibre infrastructure in 100 towns and cities 2018'*

£30m Initial private investment

£16m Direct network build benefits

£45m Private household benefits

£8m Healthcare

£27m Innovation in business

£28m Business productivity

£22m Worker flexibility

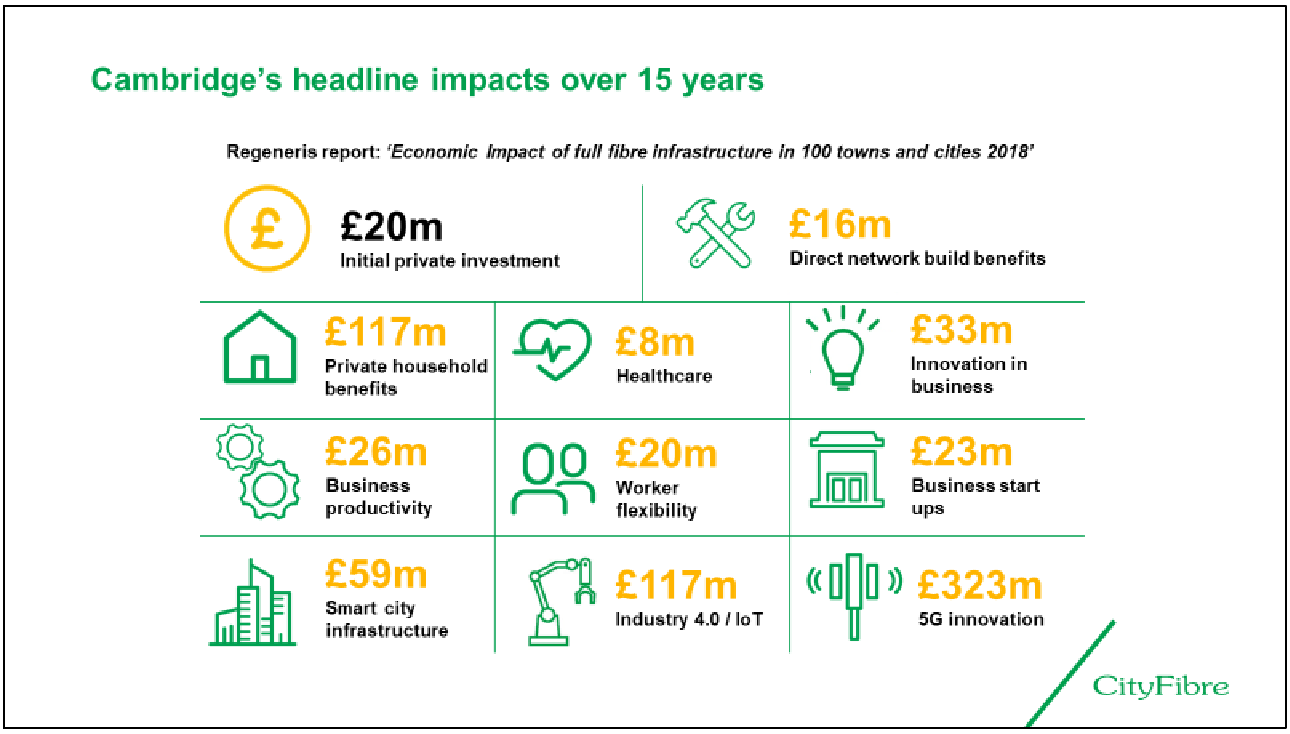
£25m Business start ups

£54m Smart city infrastructure

£106m Industry 4.0 / IoT

£293m 5G innovation

CityFibre



Cambridge's headline impacts over 15 years

Regeneris report: *'Economic Impact of full fibre infrastructure in 100 towns and cities 2018'*

£20m Initial private investment

£16m Direct network build benefits

£117m Private household benefits

£8m Healthcare

£33m Innovation in business

£26m Business productivity

£20m Worker flexibility

£23m Business start ups

£59m Smart city infrastructure

£117m Industry 4.0 / IoT

£323m 5G innovation

There are already programmes ongoing in Cambridgeshire and Peterborough to improve mobile and broadband services including the Connecting Cambridgeshire and the CityFibre GigaBit City deals, Virgin rolling out fibre to thousands of homes in Chatteris and March, and Hyperoptic and CNF announcing plans for Greater Cambridge. This is good progress. As a result of the Connecting Cambridgeshire programme, for example, the county's superfast broadband coverage has gone from less than 60% in 2010 to over 96% by January 2018.

Ofcom's December 2017 Connected Nations report confirms that the two cities of Greater Cambridge and Peterborough are well served in terms of digital infrastructure, and generally have coverage above the England average. However, indoor and in-car coverage for 4G mobile voice and data services for all other areas of the county is below the England average. At 8%, full fibre (FTTP) coverage across Cambridgeshire and Peterborough is marginally above the national average for England but still low, particularly compared to other regions in Europe and well below, for example, South Korea.

For a region that is seeking to compete on a global stage and attract significant volumes of inward investment, this must be improved. In 2019/20, the Combined Authority is set to invest £2.1m on improving digital connectivity, working through Connecting Cambridgeshire. Priority planned investments include £1m to improve mobile coverage, £500,000 for full fibre, £200,000 to develop a 5G network, and £100,000 on public access Wi-Fi. This work will be aligned with the strategy for the economic development of market towns[18].

---

[18] Combined Authority Business Plan 2019-20

We recommend the entire region holds aspirational targets of 1GB/s or higher broadband speeds across the area by 2022 as well as 4G connectivity on all transport routes, residential areas and business parks. In order to achieve this ambitious target, we would encourage a review of the structure, processes and regulations of local Government that will enable and encourage the private sector to roll out the necessary digital infrastructure.

We understand that private companies are unlikely to prioritise investment in full fibre infrastructure in areas that may not offer promising financial returns. To address this challenge, a region-wide programme of **demand generation** for digital infrastructure must be pursued, building on the example provided by the local community Digital Champions, who have been encouraged and convened by Connecting Cambridgeshire to stimulate the Superfast Broadband roll out, and also the St Neots Smart Places Initiative who organised a three-day Future Takeover event for 193 local residents and businesspeople that explored the role technology can play in creating a 'smart' market town. The aims of such a demand generation programme would be threefold:

- inspiration: creatively unlocking the realisation of what enhanced connectivity could mean for businesses and citizens
- consultation: understanding the unique requirements of the local eco-system.
- education: raising awareness of the benefits of GB/s internet speeds and digitalisation in general

The UK Government committed £200m in the 2016 Autumn Budget to develop the country's 5G infrastructure[19]. This includes the funding or test networks, and sector-specific trials, an Urban Connected Community programme in the West Midlands, and other programmes yet to be rolled out. Integral to DCMS' rollout plans is the national UK5G Innovation Network, headed by local membership firm Cambridge Wireless.

Cambridgeshire and Peterborough should leverage this national Government ambition and the strengths it has in the region to deploy an early 5G testbed & trials. Such a testbed would need to work with multiple businesses to maximise the impact of the new technology and generate a long term economic benefit for the area. It would involve providing the network infrastructure, but also enabling businesses to trial 5G devices and services on this network. Such a testbed would require the public sector to generate physical space as well as institutional goodwill for intelligent city technology innovation projects, making it as simple as possible for the private sector to trial, interact and learn to use, new products and services through the adoption of "Open Innovation" principles.

---

[19] 5G mobile networks may deliver £173bn in UK GDP growth between 2020 and 2030 according to FCCG (2017). 'UK Strategy and Plan for 5G & Digitisation –Driving Economic Growth and Productivity'. FCCG estimates are based on global contribution of 5G from GSMA (2017). 'The Mobile Economy' and the net benefit of investment in 5G in the UK.

The UK5G Innovation Network and DCMS' Phase 1 Trials

Set up to accelerate the adoption of 5G in the UK, UK5G facilitates communication and cooperation between organisations involved in the rollout of 5G infrastructure and services. It works hand in hand with the six phase 1 trials funded by the Department for Culture, Media and Sport. These trials offer influential insights into what cities and rural areas might achieve through 5G testbeds. For example the manufacturing testbed operated by the Worcestershire 5G Consortium is set to demonstrate 1% productivity improvements through the use of 5G technology. The Smart Tourism testbed in the West of England is engaging citizens in public spaces through augmented reality applications. And the 5GRIT testbed is utilising 5G-enabled high definition video feed from drones to examine farmland and identify irregularities in real-time.

The goal for the Combined Authority area should be that visiting potential investors come away with a genuine realisation that we are world-leading smart region. To strengthen and support this aim, the Combined Authority should continue to invest in increasing the "smartness" of the region, preferably by working alongside exemplar local companies[20].

The CPCA have reserved over £5m of capital expenditure over the next three years for Digital Infrastructure. With this budget, the Combined Authority has the potential to increase the quality of life for its inhabitants, make it an increasingly attractive area for potential investors and provide local technology entrepreneurs with a critically larger customer-based demand, necessary, when aggregated, to create initial critical mass and to support early stage growth.

Organisations such as Future Peterborough – which brought that city to success in the 2015 Smart City of the Year Award – and Connecting Cambridgeshire with the Smart Cambridge and Smart Places initiatives are all working in this field, and it is important to note that individual market towns are also currently generating their own digital infrastructure plans.

We recommend for these individual plans to communicate, interconnect and collaborate to make deployment more efficient, supported by an overarching strategy and a single barrier-busting body whose remit is to accelerate the development of Cambridgeshire & Peterborough as a smart region through the sharing of best practice and strategic engagement with infrastructure providers and Operators.

A key requirement here is that that for all private or public initiatives involving transport, housing or commercial development, ambitious and complementary digital infrastructure provision should now become an absolute planning necessity before permission to proceed is given.

This need for a collaborative, networked approach, highlights the significant challenge to the effective deployment of next generation digital infrastructure across the entire Combined Authority area: simply the number of different policy authorities and government bodies involved. The ownership of networks of assets is complex across the landscape and there are many historical examples of fragmented management one should learn from.

---

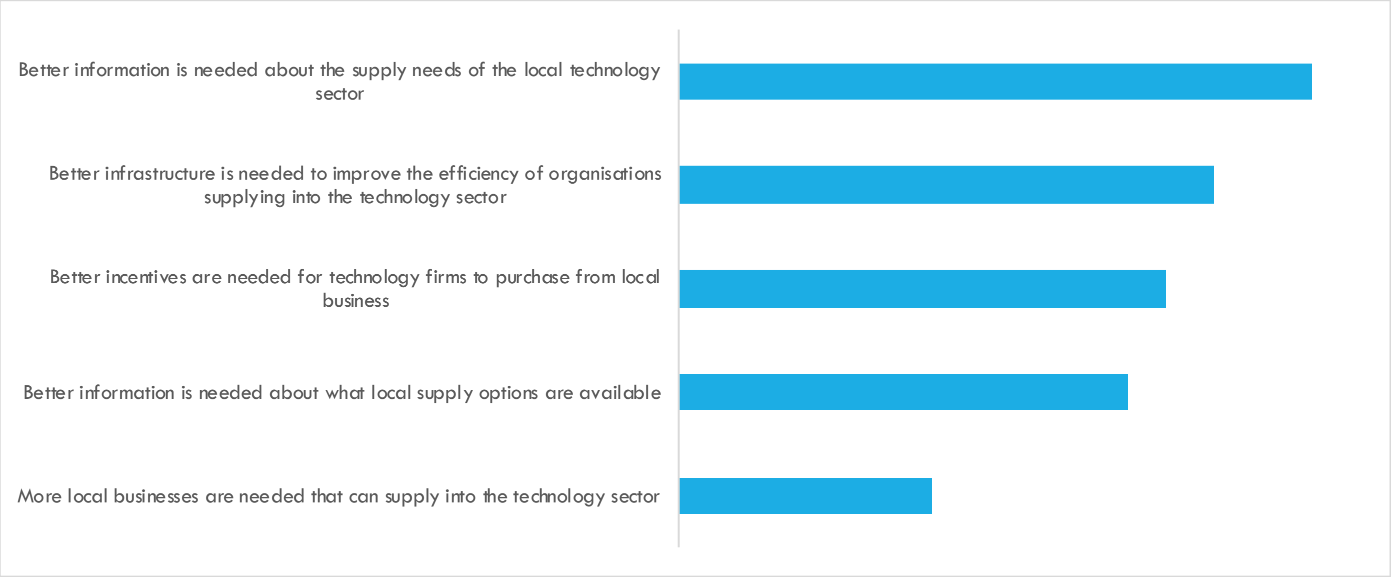
[20] A great example of this is Urban Data Project between Telensa, Microsoft and the Smart Cambridge team.
https://www.telensa.com/news/telensa-announces-the-urban-data-project-with-cambridge-as-launch-partner-city

For example: lampposts are an asset that can be central to the deployment of smart solutions while being finely distributed across the territory, providing an extended network penetrating most of the corners of present urban landscapes. They might be owned by one of a number of local councils or by a long-term PFI contract; such fragmentation makes it difficult for a scheme that aims regionally and requires input from numerous external stakeholders to be effective. Different approaches can instead be followed as piloted, for example, by GovTechnology, the Singapore government agency in charge of a “Lamppost-as-a-Platform” pilot project, that is tendering business for ideas and solutions on using this platform.

SUPPLY CHAIN

VISION

The Digital Sector Strategy's vision is that the CPCA region becomes a region where more local firms complement the supply and demand needs of the local technology community. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
Better information is needed about the supply needs of the local technology sector	3.95
Better infrastructure is needed to improve the efficiency of organisations supplying into the technology sector	3.85
Better incentives are needed for technology firms to purchase from local business	3.80
Better information is needed about what local supply options are available	3.76
More local businesses are needed that can supply into the technology sector	3.56

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA **See Annex 1**	**INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA** **See Annex 2**
Companies go where they find the best value for meeting their needs (IND). This region is internationally connected (UK, EXP) and buying services from anywhere from the world (EXP) does not seem to be an issue. However, 'more' of connecting (NET) the both sides would be win-win. There should be more transparent knowledge sharing (KNO) of buyer needs. Also, improved access to suppliers to both public and private procurement (IND) would open opportunities for local companies (IND) to offer their products and services.	Peterborough, Fenland and Huntingdonshire set as key priorities "Better information is needed about what local supply options are available", and "Better information is needed about the supply needs of the technology sector" This identifies the need for bridging an information gap in these districts concerning local and technology sectors' supply chains. Greater Cambridge identifies the need to respond to an infrastructural need, captured in the priority: "Better

	infrastructure is needed to improve the efficiency of organisations supplying into the technology sector" Meanwhile operational improvements were considered of key relevance by Peterborough and Fenland, emphasizing the two statements "Better incentives are needed for technology firms to purchase from local businesses" and "More local businesses are needed that can supply into the technology sector".

RECOMMENDATIONS	
For public sector	**For private sector**
Sponsor a researched programme of networking activities that helps the region to increase understanding of the value chains of digital businesses and to help remediate potential gaps and bottlenecks in the local supply market.	**Provide more opportunities for digital businesses to meet local suppliers, and vice versa, through targeted face to face networking opportunities and intra-regional programmes.**

BACKGROUND ON SUPPLY CHAIN IN CAMBRIDGESHIRE & PETERBOROUGH

A well-advertised, open, accessible and utilised local supply chain is needed for high-value technology clusters to provide both direct benefit and indirect spillovers and externalities to the rest of Cambridgeshire and Peterborough[21]. The supply chain is key for the transfer of knowledge and ideas. It is not a simple linear process, but essentially a *networked* one, where parts of a product or of a service, can be reassembled and reconfigured, multiple times, and where the same actors can play different roles, as suppliers, customers or collaborators, especially for supply chains delivering the production of digital goods[22]. It is important to realise that such networked interactions, jointly forming the supply chains, are mutually beneficial to all parties.

> "Ten years ago a report* identified that the East of England was highly successful at innovation yet lagging internationally in terms of economic output. **One of the key differences with comparable international regions was the lack of supply chains.** Since then, Cambridge and the wider region has had an influx of global corporations. Like the Eindhoven region 10 years ago, we need to develop a "create & make" policy, where start-ups can increase their success rate and grow into medium-size organisations by leveraging the presence of large companies and utilize their access to global markets."
>
> Henk Koopmans, CEO Huawei R&D UK
>
> *The Innovation performance of the East of England, EEDA March 2009.

CBR research from 2018 suggests that 10.8% of the value of supplies for local Cambridgeshire & Peterborough businesses across all sectors came from their local area (defined as being within thirty miles), whereas 27.8% came from overseas. This represents a missed opportunity that this strategy recommends is addressed. However, analysing the nature and details of the supply chain of the technology industry in Cambridgeshire and Peterborough is a lengthy and data intensive task, and not one possible within the constraints of this strategy. We recommend that this is done by CPCA as a further research project.

---

[21] Giovannetti, E. and Piga, C. (2017) "The Contrasting Effects of Active and Passive Cooperation on Innovation and Productivity: Evidence from British Local Innovation Networks", International *Journal of Production Economics*, Volume 187, May 2017, Pages 102–112

[22] D'Ignazio A. and Giovannetti E. (2014) "Continental Differences in the Clusters of Integration: Empirical Evidence from the Digital Commodities Global Supply Chain Networks" *International Journal of Production Economics*, Volume 147-B, pp 486–497

As mentioned in the introduction, this strategy does not seek to interfere unnecessarily in the workings of the market. However, in the domain of Supply Chains two key features have been identified by the Commission and by respondents in the Business Survey which indicate the presence of a market failure, and could therefore benefit from support from Government and the business community.

1. Lack of information on suppliers in the region
2. Lack of information on the buying practices of local digital firms

These problems and barriers are not surprising as companies trading along complex supply chains are mainly doing bilateral trading, often based on relationships, not through anonymous competitive market places. Such bilateral trading takes place all along complex supply chains that involve high technology digital goods, be it a service or a commodity.

Moreover, the reality of facing just one supplier, or one customer, rather than a multitude of competing ones, may place this supplier, or customer, in a strong bargaining position, making it *unavoidable*. Such *unavoidability*, in a complex digital supply chain, can be compared to the role of an airport with no competing airports in a radius of 100 miles. When these effects, also known as market *dominance,* arise, economic theory tells us that regulators should carefully scrutinise for the possibility of their abuse, where such *dominant* positions are used to prevent new entry or to extract excessive rents.

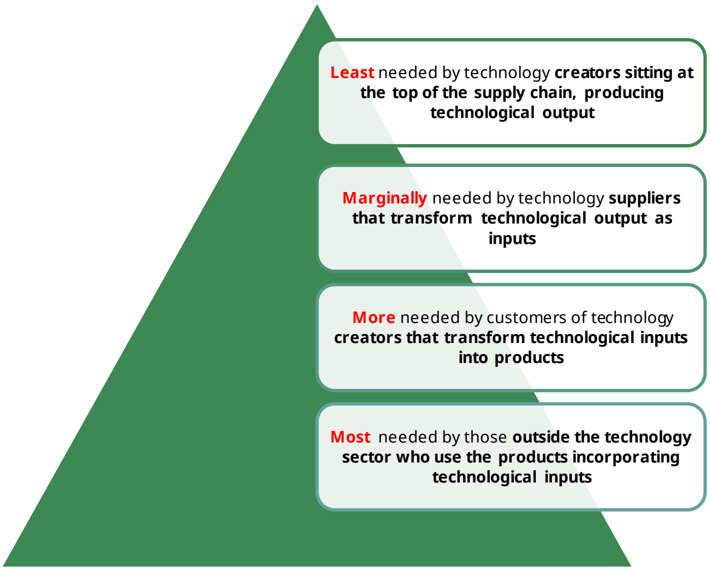
While the emergence of online platforms have initially reduced these risks, as they provide a larger set of exchange opportunities along the supply chains, when growing and becoming more successful, they also pose additional risks of *monopolisation* due to the high barriers to entry. Such barriers, potentially blocking new entrants, innovators and entrepreneurs, become steeper due to clear mechanisms, where *success bring more success*, as the number of customers on one side of an online platform enjoy higher benefits when there are more potential suppliers, on the other side of the platform. This happens, for example, when advertisers prefer to invest on social media platforms that allow them to reach more customers, hence providing these platforms, with more resources to expand and attract even more customers, leading, eventually, to a self-reinforcing process possibly, leading to the possible capture, and dominance, of the entire online market. [23].

Connecting local supply with demand, across digital platforms and face to face, is the key to unlocking this failure. There may well be companies already operating within the Cambridgeshire and Peterborough area that could be better utilised by local technology firms. Carefully curated networking events for customers to meet suppliers will generate new opportunities and stimulate regional growth. Building connections between the region's districts will be key to ensuring that the supply pool is as broad as possible. **We feel there is an opportunity for the Combined Authority, working with local technology organisations, to support intra-regional "Trade Missions" that build connections between firms and establish new relationships.**

---

[23] Rochet, J-C. and J. Tirole (2003), "Platform Competition in Two-Sided Markets", *Journal of the European Economic Association*, 1, 990–1029

An additional relevant insight emerging from the quantitative analysis of the Digital Sector Strategy Business Survey shows that access to supply chain relevant information is perceived differently depending on where in the supply chain you sit. Technology creators feel the need for information less, while those outside the technology sector feel the need more. These supply chains roles can then be mapped into the district differences, discussed above, to obtain a clearer picture of the geographic distributions of respondent companies supply chain needs and roles.


Least needed by technology creators sitting at the top of the supply chain, producing technological output
Marginally needed by technology suppliers that transform technological output as inputs
More needed by customers of technology creators that transform technological inputs into products
Most needed by those outside the technology sector who use the products incorporating technological inputs

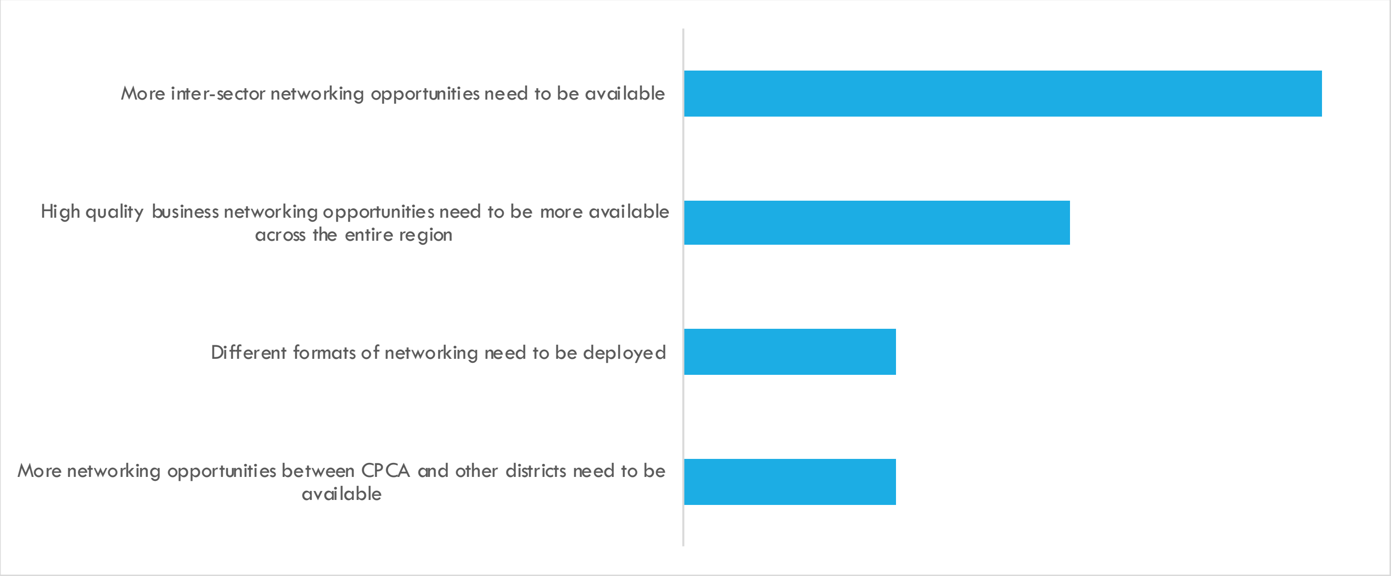
The pyramid of information needs along the digital supply chain

The Digital Sector Strategy Business Survey suggests that for digital businesses, quality over cost or provenance is the most important factor; it also reinforces the fact that many digital businesses have an international perspective on sourcing. Therefore, to develop a healthy local supply chain for the technology community, these businesses need to be globally competitive, which means the local suppliers need visibility on what digital firms are currently buying, from whom and at what quality and price. In a functioning market, this knowledge will enable firms hoping to establish in the area to position themselves appropriately for success.

HIGH IMPACT NETWORKING

VISION

The Digital Sector Strategy's vision is that the entire region becomes a highly networked environment where organisations help bring the communities together and support them as they make the right connections. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/5)
More inter-sector networking opportunities need to be available	4.33
High quality business networking opportunities need to be more available across the entire region	4.20
Different formats of networking need to be deployed	4.11
More networking opportunities between CPCA and other districts need to be available	4.11

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA See Annex 1	INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA See Annex 2
Networking is happening within industry subsectors (IND), as well as across disciplines (UK). There should be more emphasis on attracting businesses (IND) and individuals (TAL) outside of the region to attend the events which often have the same local people attending (UK). Showcase the industry cluster (IND) and share knowledge (KNO) at events by high net worth individuals from successful businesses (IND). Different parts of the region have different needs for networking. An ecosystem is joined up collaborative network. Access to venues should be easy and the region would do better with more medium sized venues. Special topic events (IND) will survive if there is enough demand for them.	Networking has barriers that needs to be overcome in Fenland and Huntingdonshire Fenland identifies two priorities as critically relevant: • "High quality business networking opportunities need to be more available across the entire region", and • "More inter-sector networking opportunities need to be available (e.g. "agriculture meets sensors")" This last priority is also seen as critically important for Huntingdonshire.

RECOMMENDATIONS	
For public sector	**For private sector**
Ensure appropriate physical space, connections and channels are available for businesses to network by transforming underutilised public infrastructure into co-working spaces or learning zones and supporting landlords in installing co-working spaces in high street spaces. • Transform available or underutilised libraries/public spaces into co-working spaces or learning zones. • Using public sector asset redevelopment projects as an opportunity to create co-working spaces or learning zones, and by inviting landlords and developers to come forward with proposals to create commercial space that specifically supports flexible co-working and networking space • Pump prime underserviced networking areas of high potential to enable the delivery of high quality events that attract the desired delegates. Areas in need are inter-sector networking activities, intra-regional networking activities (see Supply Chain: Trade Missions).	**Established networking firms to deliver high quality events across the region while collaborating to build a comprehensive ecosystem of business development and knowledge transfer.** • Focus on areas of higher population density – for example Huntingdon and Peterborough – and patience will be needed to get it off the ground (ref. Alconbury). Work with Market Towns strategies to put in place community networking events where people live, with themes and content of universal appeal. • We support the CPIER recommendation for the creation of a regional Fellows Network to strengthen networks across the area and identify opportunities. In particular these Fellows Networks could bring together entrepreneurs in local support groups.

BACKGROUND ON NETWORKING IN CAMBRIDGESHIRE & PETERBOROUGH

> "Networking represents the lifeblood of any ecosystem, helping to bind together all its constituent parts to allow information and knowledge to move quickly between each of the individuals. Greater connectivity and transparency not only helps to highlight and eject bad actors from the system, but also creates partnerships and value that otherwise simply would not happen"
>
> **Jon Bradford, The Bradfield Centre**

The Greater Cambridge cluster's business networking culture is a unique phenomenon and one to which the innovation of the area, which boasts the highest number of patents per head of anywhere in the UK, owes a considerable debt. The transfer of knowledge and development of opportune business relationships through "chance" encounters at events are a hallmark of this region's success. It has been revealing that throughout the development of this Digital Sector Strategy "High Impact Networking" has emerged as the fundamental area for region-wide development. Bringing people together to share ideas and expertise is needed to stimulate demand for new digital infrastructure, to raise awareness among entrepreneurs of the investment models available to them, to accelerate the adoption of new technologies by industry, to develop relationships and partnerships overseas, and more. Only when a regular, high quality platform exists for businesses to meet new investors, partners, suppliers or employees will productivity really start to accelerate.

What is particularly special about the networking culture is that it is almost entirely privately funded. The business community contributes to its ongoing development through, not only fees and sponsorship, but also through very substantial commitment of time. The model is highly participative and 'bottom-up'. However, while this culture of high impact networking thrives in Greater

Cambridge and stimulates its local economy, it is far less prevalent in other districts of Cambridgeshire & Peterborough.

At present there are around 60 dedicated networking organisations in the Greater Cambridge area with prominent players listed in this table.

Networks	Focus Areas	Approx number of company members
Cambridge Network	General Business	1000+
CW (Cambridge Wireless)	Technology	400+
Cambridge Cleantech	Energy & environmental technology	391
One Nucleus	Life Sciences	470
Agri-Tech East	Agricultural technology	149
Digital People in Peterborough	Technology	Open to all
Opportunity Peterborough Bondholder Network	Business	200

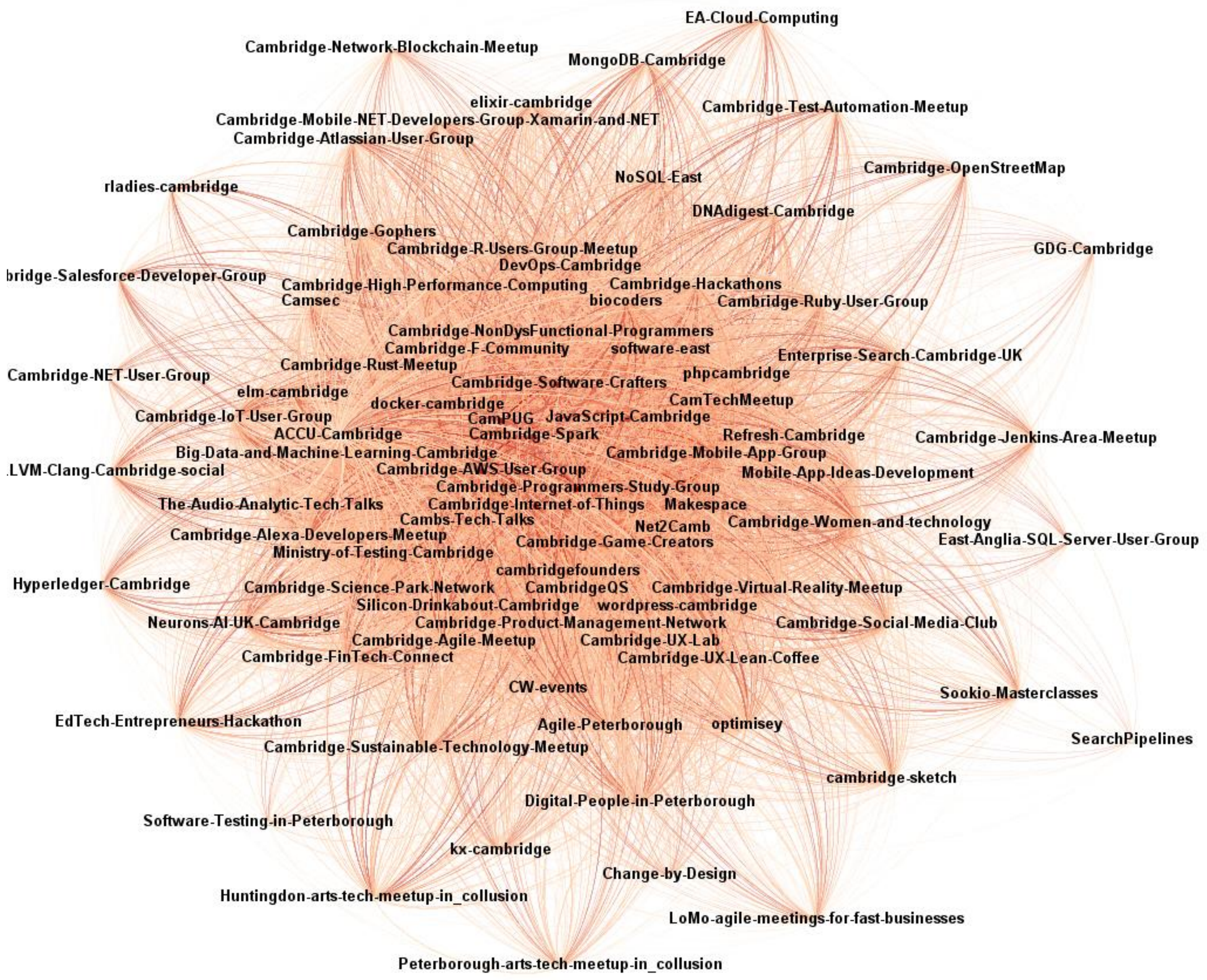
They offer formal opportunities for high quality networking in general business areas, technology, energy efficiency, health-technology, agri-technology. These networking organisations work alongside organic, community-driven networking opportunities highlighted successfully in Tech Nation 2018 through Meet-Up data. The most popular Meet-Ups include Makespace Cambridge (2,246 attendees), Cambridge IoT (1,210) and Data Insights Cambridge (1,074). It has a larger Meet-Up scene than London when analysed proportionally to the number of tech workers.

Geographically, the majority of networking opportunities, other than the traditional Chambers of Commerce activities, take place in the area around Greater Cambridge. It is necessary to offer relevant business networking opportunities in Peterborough, Huntingdon and the surrounding market towns to accelerate growth in these areas – especially as transport infrastructure around Greater Cambridge can render the accessibility of networking opportunities frustrating. CPIER recommends the establishment of a networking Fellows programme to support and advise on the development of effective, localised networking opportunities. This Strategy supports that recommendation, understanding that while growth needs to be stimulated it needs to be done in a manner that suits, while interconnecting, the local communities.

However what needs to be added is a focus on constructing bridges across localised networks, so that a larger Authority-wide “network of localised networks” can be formed. The Business Survey expresses the perception that, in Greater Cambridge in particular, there is little need for more networks to set-up. Rather, the local community need to be encouraged to participate in initiatives already in existence and those networking groups should collaborate with each other to stimulate inter-network opportunities.

Furthermore, there are gaps in the networking landscape where this “network of networks” can collaborate to deliver new events that fill as-yet unmet demand. One example of this would be more sessions that unite the technology sector with regionally important vertical markets such as manufacturing, logistics and agriculture. Another example would be delivering impactful networking activities in districts that have, to date, been under-served by networking firms. In such instances, existing organisations will need to be financially supported by the Combined Authority to pump prime this new culture of networking before attendance increases, sponsorship is found and the private sector can make it viable. Strengthening existing networks and encouraging collaboration, rather than increasing fragmentation will serve to increase the quality of the networking opportunities available.

The Strategy team analysed the relationships between the Meet-Up networks in Cambridgeshire and Peterborough. The results, visualised in the image below, demonstrate how individuals participate in multiple networking activities. However, it also demonstrates clear outlier networks, such as Software Testing in Peterborough, that could be more tightly included into a wider ecosystem. When analysed alongside the offering of networking firms, gaps emerge such as the running of IoT related events in the area around Peterborough to connect technology firms with potential collaborators and customers in the manufacturing and logistics sector.


EA-Cloud-Computing
Cambridge-Network-Blockchain-Meetup
MongoDB-Cambridge
elixir-cambridge
Cambridge-Test-Automation-Meetup
Cambridge-Mobile-NET-Developers-Group-Xamarin-and-NET
Cambridge-Atlassian-User-Group
Cambridge-OpenStreetMap
NoSQL-East
rladies-cambridge
DNAdigest-Cambridge
Cambridge-Gophers
GDG-Cambridge
Cambridge-R-Users-Group-Meetup
DevOps-Cambridge
bridge-Salesforce-Developer-Group
Cambridge-High-Performance-Computing
Cambridge-Hackathons
Camsec
biocoders
Cambridge-Ruby-User-Group
Cambridge-NonDysFunctional-Programmers
Cambridge-F-Community
software-east
Enterprise-Search-Cambridge-UK
Cambridge-Rust-Meetup
Cambridge-NET-User-Group
phpcambridge
Cambridge-Software-Crafters
elm-cambridge
docker-cambridge
CamTechMeetup
Cambridge-IoT-User-Group
CamPUG
JavaScript-Cambridge
ACCU-Cambridge
Cambridge-Spark
Refresh-Cambridge
Cambridge-Jenkins-Area-Meetup
Big-Data-and-Machine-Learning-Cambridge
Cambridge-Mobile-App-Group
.LVM-Clang-Cambridge-social
Cambridge-AWS-User-Group
Mobile-App-Ideas-Development
Cambridge-Programmers-Study-Group
The-Audio-Analytic-Tech-Talks
Cambridge-Internet-of-Things
Makespace
Cambs-Tech-Talks
Net2Camb
Cambridge-Women-and-technology
Cambridge-Alexa-Developers-Meetup
Cambridge-Game-Creators
East-Anglia-SQL-Server-User-Group
Ministry-of-Testing-Cambridge
cambridgefounders
Hyperledger-Cambridge
Cambridge-Science-Park-Network
CambridgeQS
Cambridge-Virtual-Reality-Meetup
Silicon-Drinkabout-Cambridge
wordpress-cambridge
Neurons-AI-UK-Cambridge
Cambridge-Product-Management-Network
Cambridge-Social-Media-Club
Cambridge-Agile-Meetup
Cambridge-UX-Lab
Cambridge-FinTech-Connect
Cambridge-UX-Lean-Coffee
CW-events
Sookio-Masterclasses
EdTech-Entrepreneurs-Hackathon
Agile-Peterborough
optimisey
SearchPipelines
Cambridge-Sustainable-Technology-Meetup
cambridge-sketch
Digital-People-in-Peterborough
Software-Testing-in-Peterborough
kx-cambridge
Change-by-Design
Huntingdon-arts-tech-meetup-in_collusion
LoMo-agile-meetings-for-fast-businesses
Peterborough-arts-tech-meetup-in_collusion

Connection map showing member-based links between meet-ups in the CPCA Area. If a member of one meet-up is also a member of another meet-up, a "bridge" is formed and mapped. Meet-ups with the most bridges are towards the centre.

Given the transport challenges of the region, the advancements made in recent years in remote communications and the popularity of online networking platforms, it is possible for businesses in Cambridgeshire & Peterborough to consider out-of-the-box ideas for addressing the geographic and transport challenges of networking. Video conferencing, webinars, online forums and digital communications tools can also support the educational element of networking and, to some extent, the connection-forming factor. However, we recognise the fact that open and trusting business relationships are founded on face to face contact, and that the "chance encounter" which is a hallmark of Greater Cambridge networking is much harder to replicate online.

Rebranding networking: the smart-working philosophy

Networking is powerful driver, but the word itself does not do the concept justice. "Purposeful networking" or "Smartworking" may be better. Smartworking is based on the idea that a start-up or established technology company should not only spend time in their lab developing their product, they need to get out and see the forest through the trees. For many entrepreneurs and developers, this requires a planned and sustained investment of valuable resources (both time and money) in meeting new people from different fields – and this at a time when there is a lot of pressure to not to spend time on anything other than the task(s) in hand! The people who tend to stay in are those who feel they don't get any added value from meeting people face-to-face, and that knowledge is found mainly in papers or on a website.

Networking provision needs to be made available and attractive to the next generation of technology professionals. There is a concern as to whether future engineers are able or willing to participate in the kind of networking previous generations have embraced, partially as a result of their experience of social media networks. Expectations are different, lengthy meetings during the working day often need to be replaced by short breakfast or early evening events, with highly participative groups, and an informal social feel.

Inter-organisational networking for junior engineers should be seen as central a part of the culture of a business as much as it is for senior commercial professionals. There is social strength in cohorts – the bonds that unite peers thrown into a new situation together – and this can be used by networking firms, acceleration programmes and incubators to unite junior professionals who are new to the region and form additional social capital between organisations.

High quality networking also relies on appropriate physical space being available. Not only is affordable space needed for community organisations to host events, but co-working spaces are required that inspire regular and informal conversation between businesses. The Bradfield Centre is a prime example of a building that has been constructed with networking at its heart.

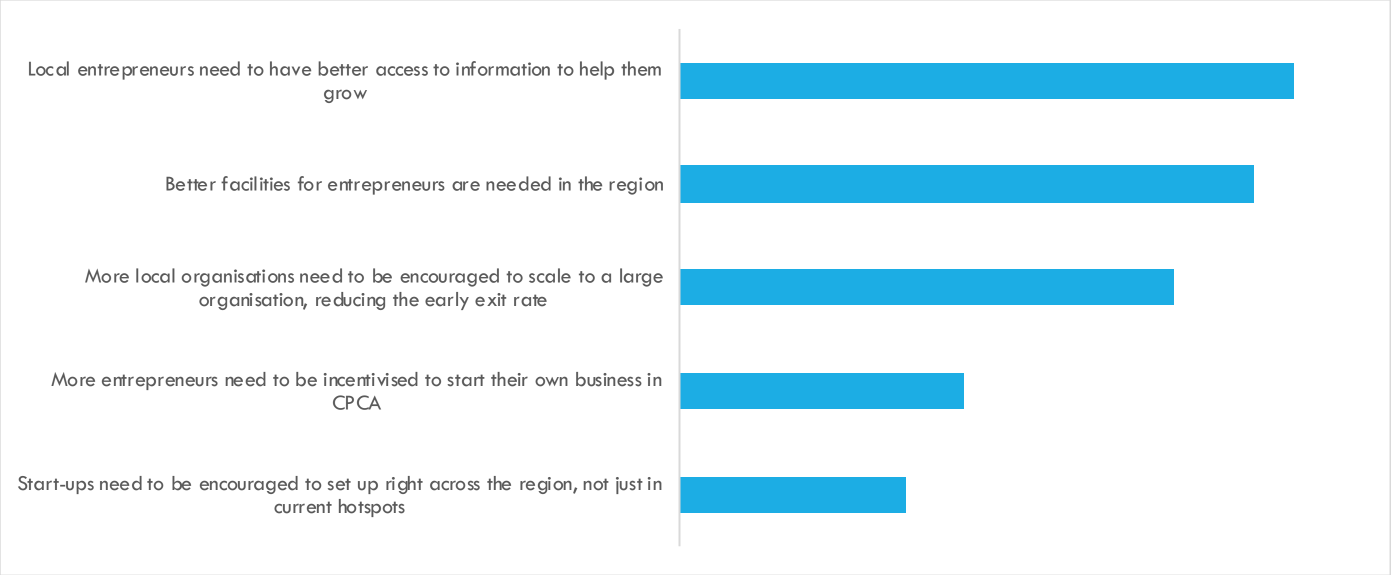
An international example of where this has happened to great success in another context is the Helsinki Central Library Oodi. This newly designed 185,677sqft space incorporates co-working, event venues and traditional libraries under one roof. It anticipates about 2.5 million users annually. Similar spaces need to be available in other urban areas of the region and the market towns, not only to provide affordable office space to start-ups but also to ease the process of organising networking opportunities.

Currently underutilised public spaces such as libraries could be remodelled to fulfil the co-working and networking requirements of high-growth businesses. Such a need for accessible space could also correlate with the Healthy High Street programmes that seek to re-purpose the centres of town given the decline in the physical retail market. Educating and incentivising landlords to tolerate the different income streams of co-working spaces would be the first step to making this happen.

ENTREPRENEURSHIP

VISION

The Digital Sector Strategy's vision is to have more entrepreneurial technology businesses in the region that scale up to larger enterprises and that stay in the region. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/5)
Local entrepreneurs need to have better access to information to help them grow	4.28
Better facilities for entrepreneurs are needed in the region	4.21
More local organisations need to be encouraged to scale to a large organisation, reducing the early exit rate	4.07
More entrepreneurs need to be incentivised to start their own business in CPCA	3.70
Start-ups need to be encouraged to set up right across the region, not just in current hotspots	3.60

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA See Annex 1	INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA See Annex 2
Startups should be supported at different stages of their journey by mitigating some of the risks they take, easier access to funding (INV) and knowledge sharing (KNO). There should be more advice about access to funding and local tax incentives. The region should attract more founders and co-founders and the whole region should be promoted to new startups. Startups need affordable working space where they can network and get access to infrastructure (DIG).	Stronger needs exist in both Fenland and Huntingdonshire indicating an asymmetric distribution of entrepreneurship hotspots. In detail, Fenland's answers prioritise • "Start-ups needs to be encouraged to set up right across the region, not just in current hotspots" and • "Better facilities for entrepreneurial success are needed in the region (e.g. affordable offices)" While Huntingdonshire's answers prioritise

	• "More entrepreneurs need to be incentivised to start their own business in CPCA" and • "Local entrepreneurs need to have better access to information to help them grow"

RECOMMENDATIONS	
For public sector	**For private sector**
Ensure the presence of high-quality, supportive spaces for start-ups to grow across the region, along with financial stimulus that encourages growth in desired areas, for example business establishment in non-Cambridge launchpads, or digital businesses focused on products/services for Manufacturing / Agriculture / Logistics. • Provide high quality, supportive co-working space or launchpads for start-ups, for example by reinventing libraries into skills zones or transforming high street spaces into co-working and networking spaces, and reconsidering business rates for such space use (see High Impact Networking and Talent & Skills). • Create a CPCA Digital Innovation Fund (similar to the Northern Powerhouse Investment Fund and as a subset of the planned CPCA Innovation/Accelerator growth investment fund), supported by the British Business Bank, for digital start-ups with a particular focus on convergence activities and establishment in hubs outside Cambridge city. • Continue co-funding in accelerator, launchpads and incubator programs run by universities, charities, private organisations, and companies.	**Established networking firms and universities to deliver knowledge sharing programmes that match different stages of start-ups, from birth to scale-up, along with networking and mentoring opportunities throughout the region.** • Tailored capability programmes on culture, building a board, building teams, marketing, developing an international strategy, and support in finding the first customer. • Tailored programme for target high growth firms. • Establish entrepreneur mentoring programmes, led by local start-up Fellows. • Provide these education opportunities at a local level.

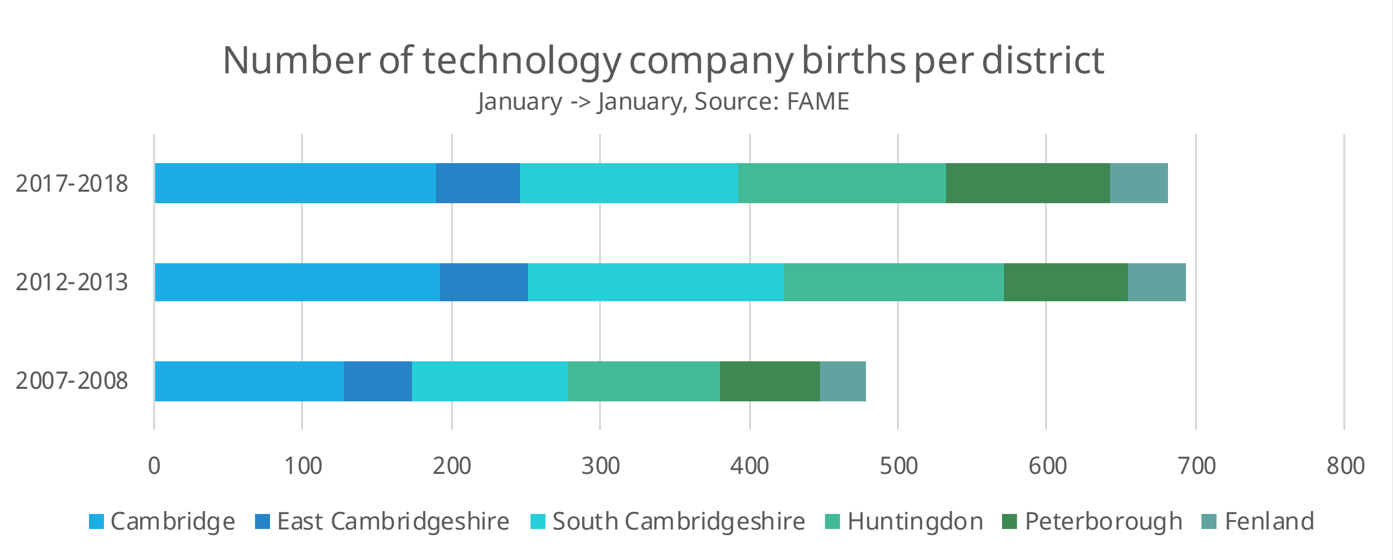
High levels of successful enterprise births and their temporal up-scaling, jointly, form the key determinants of high productivity for a region. They not only promise job creation, but attract inward investment, talent, co-founders and new ideas. Accelerator programs have had an important effect in increasing the valuation of the start-up companies which are often funded by ERDF (European Regional Development Fund) projects[24].

A sectoral analysis of technology start-ups in the region in 2017 using the fame database shows that the most common subsector for firms to start in is "Computer Consultancy" (144 start-ups), followed by "Business and Domestic Software Development (84 start-ups) and "Research and experimental development on biotechnology" (43 start-ups).

A geographical analysis of technology start-ups using the same source shows that within Cambridgeshire & Peterborough, Peterborough is the only region with more technology businesses starting up in 2017 than in 2012, South Cambridgeshire boasts the most growth in any one period with 70% more technology businesses being founded in 2012 than in 2007 and Fenland holds the fewest technology business start-ups of all areas. The geographical discrepancies in technology entrepreneurship are clear, and the Business Survey shows that there is a wish in the districts where start-ups are less prevalent (Fenland, Huntingdonshire, Peterborough) to have more businesses encouraged to start in these areas, and for there to be local facilities to support this.

---

[24] Accelerating the UK, Beauhurst



The *pulling* effect of Greater Cambridge's agglomeration cannot be denied, nor can the fact that physical proximity greatly improves networking and collaboration effectiveness. However, Greater Cambridge and South Cambridgeshire are not the only areas where start-ups can benefit from proximity effects. There is an opportunity to co-locate technology start-ups closer to similar organisations and their customer base by, for example, in establishing an agri-technology sandbox in Fenland.

Such physical proximity will also ease the process of knowledge transfer and accelerate the adoption of new technologies by industry. The Business Survey generated the insight that Fenland, Peterborough and Huntingdon place more importance in start-ups being encouraged to set up around the region than East Cambridgeshire, South Cambridgeshire and Greater Cambridge. To kickstart the process of encouraging technology start-ups to establish in vertical market-based hubs throughout the region, the Combined Authority may need to offer financial support. The creation of a CPCA Innovation Fund (similar to the Northern Powerhouse Investment Fund and as a subset of the planned CPCA Innovation/Accelerator growth investment fund) is recommended that will nurture digital start-ups with a particular focus on convergence activities in priority markets, and to help them establish in hubs outside of the City of Cambridge.

There is already provision for start-ups within Cambridgeshire and Peterborough in terms of networking, workspace, access to mentors, access to investors and opportunities to learn from experienced entrepreneurs (see table below for more details). However, this provision is Greater Cambridge and South Cambridgeshire focused, with only a few opportunities in Peterborough such as the Allia Future Business Centre and the University Centre Peterborough. The Business Survey generated the insight that Fenland in particular prioritises better facilities for entrepreneurs and Huntingdonshire believes that local entrepreneurs need to have better access to information.

Universities & research institutes	Investment firms	Incubators / Accelerators / Training Programmes	Competitions / Events
University of Cambridge	Cambridge Capital Group	IdeaSpace	PitchFest
Anglia Ruskin University	Cambridge Angels	Bradfield Centre	CW Discovering Start-Ups
Babraham Research Institute	CIC	Allia Future Business	Cambridge University Entrepreneurs
Wellcome Genome Campus	Cambridge Enterprise	Cambridge BioMedical Campus	Start-Up Science
University Centre, Peterborough	Amadeus Capital Partners	St John's Innovation Centre	Venturefest East
Medical Research Council	IQ Capital	Babraham Institute BioIncubator	
Leverhulme Institute	Delin	Barclay's Eagle Labs	
		CJBS Accelerate Cambridge	
		ARU REACTOR Gamification	

Despite the level of provision that is currently available in Greater Cambridge, the Business Survey suggested that the greatest priorities for accelerating entrepreneurship in the region are to provide better facilities and better access to information to help start-ups grow. Furthermore, as a respondent to the Business Survey succinctly puts it, for start-ups, "the best funding is a customer".

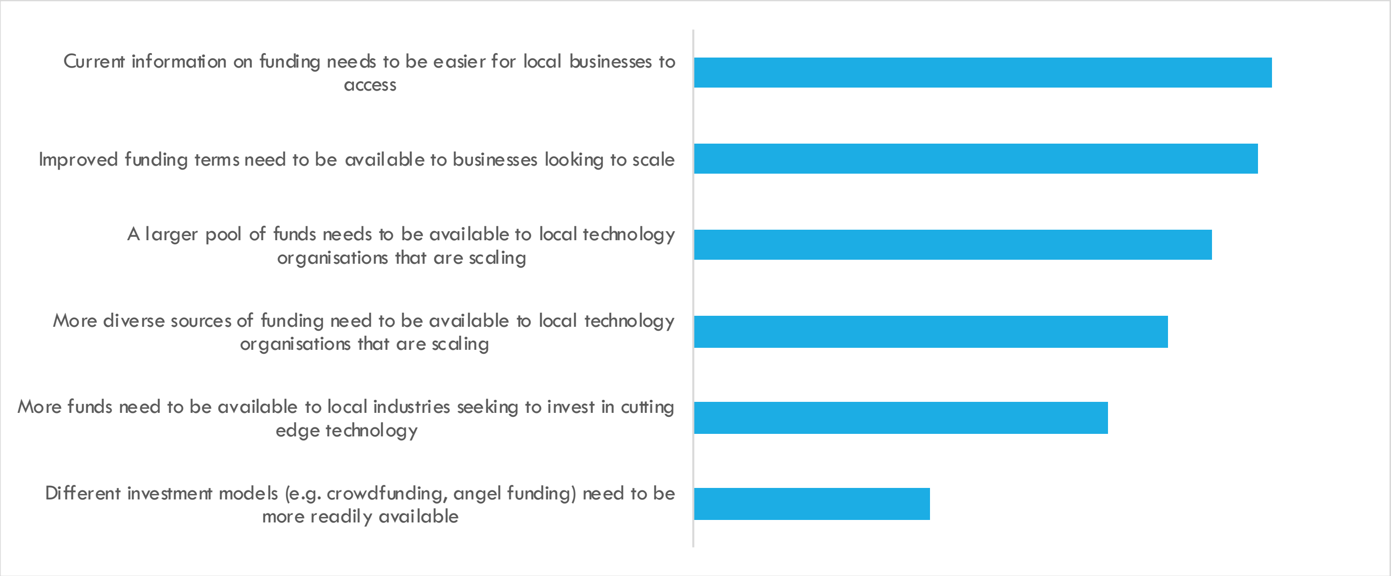
Basic market-oriented thinking would suggest that if a product or service is well positioned and well executed, the customers will come. However, it is worth noting that technology start-ups may struggle with having the skills and network to produce initial revenues. If there is a wish to encourage technology entrepreneurs to establish businesses across the region, provision of mentor programmes, investor access, education and networking events must be more readily available at a local level. The existing networking firms and higher education establishments are best placed to offer this service, with funding from the Combined Authority needed to reduce the risk of entering new markets. There is also an opportunity to establish more start-up co-working spaces in different areas of the region that solve the affordable office space, offering a "soft landing" for embryonic technology firms. One option for delivering on this is to transform underused public spaces such as libraries into effective start-up co-working or maker spaces.

The needs of scaleup business leaders remain clear and consistent. With ambition to grow and scale even further and faster, they want: talented workforces; opportunities to share and learn from successful peers; wider access to markets both at home and overseas; and access to growth finance that is 'patient' and 'smart'. Scale Up Institute Review, 2017

INVESTMENT AND FINANCE

VISION

The Digital Sector Strategy's vision is that the region has an abundance of strategic and patient financial resources to grow businesses. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
Current information on funding needs to be easier for local businesses to access	4.19
Improved funding terms need to be available to businesses looking to scale	4.18
A larger pool of funds needs to be available to local technology organisations that are scaling	4.15
More diverse sources of funding need to be available to local technology organisations that are scaling	4.12
More funds need to be available to local industries seeking to invest in cutting edge technology	4.08
Different investment models (e.g. crowdfunding, angel funding) need to be more readily available	3.96

Insights from Qualitative analysis of survey data **See Annex 1**	**Insights from Quantitative Analysis of survey data** **See Annex 2**
There should be better access (NET) to different types of funding (national, international) which is connected to expertise (mentors, advisers) (TAL, KNO) in running and growing a business (IND). More advice and training are needed about different types of finance instruments, and tax breaks, especially for small companies (ENT).	All the different priorities were considered as a "top priority" in Fenland, clearly indicating a very wide set of needs around information and access to finance and investment. Meanwhile, Huntingdonshire identifies the need for "Improved funding terms for local businesses looking to scale" as the key priority, indicating the willingness to scale

RECOMMENDATIONS	
For public sector	**For private sector**
Create a CPCA Digital Innovation Fund (similar to the Northern Powerhouse Investment Fund and as a subset of the planned CPCA Innovation / Accelerator Growth Investment Fund), supported by the British Business Bank, for digital start-ups. This Fund should complement the offering of local angels and venture capitalists, but focus on: • encouraging set-up in non-Cambridge districts and in complementary hubs • supporting convergence projects • The Innovation Fund should support start-ups in generating prototypes if sourcing from local companies	**Increase the quality, visibility, accessibility of financial information & support** • Balanced, unbiased education on the various finance options for business growth needs to be locally accessible, with experienced entrepreneurs available to educate business leaders and encourage start-ups to be ambitious in their finance strategy. The proposed Fellows network (see Entrepreneurship) should help supply this need. • Support the formation and upscaling of local - as well as access to global - crowdfunding platforms • Local networking opportunities for angel investors for the purpose of knowledge sharing and attracting new investors.

BACKGROUND ON INVESTMENT & FINANCE IN CAMBRIDGESHIRE & PETERBOROUGH

The East of England Science and Innovation Audit claimed that Cambridge is a low risk place to make high risk investments, and that the East of England has the capacity to commercialise knowledge to a level that London cannot. On top of standard UK funding opportunities, there are a broad range of investment firms based in Cambridgeshire & Peterborough that target the technology start-ups that regularly spin out of the universities and consultancies in the region. Furthermore, there is a culture specifically in Greater Cambridge of successful entrepreneurs re-investing in the next generation of technology start-ups, offering both mentorship and money.

TECHNOLOGY INVESTORS BASED LOCALLY INCLUDE:

Name	Fact
Cambridge Angels	More than 60 high-net worth investors who have proven experience as successful entrepreneurs in technology, internet, software, hardware, digital healthcare and life sciences.
CIC	Focused on building healthcare and technology businesses
Amadeus Capital Partners	Focused on AI & machine learning, online consumer services, cyber security, digital health and medical technology, digital media, enterprise SaaS, fintech.
Cambridge Capital Group	Well-screened investment opportunities in hi-technology sectors such as engineering, internet, software, medtech, biotechnology, electronics, fintech and wireless communications.
University of Cambridge Enterprise Fund / Cambridge Enterprise	Investment in early stage technology companies as they spin-out of the University

However, feedback from the entrepreneurial community in reports (such as those conducted by the Scale Up Institute) and from this strategy's Business Survey highlight that the current level of financial information - and support - may be insufficient. Insights showed that more guidance should be freely accessible regarding the financial options available and, at its best, funding when granted should be linked to expertise and support. This could reflect the fact that while there are a wide range of '1:many' sources of information available (see inset, below), each business is different and

'1:1' knowledge sharing opportunities with an experienced financier or entrepreneur would be more beneficial and trusted. Balanced, unbiased education on the various finance options for business growth needs to be locally accessible through events, clinics or other activities, with experienced entrepreneurs available to educate business leaders and encourage start-ups to be ambitious in their finance strategy. This is possible for local networking firms to deliver.

Sample sources of investment & finance information for start-ups

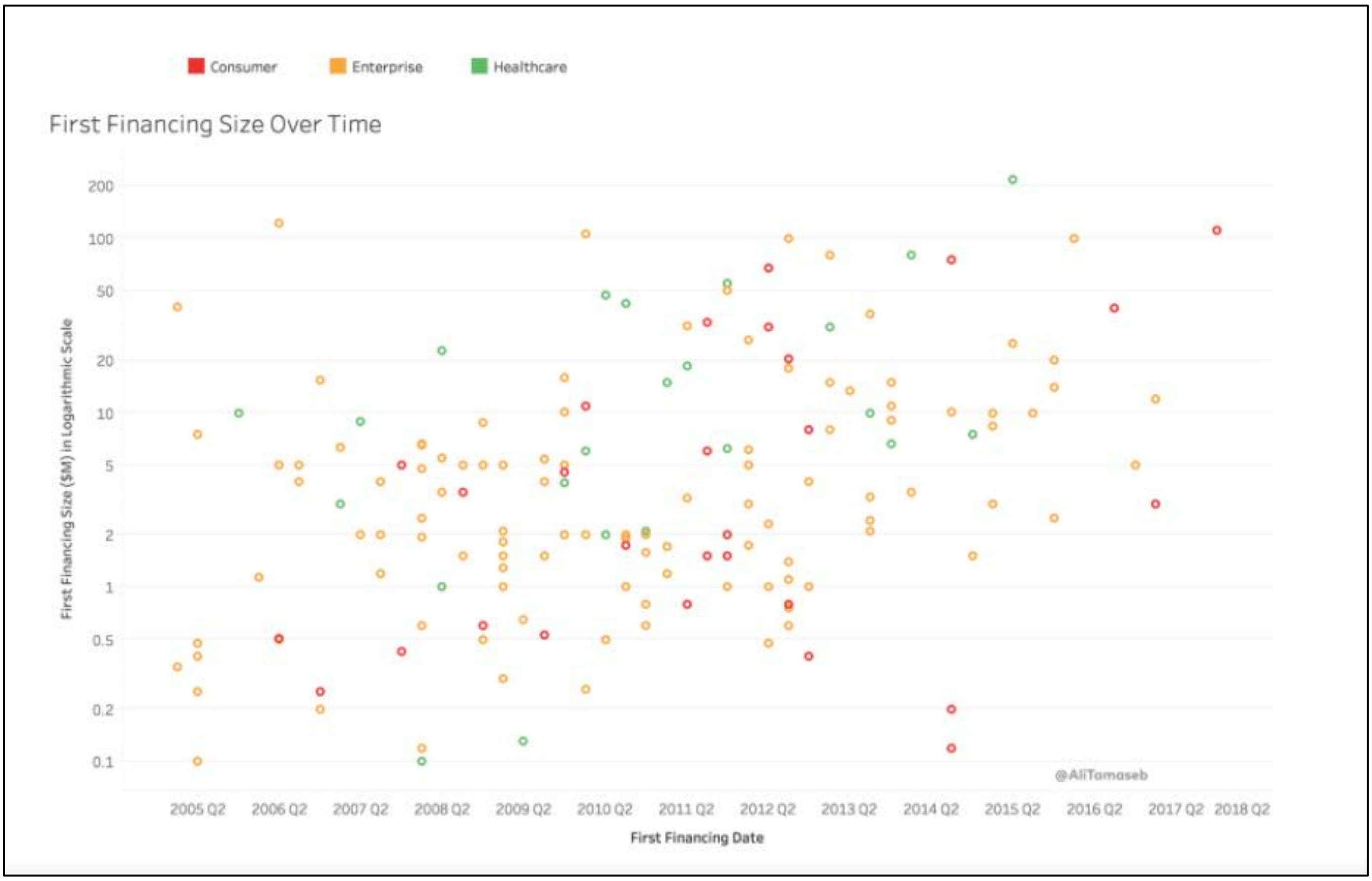
- Invested Investor website
- gov.uk: Finance and support for your business
- British Business Bank: Looking to start-up
- UK Business Angels Association website
- gov.uk: Business innovation – what funding you can get and how you can apply
- gov.uk - Innovation Loans and how to apply

For the sake of the international leadership ambitions of this strategy, we need to make international comparisons. The Audit claims that many firms are starting to look abroad for early stage funding where the attitude towards risk appears to be more forgiving – despite the aforementioned perspective of Greater Cambridge as a low risk place to make an investment!

There is the perception of greater readiness for venture capitalists in Silicon Valley, for example, to supply multi-million-pounds of capital to an unproven start-up compared to those in Cambridgeshire & Peterborough. In different business cultures, growth can be valued more highly than revenues, and that value provides ambitious entrepreneurs the cash they need to scale fast – cash which in the UK would only start to come more easily when revenue streams have been proven. As can be seen through the chart below, first investments for billion dollar firms have been getting incrementally bigger over the years in the United States[25]. This suggests that for Cambridgeshire & Peterborough firms to compete on a global market, deeper pools of resources across all stages of funding rounds needs to be available. Tax reliefs for angel investors, such as the Enterprise Investment Scheme. Similarly, networking and education among angel investors is important for knowledge sharing and encouraging more individuals into the practice of angel investment.

---

[25] Land of the "Super Founders"— A Data-Driven Approach to Uncover the Secrets of Billion Dollar Startups



Note logarithmic left hand scale for left hand chart.

Recent years have seen a rise in alternative funding methods (driven, incidentally, by improved digital functionality). Frontier Developments, for example, recently raised well over £1m through the Kickstarter crowdfunding platform for its “Elite: Dangerous” product. While online crowdfunding is now a recognised component of the early finance market for a new business and has grown significantly in recent years, recent research found that it is tough to reach a target and three quarters of all projects fail to do so[26]. Investor-led services such as the Cambridge-based Syndicate Room are helping to provide opportunities that have undergone due diligence offers an alternative model.

The latest data from the British Business Bank[27] suggests that 70% of smaller businesses would rather accept slower growth than take on external finance to accelerate growth. This trend, based on the mistrust caused by the 2008 crisis, needs to be explored in relation to the Cambridgeshire & Peterborough digital sector and if it is an issue then it needs to be reversed. Balanced, unbiased education on the various finance options for business growth needs to be locally accessible, with experienced entrepreneurs available to educate business leaders and encourage start-ups to be ambitious in their finance strategy. Some national initiatives are already in existence, for example

---

[26] Davies, W. E. and Giovannetti, E. (2018). Signalling experience & reciprocity to temper asymmetric information in crowdfunding evidence from 10,000 projects. *Technological Forecasting and Social Change* Volume 133, August 2018, Pages 118-131

[27] Going for Growth: Helping Small Firms Flourish through Access to Finance

The Treasury and British Business Bank's Referral Scheme, the Business Finance Guide and expansions in the coverage of the Enterprise Finance Guarantee and ENABLE.

Compared to the graph above which suggests that the majority of billion dollar, US businesses are venture-capital backed, the reality in the UK is that most small firms tend to not look beyond traditional banks to fund their business. In this instance, if credit is not approved (for example, due to risk) then the bank should signpost alternative funding options to the entrepreneur as a venture capitalist, typically, is a lot less risk averse than a bank.

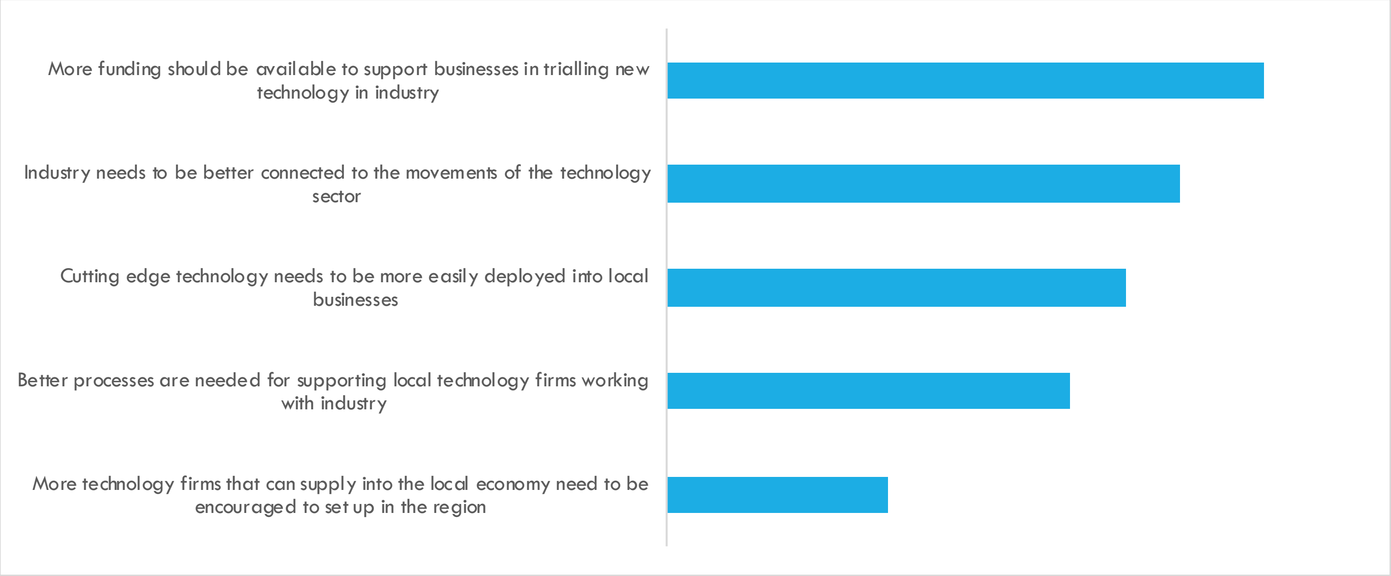
While advice on funding and scaling up can help, the most economically significant companies in Greater Cambridge (and elsewhere in the UK) have in nearly all cases developed their technology within a "soft company" model, using lead customer R&D funding to delay, minimise or avoid the need for venture capital. This in turn has enabled founders to retain control, avoid early trade sales and to grow sizeable full-function businesses. This applies to, for example, Domino Printing, Frontier, Xaar and CAT. To make adequate returns for its investors, venture capitalists must look for early trade sales which nearly always leads to the truncation of further growth and the acquisition of British businesses by foreign investors. These early trade sales are not necessarily to be avoided. However, there is a role for public sector policy to help entrepreneurs avoid venture capitalism if they wish to. Policy can aim at increasing lead customer funding for R&D and trials from both public and private sectors and at increasing other forms of non-dilutive start-up funding. This has the benefit of both enabling entrepreneurs that want to retain control to do so, and of de-risking more companies to the point where they are "venture-ready".

The creation of a CPCA Innovation Fund (with the remit to support start-ups developing technologies with potential applications in target sectors for the region such as ICT, manufacturing, logistics, agriculture, and to encourage locating in business hubs outside of the immediate Greater Cambridge cluster) has already been proposed in the Entrepreneurship chapter of this report. This Fund needs to complement the offering of local angels, venture capitalists and banks. It should be used to de-risk the creation of prototypes, and establish the public sector as a reference customer which the start-up can then utilise to raise further investment (or customers) elsewhere. This Fund exists to fill the current market lack of funding in convergence activities, with the goal that demonstration of success will encourage future private investment.

APPLICATION IN INDUSTRY

VISION

The Digital Sector Strategy's vision is that the CPCA region becomes a region where local technology companies deploy the latest technologies to transform vital industries. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
More funding should be available to support businesses in trialling new technology in industry	4.23
Industry needs to be better connected to the movements of the technology sector	4.17
Cutting edge technology needs to be more easily deployed into local businesses	4.13
Better processes are needed for supporting local technology firms working with industry	4.09
More technology firms that can supply into the local economy need to be encouraged to set up in the region	3.96

Insights from Qualitative analysis of survey data **See Annex 1**	**Insights from Quantitative Analysis of survey data** **See Annex 2**
Share knowledge (KNO, NET) and business opportunities (IND) to create and grow high quality technology companies (ENT) in new technology sectors.	This question addressed a more active pro-positive stance, asking to look at the critical elements needed to transform the future. Fenland considered all these technology issues of critical importance; so too did Peterborough and Huntingdonshire, though with slight less intensity. In detail, both • "Industry needs to be better connected to the movements of the technology sector" and • "Cutting edge technology needs to be more easily deployed into local businesses", were of key relevance for Fenland

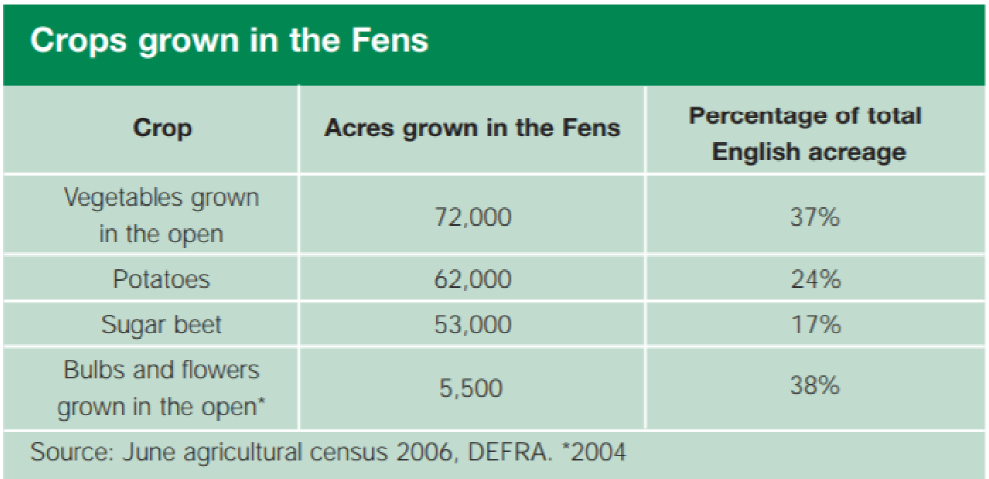
	Peterborough and Huntingdonshire as well as Greater Cambridge • "Better processes are needed for supporting local technology firms working with industry" is critical for Fenland Peterborough and Huntingdonshire, South Cambridgeshire as well as Greater Cambridge • "More funding should be available to support businesses in trialling new technology in industry" is, as expected, relevant for all areas, even though with some variation in intensity, while • "More technology firms that can supply into the local economy need to be encouraged to set up in the region" was relevant for Fenland, Peterborough and South Cambridgeshire

RECOMMENDATIONS	
For public sector	**For private sector**
Create a CPCA Digital Innovation Fund (similar to the Northern Powerhouse Investment Fund and as a subset of the planned CPCA Innovation / Accelerator Growth Investment Fund), supported by the British Business Bank, for digital start-ups with a particular focus on convergence activities and establishment in hubs outside Greater Cambridge. .	**Establish Leadership Councils for Technology in Manufacturing, Logistics and Agriculture that identify opportunities and blockers and accelerate the deployment of technology in industry.**

BACKGROUND ON CONVERGENCE IN CAMBRIDGESHIRE & PETERBOROUGH

It was established at the start of this report that the highest revenue generators in the region were not technology organisations, but those in other sectors. This chapter of the strategy considers not how the technology sector can be made more productive, but how a vibrant and engaged technology community can be an enabler for productivity growth in local vertical markets such as agriculture, manufacturing and logistics.

Developments such as advanced telecommunications, sensor technology, mobile computing and artificial intelligence promise productivity improvements. A lot has been made of the benefits of the Fourth Industrial Revolution. Recent 5G trials in Worcestershire suggest that a "smart", 5G-connected factory floor could increase manufacturing output by 1% simply by improving the processes around machine maintenance – such growth will benefit the economy around Peterborough. A recent Deloitte report suggests that just 20.7 percent of firms rate themselves as "highly prepared" to address the emerging business models of the Fourth Industrial Revolution. Furthermore, virtual reality is transforming the product design and customer feedback loop, and additive technologies (3D printing) are delivering new product creation capabilities. In Cambridgeshire and Peterborough, 2659 businesses have been identified within the High Manufacturing and Materials sector, with a geographical distribution that focuses on the East of the region. These businesses are concentrated around Peterborough, St Neots, Cambridge, Huntingdon, Wisbech and March. One such organisation is Stainless Metalcraft, based in Chatteris, which manufactures equipment for some of the world's most dangerous environments, including nuclear, oil & gas and petrochemical industries. The CPCA has identified that challenges in support for the manufacturing sector include lack of affordable start-up support and funding, limited scale-up advice and funding, lack of support in rural areas and limited grow on space at affordable prices[28].



Crops grown in the Fens

Crop	Acres grown in the Fens	Percentage of total English acreage
Vegetables grown in the open	72,000	37%
Potatoes	62,000	24%
Sugar beet	53,000	17%
Bulbs and flowers grown in the open*	5,500	38%

Source: June agricultural census 2006, DEFRA. *2004

The goal of the agricultural sector is sustainable intensification, and with Fenland operating 50% of the UK's Grade 1 land, Cambridgeshire and Peterborough hosts substantial operations by some of the world's leading agricultural and agri-technology companies including G's and Associated British Foods. Around 25% of Syngenta's research collaborations are in the UK with their UK HQ located in Cambridgeshire & Peterborough. This includes recent investments in a £2 million glasshouse and a £3.5 million facility for the automated formulation of agri-chemicals. A 2013 Governmental report for the agricultural sector showed that the sector is diverse and complex, making it difficult for individual institutions to make connections to develop new partnerships. At the same time, the UK has a highly-regarded basic research base but there has been a lack of funding for applied and translational research. This finding was echoed by the East of England Science and Innovation Audit. At least partly as a result, the UK's competitiveness in agriculture has been in decline for a number of years. Across the UK, the same report states that the top 10% of farms produce more than £180 output per £100 input while the bottom 10% fail to recover their costs. Differences in motivations and natural circumstances can partly explain this disparity. However, inconsistent levels of knowledge, slow uptake of technologies and perceived or actual barriers to knowledge transfer are often contributory factors. As an example of how technology could be deployed to improve outcomes for farmers, a recent trial showed that integrated soil-crop system management programme developed by Cui Zhenling and his team at the China Agricultural University, increased yield by 10% while cutting nitrogen use by a fifth. The Government has invested in a number of Agri-Technology centres, including Agrimetrics, the Agri-EPI Centre, CHAP and CIEL, but none are in the Cambridgeshire and Peterborough region despite Fenland and the surrounding area having such a strong and rich agricultural future. The networking organisation Agri-Tech East provides a strong focus for this sector.

---

[28] Hethel Manufacturing Sector Review

In the logistics sector, in 2005, radio frequency identification (RFID) tags were introduced in a bid to make the supply chain more efficient. This technology is attached to individual items so they can be tracked whilst in transit, retailers also use these tags in order to have a better overview of the stock they currently have in their warehouses or stores. More recently, companies have looked towards utilising automation software or cloud-based networks to improve efficiency across the supply chain. A benefit of cloud-based systems is that they are cheaper to install, they fix supply-chain problems at their source and can be used by companies across networks, regardless of the locality of the user. The logistics sector is working on introducing drones (or unmanned aerial vehicles) in order to make the delivery of goods cheaper and more efficient. For example, DHL is piloting its Parcelcopter 2.0 project, which uses drone technology to deliver time-sensitive goods (like medicine) to remote locations, quicker and more effectively than aeroplanes or ferries could achieve. Similarly, Amazon is at the forefront of developments with drones. Ocado's Customer Fulfilment Centres have transformed the efficiency of warehouses through the application of bespoke wireless technology and automated robots.

We suggest that leadership, coordination and funding is needed to accelerate the regional deployment of technology into vertical markets with a particular focus on agriculture, manufacturing, logistics and Healthcare. This leadership should come from business, with support from local government and funding from private sources and public sources, such as Innovate UK. We suggest the establishment of Cambridgeshire and Peterborough Leadership Councils for the sectors of Manufacturing, Logistics and Agriculture to identify opportunities for the regional deployment of technology in these industries, to monitor the potential rise of barriers and remove blockers collaboratively, to educate peers on best practice (for example with relation to intellectual property) and to coordinate funds for convergence activities.

The East of England Science and Innovation Audit identified unlocking investment in the process of convergence as a significant weakness of the region. Given that one of the routes for digital technologies to add significantly to regional GVA is through the adoption of more efficient technologies by industry, it is essential that there is sufficient and accessible funding to support this process. This strategy has already recommended the creation of a regional Innovation Fund that supports the establishment of start-ups - outside of the Cambridge City area – and funds specific projects that will demonstrate the capabilities of a new technology within its target sector. In such a way the public sector can help de-risk the process of developing new technologies for application in industry by becoming a potential funder, or reference customer, from which the start-up can prove concept and, from that point, more easily grow its revenues if the product is viable and the market exists.

Colocation and clustering is key to achieving application within industry at pace. Learnings can be taken from the agglomeration effects of Greater Cambridge. Space should be provided within Cambridgeshire & Peterborough for hubs that focus on target sectors such as manufacturing, agriculture and logistics, within which technology firms that target those markets can also reside. These hubs should be encouraged in science parks outside of Greater Cambridge, both to relieve the stress on that city's infrastructure and to spread the benefit of high growth business throughout the region. To enable cross-sector idea pollination, each business park should have a community space able to support networking events, and sufficient transport infrastructure to enable access. Each business park should have a central communication system or co-ordinator that signposts opportunities and builds inter-organisational connections.

[NOTE: Health and Social care technologies are recognised as being a strategic vertical sector where digital technologies play an increasing role improving both efficiency and the quality of care, and where the region is extremely well positioned to lead applications. We understand a separate strategy is being developed for the Health and Life Sciences].

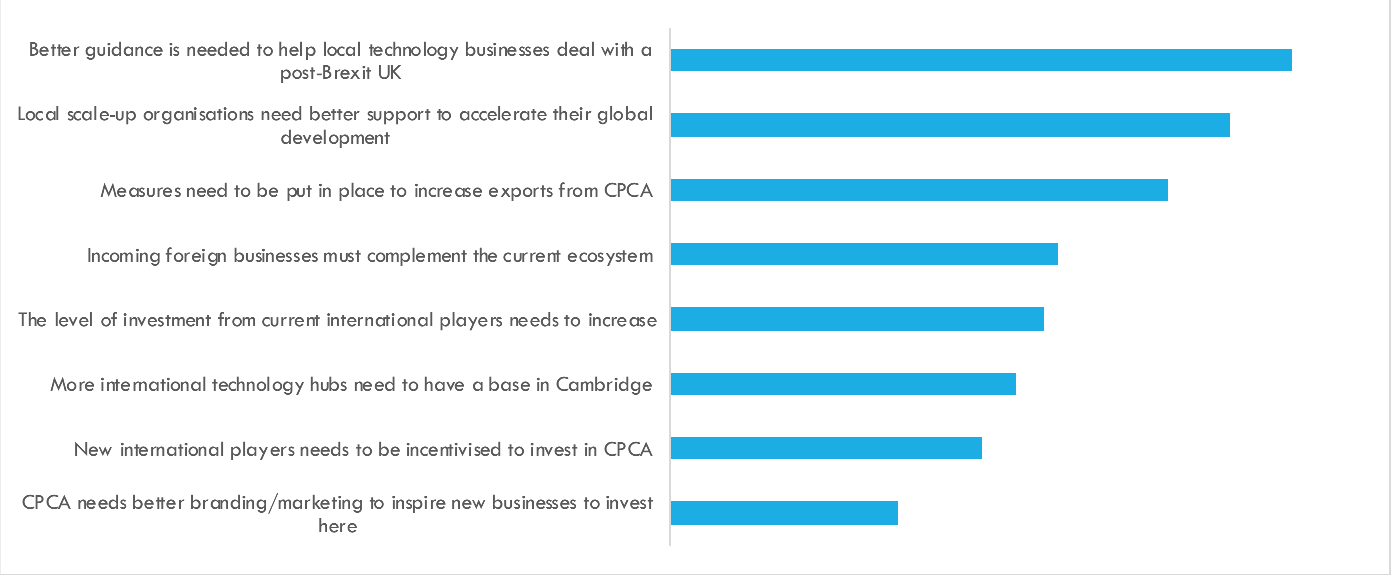
INTERNATIONAL - FOREIGN DIRECT INVESTMENT AND INTERNATIONAL TRADE

VISION

The Digital Sector Strategy's vision is that

- Foreign Direct Investment should continue to play a significant part in the sector's development, with major corporates increasing their commitment to the region, and new corporates complementing the technology eco-system.
- The proportion of CPCA export earnings from local technology companies in goods and services doubles in 5 years.

The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
Better guidance is needed to help local technology businesses deal with a post-Brexit UK	4.20
Local scale-up organisations need better support to accelerate their global development	4.11
Measures need to be put in place to increase exports from CPCA	4.02
Incoming foreign businesses must complement the current ecosystem	3.86
The level of investment from current international players needs to increase	3.84
More international technology hubs need to have a base in Cambridge	3.80
New international players needs to be incentivised to invest in CPCA	3.75
CPCA needs better branding/marketing to inspire new businesses to invest here	3.63

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA **See Annex 1**	**INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA** **See Annex 2**
Government should give grants (INV) for companies going international (EXP), to attend international trade fairs and meet customers and potential customers (NET, IND). Startups are born global (ENT) but they need advice about international trade (EXP), taxes. Brexit is causing uncertainty (EXP, INV). Foreign funding is used to scale up companies globally (EXP), to bring new knowledge (KNO) and connections (NET) to the region and wealth. Cambridgeshire & Peterborough should offer soft landing services to foreign companies considering this region for investment (EXP). When businesses visit Greater Cambridge they should see all opportunities (UK, INV) not just those in the city of Cambridge. Brexit uncertainty is a serious issue at the moment (EXP).	Fenland and Huntingdonshire express two key areas of concern, while East Cambridgeshire and Peterborough focus mainly on one. In detail • “Local scale-up companies need better support to accelerate their global development” is the top priority shared between Fenland Huntingdonshire and East Cambridgeshire • The next priority is “Better guidance is needed to help CPCA technology businesses deal with a post-Brexit UK” as a top priority in the Fenland and Peterborough • Finally “Measures need to be put in place to increase exports from CPCA”, is of top importance for Huntingdonshire Foreign Direct Investment generates three areas of priority perceived as highly relevant. In Fenland this is: • “Incoming foreign businesses must complement the current ecosystem” In Huntingdonshire the highly relevant priorities are that: • “New international players needs to be incentivised to invest in CPCA” and • “The level of investment from current international players needs to increase” This final priority is also of key relevance for East Cambridgeshire.

RECOMMENDATIONS	
For public sector:	**For private sector:**
1. Foreign Direct Investment • Build a compelling Greater Cambridge cluster brand and marketing programme that promotes the Greater Cambridge value proposition for technology investment into the region. • As part of an agreed strategy, target major investments that will complement the regional technology ecosystem. • Ensure that an effective regional inward investment sales function is being delivered across the region by providing a concierge and retention/expansion service for corporate investors, working through existing business networks. 2. International Trade: • work through Department for International Trade (DIT) and local intermediaries to support bespoke programmes aimed at enabling scale-up companies to “go global”.	1. International Trade: • Encourage large regional companies to participate in outbound missions to demonstrate the motivation and expertise of the region, and support cohorts of new technology exporters. • Encourage local intermediary organisations to develop relationships with 2-3 overseas technology hubs . [eg: Israel, Shenzhen, Silicon Valley, Singapore, Helsinki] and encourage partnerships and networking between companies.

BACKGROUND ON INTERNATIONAL IN CAMBRIDGESHIRE & PETERBOROUGH

ICT and digital businesses are naturally globally orientated. While there are customer and convergence opportunities both within the region and the UK, the largest opportunity for business growth sits internationally.

FOREIGN DIRECT INVESTMENT (FDI)

At the time of writing the landscape is uncertain. 50% of all Global FDI into Europe was captured in 2017 by UK, France and Germany, with the UK leading the pack. However, Brexit has had a dampening effect with logistics, financial services and HQs all down on previous levels, and a worrying acceleration in outbound investment to continental Europe. 30% of respondents to the EY 2018 European Attractiveness Survey of 502 global businesses in June 2018 state that Brexit will have an impact on their footprint or activities. But EY data also suggests that digitisation is revolutionising almost every industry, and foreign investors are launching numerous projects to provide digital services to their clients or streamline their own operations. The Digital Economy is perceived to be the most important sector in terms of driving growth.

Nationally, over the last 3 years the East of England accounted for 5.07% of all FDI projects, and 4.84% of all FDI jobs[29]. Meanwhile, over the last 2 years ICT/Digital sectors have accounted for 32% of all FDI projects and 21% of all FDI jobs[30]. For Cambridgeshire and Peterborough, the ICT/Digital sector remains a vital part of the attractiveness of the region to overseas investors. The table below consolidates 3 years of Foreign Direct Investment project successes, as reported to the Combined Authority/LEP and the Department of International Trade. It is worth noting the imbalance of foreign direct investment across the region, with Greater Cambridge and South Cambridgeshire hosting 90% projects and 95% of jobs.

Consolidated 3 year FDI	2015-18	2015-18	2015-18	2015-18
Combined Authority/LEP statistics	All Sectors	All Sectors	ICT/Digital sector	ICT/Digital sector
	Projects	Jobs	Projects	Jobs
Cambridge	66	2178	32	1551
East Cambs	9	179	2	53
Fenland	4	18	0	0
Huntingdonshire	11	215	1	28
Peterborough	17	416	2	42
South Cambs	51	1526	13	438
Grand Total	**158**	**4532**	**50**	**2112**
% share	100%	100%	32%	47%

---

[29] DIT Inward Investment Results

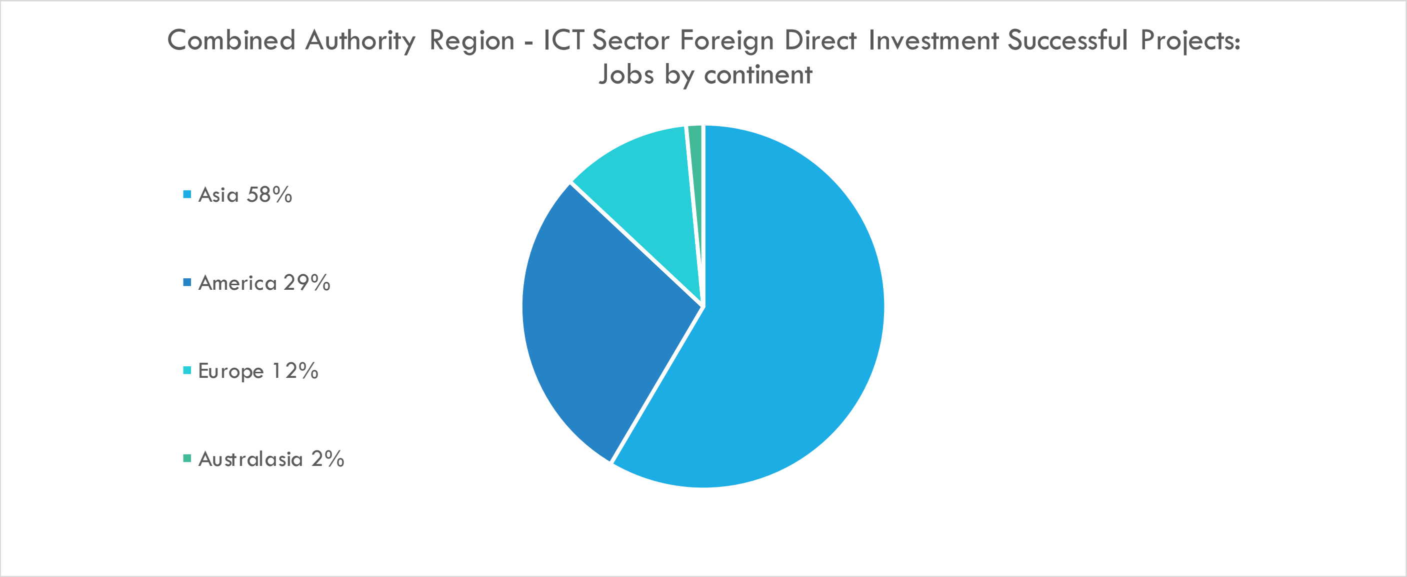
[30] DIT: Sector breakdown for involved FDI Projects 2016-18

32% of FDI projects between 2015-2018 going to the ICT/digital sector matches the national % share for ICT investment, but the region attracts over double the % of jobs (47% compared to 21%). Overseas ICT/Digital sector companies are continuing to locate substantial operations in the region, often R&D based.

Country	ICT jobs created through FDI
Japan	717
United States	552
China	503
France	101
Canada	48

For comparison, over the same period, the life science & healthcare sectors attracted 24% of all projects and 24% of FDI jobs created.

Geographically the top 5 countries over the last 3 years in terms of ICT Jobs created through FDI are listed in the table to the right, showing the dominance of companies from Japan, USA and China. The chart below explores the % distribution of these ICT FDI jobs by continent and shows that Asia accounts for nearly 60% of all technology-based investment into the region.



CBR research covering 2015-16 and 2016-7 confirms the importance of FDI to knowledge intensive companies in the Combined Authority area. Knowledge intensive (KI) companies are much more likely to be foreign owned than other (Non-KI) companies. According to CBR data, Peterborough has 67% of KI employment and 82% of KI turnover in foreign owned companies. Cambridge has 75% of KI turnover in foreign owned companies. Whereas Fenland has 5% of KI employment and 3% of KI turnover in foreign owned companies. It is critical to not underestimate the importance of foreign ownership on the knowledge intensive sector of the region.

Many major Technology corporations have a presence in the region (Google are relatively close by at their London Kings Cross HQ):

Amazon
Apple
Citrix
Huawei
Intel
MediaTek
Microsoft
Nokia
Qualcomm
Samsung
Toshiba

Greater Cambridge has grown several global ICT/Digital businesses over the last twenty years. Many have been acquired by overseas companies (see the table to the right for some prominent examples).

The acquisition experience has not always been positive. A well-known example is how, in 2006 Motorola paid over £100m to buy TTPcom, then in 2008 laid off 155 staff, and pulled out shortly afterwards. Yet it is a mark of the 'stickiness' of the Greater Cambridge cluster that talented personnel stayed in the region and became absorbed into other technology companies or started their own businesses.

Autonomy was founded in 1996, listed in 1998 and sold to HP for $11bn in 2011.

CSR was founded in 1998, floated in 2004 and sold to Qualcomm for $2.4bn in 2015

CSR sold its handset technology division to Samsung for $310m in 2012. Recently Samsung announced the opening of a new AI centre in Cambridge in May 2018.

ARM was founded in 1990, floated in 1998 and sold to Softbank Group for $31bn in 2016.

Aveva (formed out of the UK government funded CAD centre in 1994) and with revenues of £215m in 2017, agreed to merge with France-based Schneider Electric in 2018. Schneider Electric is now the largest shareholder.

The region continues to grow global businesses. Frontier Developments, a gaming company founded in 1994, has a market value of £659m. Quixant, founded in 2005 and which produces products for gaming machines, has a market value of £295m[31]. Darktrace is latest example of extremely rapid growth: started only in 2013 the company was valued at $1.25bn in July 2018 and employs 800 people worldwide.

It is the combination of home-grown businesses and talent, with the very substantial investment made by large, international corporates into the local economy that makes the region so compelling - the agglomeration effects referenced in the recent CPIER report make Greater Cambridge in particular a highly desirable and prestigious place for an ICT/Digital business to be based.

And yet, the resources publicly invested in the Inward Investment function for the region remain extremely low in comparison to other parts of the country. For example, London & Partners have a budget of £12m, Marketing Manchester has a budget of £7.6m (not including MIDAS the FDI agency).

This means that there are few locally deployed assets to target specific companies to invest in the region, and very little attention given to how early visits from interested investors can be professionally concierged. Interviews during the development of the strategy confirmed that potential ICT investors sometimes did not explore the region because the ability to quickly and easily pull together a comprehensive and bespoke visit programme was not in place, in comparison to other UK regions. Interviews also suggest that sometimes investor visits can be somewhat haphazard, with no clear docking point and organisational lead.

---

[31] CBR

Much inward investment will come from re-investment and expansion of existing operations. 64% of the jobs in 2017/8 came from re-investment. All these relationships need support on the ground, and local networking organisations can do this to a certain extent as part of their commitment to sustaining the cluster, but strong regional coordination and pipeline management is needed, along with triangulation through the DIT overseas network with the relevant overseas HQ.

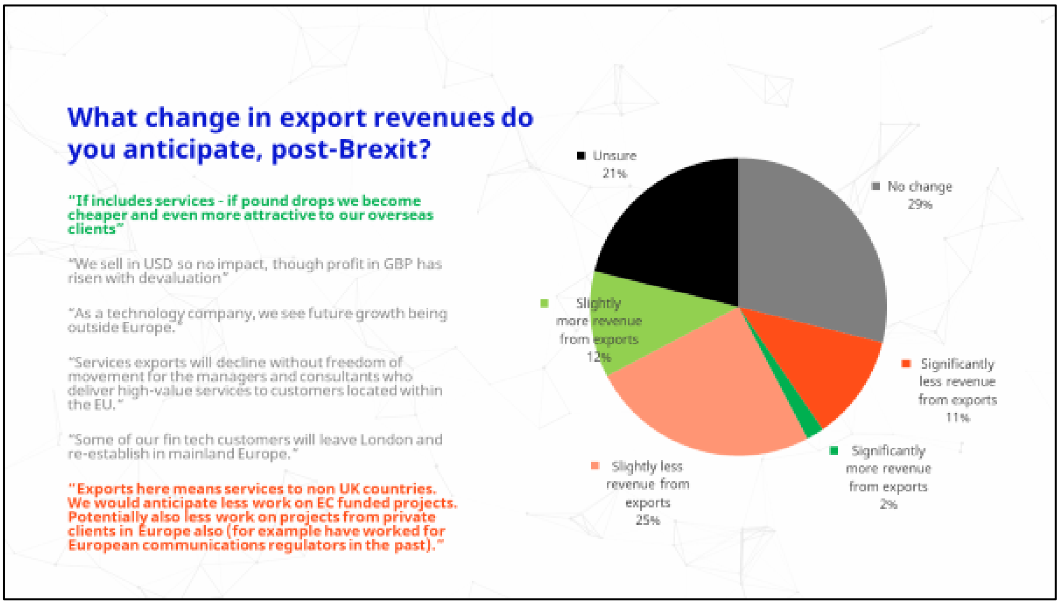
The marketing, targeting and sales FDI functions represent a classic market failure, given there is no rationale for the local private sector to fund these activities, and the potential investor cannot be charged. The regional offer is so powerful, there is a great opportunity, along with effective marketing and organisation, to successfully and systematically target investors that will enhance the economy. As CPIER recommends, the UK Government should adopt a 'Cambridge or overseas' mentality towards knowledge-intensive (KI) business, recognising that in an era of international connectivity and footloose labour, many high-value companies will need to relocate abroad if this area no longer meets their needs.

The key international marketing attribute for the region, when focussing on the ICT/Digital sectors, is undoubtedly the Greater Cambridge offer. The CPIER work highlights the fact that there are three distinct economies in the region - and it would be mistaken to dilute the extremely powerful marketing messages through amalgamation. Leading with the Greater Cambridge brand will benefit the rest of the region, since every investor is a potential supply chain opportunity also. Target audience will be C level leaders in target overseas technology companies, and their intermediaries.

Of course, a complementary and distinctive brand strategy also needs establishing for Peterborough and Fenland, but is likely not to lead with the ICT sector, and so is not examined here.

Much work needs to be done to clearly articulate the Greater Cambridge message and to provide guidance on what the technology ecosystem in the area offers, and how to engage meaningfully with the cluster. Despite multiple outward facing Greater Cambridge based organisations there is no clear pathway for potential inward investors, and this needs to be rectified.

INTERNATIONAL TRADE



What change in export revenues do you anticipate, post-Brexit?

"If includes services - if pound drops we become cheaper and even more attractive to our overseas clients"

"We sell in USD so no impact, though profit in GBP has risen with devaluation"

"As a technology company, we see future growth being outside Europe."

"Services exports will decline without freedom of movement for the managers and consultants who deliver high-value services to customers located within the EU."

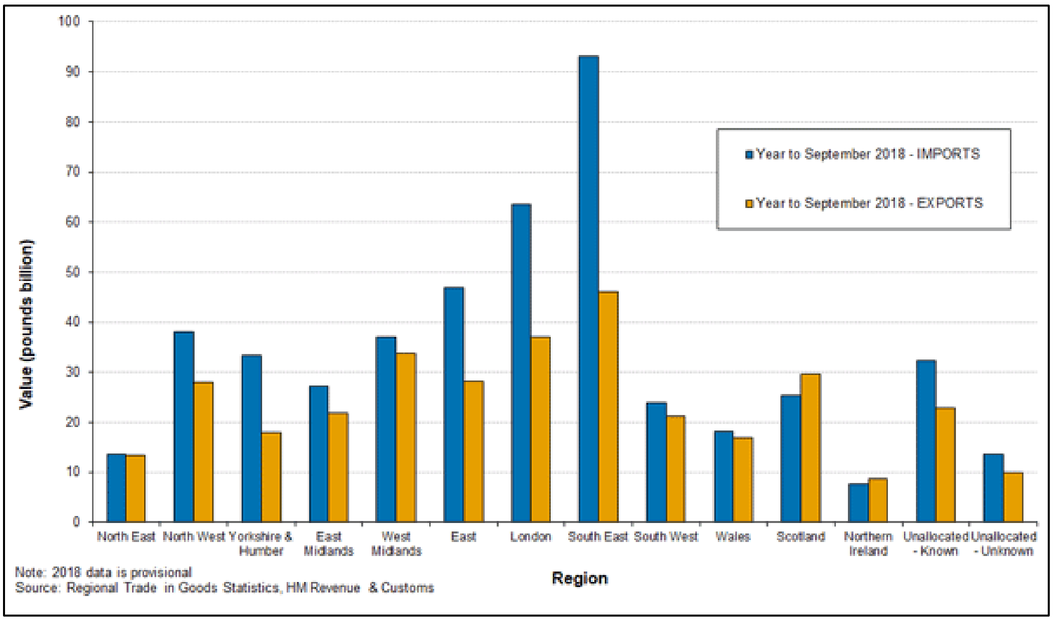
"Some of our fin tech customers will leave London and re-establish in mainland Europe."

"Exports here means services to non UK countries. We would anticipate less work on EC funded projects. Potentially also less work on projects from private clients in Europe also (for example have worked for European communications regulators in the past)."

Unsure 21%
No change 29%
Slightly more revenue from exports 12%
Significantly less revenue from exports 11%
Significantly more revenue from exports 2%
Slightly less revenue from exports 25%

CW ran a Brexit Impact Survey[32] from 31 Oct – 16 Nov 2018 to ask Technology companies about their opinion on the effects of Brexit. See the chart to the right for a summary of their opinion on Export revenues.

It is certainly the case that having a vigorous ICT/Technology sector exporting goods and services will continue to be crucial for the region in the years ahead. According to the latest UK Government Export Strategy Overview, 90% of global development is expected to come from outside the EU over the next 10-15 years. The Digital Sector must seize the opportunity to look to markets - particularly in Asia and America.



Note: 2018 data is provisional
Source: Regional Trade in Goods Statistics, HM Revenue & Customs

Exports represent 35% of UK GDP and the East of England collectively is the third most significant region according to the latest HMRC statistics. The digital sector consists of 18.9% of service exports, which are in turn 35% of total trade.

The digital sector is often underreported in official statistics, a recent study shows the UK digital sector accounting for **24%** of all exports.[33]

---

[32] Link to be provided when published

[33] The Digital Sectors After Brexit, Frontier Economics for technologyUK

Key barriers related to business exports are (generally, across all UK sectors): not having the right contacts to find the appropriate partner or customer, payment risks, on-tariff barriers, and management skills in international trade.

Greater Cambridge based technology companies are often "born global". A quick survey of recent press announcements in Business Weekly shows companies active in numerous markets:

Company	**Product**	**Export Market**
CyanConnode (Cambridge)	Narrowband radio frequency mesh networks	Philippines, Ukraine
Sepura (Cambridge)	Digital radio specialist	Mexico
Bango (Cambridge)	Online payment	Chile, South Korea
Blighter Surveillance Systems	Radar & surveillance	India
UltraSoC	Embedded analytics	Asia
Pixel (Cambridge)	Radar	China

The DIT provides export services and information suitable for early stage companies, and can also connect companies to useful contacts and opportunities through their overseas network along with Export Finance if needed. In 2017/8 the DIT Technology Exports team supported 330 UK technology companies win 506 projects/contracts overseas.

Department for International Trade Case Study on SG Control's export growth in the Far East

SG Controls is a Cambridge-based company that designs and supplies equipment for the optical fibre manufacturing sector and is set to double the volume of products it makes following a surge in demand in China, Japan and India. SG Controls has been exporting its products since 1979 and is working with trade advisers from the Department for International Trade (DIT) and UK Export Finance (UKEF), who is supporting the company to fund its new ventures in the Far East. The company's international success led to the creation of 40 new jobs at its site in Newton in the last 18 months to cope with growing demand. "Working with the DIT enabled us to find a funding mechanism to satisfy our requirements and those of our customers, as DIT trade advisers work directly with UK Export Finance to provide support to our banks to allow them to issue guarantees to customers," says Ian McNulty, MD at SG Controls.

Businesses should be pointed towards the services that can be provided. With limited resources, focusing on scale-up companies that can quickly take advantage of global export opportunities makes sense, as well as strategically identifying a shortlist of target overseas markets.

Cultivating deeper links with ICT Technology hubs will also prove beneficial. Connecting networking organisations based in these hubs (eg: Israel Technology Hub) with local networking organisations, and supporting repeated trade missions and meetings will build relationships and drive partnerships and contracts. A focus on Asian markets will be particularly important here, especially given the proportion of FDI investment from Asia.

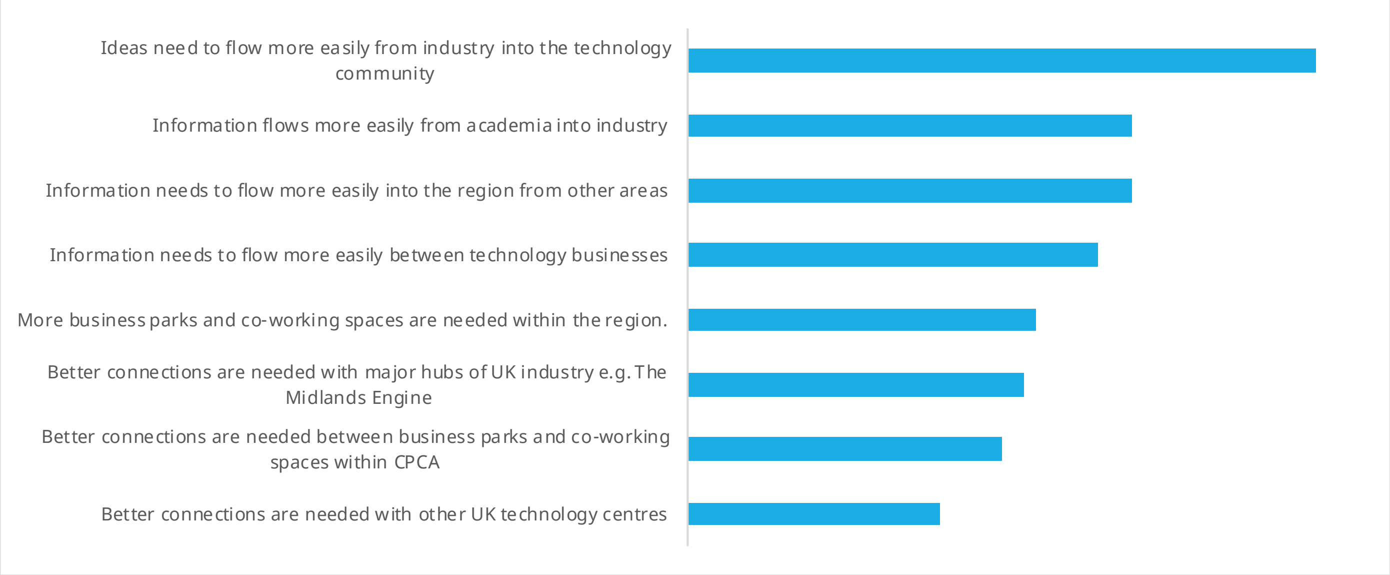
Finally, it is worth pointing out that digital transformation is radically affecting export processes. Digital companies can transform the productivity of companies in vertical industries, enabling expansion into overseas markets. Advanced digital solutions enable better access and management of international customers through B2B e-commerce platforms.

It is very welcome that the CPCA has announced in their Business Plan that a strategy will be developed aiming to secure funding for more enhanced, higher impact Trade and Investment activities starting in 2020/21. It is also noted that the CPCA will support Opportunity Peterborough's inward investment activities, delivering support to more companies in the North of the area. However, the current CPCA business plan allows only for £50K per annum against Trade & Investment functions out of the revenue budget, and this is clearly not enough. This strategy recommends that more resources need to be devoted to provide effective internationalisation programmes and projects.

KNOWLEDGE TRANSFER

VISION

The Digital Sector Strategy's vision is that knowledge and ideas can disperse successfully throughout the region. We also wish this to be a region where businesses of any sector can efficiently collaborate through linked networks of science parks and co-working spaces and where knowledge transfer between academia, technology firms and industry works seamlessly. The following hypotheses were explored in the Digital Sector Strategy Business Survey and their relative perceived importance is outlined below:



	Importance perception score (/ 5)
Ideas need to flow more easily from industry into the technology community	4.52
Information flows more easily from academia into industry	4.19
Information needs to flow more easily into the region from other areas	4.19
Information needs to flow more easily between technology businesses	4.13
More business parks and co-working spaces are needed within the region.	4.02
Better connections are needed with major hubs of UK industry e.g. The Midlands Engine	4.00
Better connections are needed between business parks and co-working spaces within CPCA	3.96
Better connections are needed with other UK technology centres	3.85

INSIGHTS FROM QUALITATIVE ANALYSIS OF SURVEY DATA See Annex 1	INSIGHTS FROM QUANTITATIVE ANALYSIS OF SURVEY DATA See Annex 2
Knowledge transfer between academia and industry can reduce risks and accelerate market entry (IND). Attention should be paid to IP Management, ownership and knowledge transfer processes	The respondents identified three key priorities for Fenland • "Ideas need to flow more easily between industry and the technology community"

(SUP). Funding collaboration between industry and academia should be encouraged (INV). Connecting the region (NET) with other regions is about bringing new skills, talent (TAL), business opportunities (IND) and businesses (INV) to the region. While businesses outside of the region are considering of locating themselves here, they should be shown other parts of the region than Greater Cambridge locations (NET).	• “Information needs to flow more easily into the region from other areas”, and • “Information needs to flow more easily from academia into the technology community” Interestingly, two of these priorities are also perceived as significantly important in Huntingdonshire • “Ideas need to flow more easily between industry and the technology community” and • “Information needs to flow more easily into the region from other areas” The perception that “Ideas need to flow more easily between industry and the technology community”, is also highly important in Peterborough. This domain of “Links within the UK” is of particular relevance to the Fenland, whose respondents selected four issues as critically relevant. Peterborough highlighted three areas and Greater Cambridge two. In detail: • “More business parks and co-working spaces are needed within the region”, • “Better connections are needed between business parks and co-working spaces within CPCA” “Better connections are needed with other UK technology centres”, was a priority in Fenland, in Greater Cambridge and in Peterborough

RECOMMENDATIONS

RECOMMENDATIONS	
For public sector	For private sector
Working with existing communities for technology / industry, deliver more inter-sector networking opportunities across the region that connect industry with the technology community and academia.	Develop Launchpads outside of Greater Cambridge where the applications of new digital technologies and solutions can be trialled. These Districts should feature the latest technology infrastructure, should be accessible for start-ups and should focus on industries that are important to the Combined Authority economy, such as Manufacturing or Agriculture.

BACKGROUND ON KNOWLEDGE TRANSFER SYSTEMS IN CAMBRIDGESHIRE & PETERBOROUGH

Knowledge transfer is the sharing process of learnings and skills between academia and the non-academic community, including business and the public sector. It is a key driver of economic growth and an important reason for Government investment in university research. Equally, for academics, the knowledge transfer system is a source of new ideas. While often measured in outputs such as university spin-out businesses and patents filed, there are far more elements to a successful knowledge transfer system including publication, collaborative research and academic consultancy.

Cambridgeshire and Peterborough, led by the University of Cambridge and Anglia Ruskin University, has a long-established knowledge transfer system that is a key contributing factor to this area being one of the most well-regarded technology innovation hubs in the world. The region's ecosystem has been a source for many globally competitive businesses like ARM and HP Autonomy. Its excellence in research has attracted inward investment from many global ICT businesses such as Microsoft, Huawei, Apple, Google, IBM – investment which is underpinned by outstanding research and teaching in the region's universities. (BEIS SIA, 2017)

As a world-class example for digital knowledge transfer, the University of Cambridge's Computer Laboratory and Cavendish Laboratory have been prolific sources of ICT and digital spin-out businesses. The Computer Laboratory has produced at least 200 companies including Acorn, Jagex, Ubisense and Raspberry Pi foundation.

Anglia Ruskin University (ARU) brings considerable research and teaching excellence, including in emerging specialisms such as internet of things, cybersecurity, computer science and digital gaming. ARU is well-known for its multi-disciplinary approach to university education and research, as well as entrepreneurship embracing industry collaboration e.g. via apprenticeships and effectively matching teaching activity to business needs.

In addition, UK Research Councils and charities have invested heavily in installing research centres in the region which have considerably augmented the strength of the area's knowledge ecosystem. These include the Sanger Institute, the Babraham Institute, the Laboratory for Molecular Biology (LMB) and the Wellcome Genome Campus.

A major source of funding for establishing and developing better knowledge transfer between academia, technology companies and industry in the region has been the European Regional Development Fund (now, of course, at risk). Programs like Innovate2Succeed, Serious Impact, Innovation Bridge, Keep+ and REACTOR have been contributing to digital innovations, especially among SMEs and start-ups.

One important mechanism of universities in supporting new business creation, other than spin-outs, is linking academia to industry to support early stage technologies companies by providing knowledge in different forms (academic expertise, business connections, mentoring, space and skills). The co-funding element of this mechanism via public and private funding has had a great impact on knowledge transfer[34]. As an example, Accelerate Cambridge is a programme run by CJBS (Cambridge Judge Business School) that has accelerated already over 100 early stage technology companies. Similarly, REACTOR (Anglia Ruskin University) has supported over 50 SMEs/Startups with their gamified, digital innovation.

---

[34] Accelerating the UK, Beauhurst

The mechanisms by which start-ups spin out of the major universities are already established and working well, particularly in the Greater Cambridge area. These include recruitment, knowledge sharing through networking, presenting at events, publication and collaborative research. However, the process through which businesses can collaborate with the university is less straightforward. It must also be noted that there are intra-regional discrepancies with the strength of the knowledge transfer system. It is currently centred around Cambridge city where the two main universities of the region have their main bases. The opening of the University of Peterborough offers a good opportunity for a similar system to be established in that city. The flow of information between academia, consultancies, start-ups and corporates must be nurtured across the region with relevant networking activities and knowledge sharing events for highlighted digital sectors, such as Artificial Intelligence (as per the Business Survey).

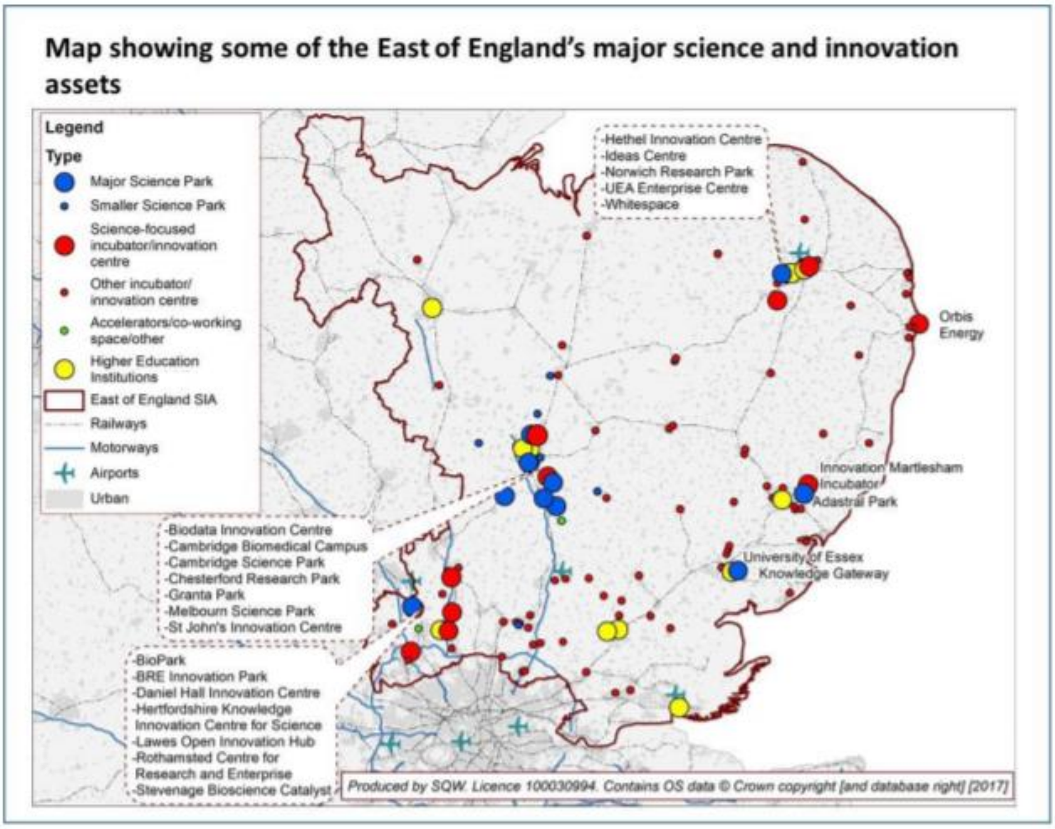
As a final note, it is R&D of the private sector that contributes the majority of funding to research activities in a commercial context. These activities have also had a great impact in recruiting and retaining world class talent and skills within the region, which has contributed hugely to the region’s social capital and it is imperative that the region maintains and increases the level of private R&D in the region by supporting start-ups to scale and attracting foreign direct investment through ambitious regional marketing programmes.

LINKS WITHIN THE UK

Cambridgeshire and Peterborough benefits from a number of key geographical and transport assets:

- The M11 provides rapid and direct access South to London and Stansted Airport
- Railways offer access to London from Peterborough in 51 minutes, from Cambridge in 49 minutes and from Huntingdon in 63 minutes. The new line from Cambridge via St Pancras offers direct route to the finance markets of the City.
- Stansted Airport provides access to international destinations
- The A1(M) to the East connects the region to London in the South and the Midlands and North East.
- The A14, which is currently undergoing significant improvement works, connects Cambridgeshire and Peterborough to Norfolk and Suffolk, including the technology hubs at Norwich and Ipswich and the busiest container port in the UK, Felixstowe, dealing with 42% of Britain’s container trade.
- The A14 also connects Cambridgeshire and Peterborough to the Midlands Engine and the manufacturing hubs of Birmingham and the West Midlands.

There is huge potential in these assets to continue to grow Cambridgeshire and Peterborough’s business connections. However, transport within the region remains an issue especially in more rural areas such as the Fenland. To enable businesses in the region to benefit from more efficient connections to stakeholders, networking opportunities and reduced commuting times, improvements in transport infrastructure within the area must be the first priority. Individual market towns must be better connected, and travel within cities must be eased.

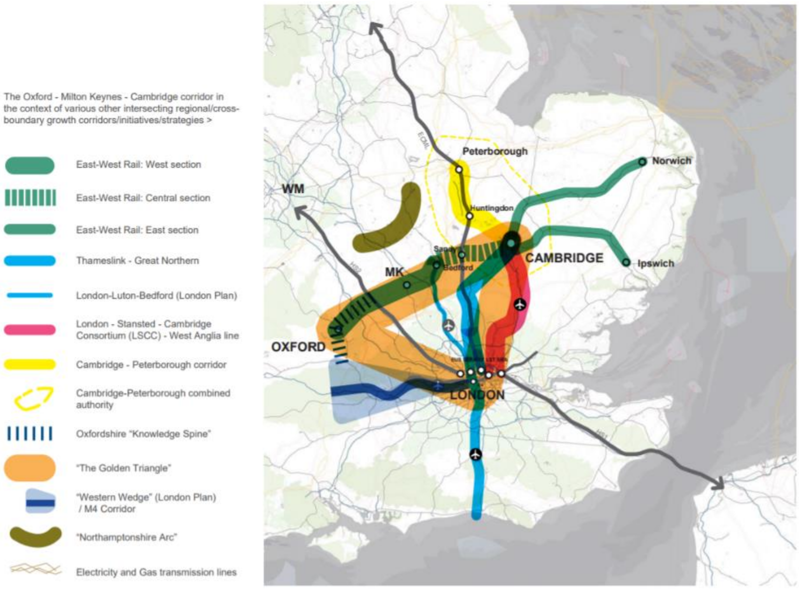


Map showing some of the East of England's major science and innovation assets

Legend
Type
Major Science Park
Smaller Science Park
Science-focused incubator/innovation centre
Other incubator/ innovation centre
Accelerators/co-working space/other
Higher Education Institutions
East of England SIA
Railways
Motorways
Airports
Urban
-Hethel Innovation Centre
-Ideas Centre
-Norwich Research Park
-UEA Enterprise Centre
-Whitespace
Orbis Energy
Innovation Martlesham
Incubator
Adastral Park
University of Essex
Knowledge Gateway
-Biodata Innovation Centre
-Cambridge Biomedical Campus
-Cambridge Science Park
-Chesterford Research Park
-Granta Park
-Melbourn Science Park
-St John's Innovation Centre
-BioPark
-BRE Innovation Park
-Daniel Hall Innovation Centre
-Hertfordshire Knowledge
Innovation Centre for Science
-Lawes Open Innovation Hub
-Rothamsted Centre for Research and Enterprise
-Stevenage Bioscience Catalyst

Produced by SQW. Licence 100030994. Contains OS data © Crown copyright [and database right] [2017]

Cambridgeshire and Peterborough has the fortune to be involved in a number of prominent corridor plans that connect high growth areas and encourage collaboration. These include:



The Oxford - Milton Keynes - Cambridge corridor in the context of various other intersecting regional/cross-boundary growth corridors/initiatives/strategies >
East-West Rail: West section
East-West Rail: Central section
East-West Rail: East section
Thameslink - Great Northern
London-Luton-Bedford (London Plan)
London - Stansted - Cambridge Consortium (LSCC) - West Anglia line
Cambridge - Peterborough corridor
Cambridge-Peterborough combined authority
Oxfordshire "Knowledge Spine"
"The Golden Triangle"
"Western Wedge" (London Plan) / M4 Corridor
"Northamptonshire Arc"
Electricity and Gas transmission lines
Peterborough
Norwich
WM
Huntingdon
CAMBRIDGE
Ipswich
MK
Bedford
OXFORD
LONDON

- **Cambridge Milton Keynes Oxford Corridor:** working to fix the housing and transport challenges of Cambridge by expanding towards Milton Keynes. Joining up the "golden triangle"
- **London Stansted Cambridge Consortium / Innovation Corridor**: This vibrant polycentric region provides a unique ecosystem of talent and business including Technology City, GSK, Google, Cambridge University, UCL, Raytheon, Wellcome and Microsoft.

- **Cambridge Norwich Technology Corridor:** has the potential to be home to an additional 26,000 additional jobs, 46,000 people and create value of an additional £2.75bn to regional economy.
- **Cambridge Ipswich Banana:** there is potential for links to be strengthened between the telecommunications and software hub of Ipswich and Cambridge.

If such plans are successful in their goals, they will serve to increase the supply of talent and productivity of Cambridgeshire and Peterborough’s digital sector. This strategy supports and aligns itself with these plans.

END

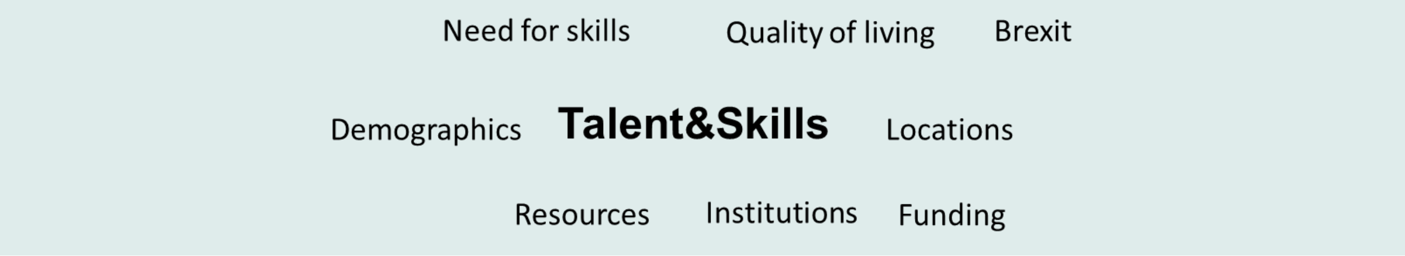
ANNEX 1

Qualitative findings from primary data

Qualitative survey findings are collected from the survey respondents, board meeting notes, and brief interviews. They have been analysed at domain theme level, as well as in detail at comment level. As expected, domains become connected to each other in the responses. Below are the selected domains to which quotes are referred to.

Entrepreneurship **ENT**	Links within the UK **UK**	Export Strategy **EXP**
Investment & Finance **INV**	Talent & Skills **TAL**	Adoption within Industry **IND**
High Impact Networking **NET**	Foreign Direct Investment **FDI**	Digital Infrastructure **DIG**
Knowledge Transfer **KNO**		Supply Chain **SUP**

QUALITATIVE SURVEY INPUT ON TALENT AND SKILLS



It is important to understand the demand and supply of skills (SUP) in the region and the changing needs of now and future. Growing skills pool ‘organically’ is a long process, from school, to universities (KNO) and to the job market (IND). The respondents refer to very different types of talent needed in the region (UK), e.g. via apprenticeships, BSc, MSc, or PhDs but one pattern is that a skilled person is a ‘specialist’ in a certain topic of need, mostly in STEM subjects (DIG). Respondents widely talk about investing (INV) more in the youth but not to forget ‘adult’ groups and teaching the teacher. When it comes to locations where talent is or wants to be, Cambridge (UK) will remain a magnet but the idea of offering a high quality and balanced life style of the work force is becoming a selling argument of a location. Brexit is bringing uncertainty in recruiting talent (FDI).

> Quote: “Better digital skills training (IND) and support for young people at school, college, university is critical (KNO).”
>
> Quote 2:” I'm certainly feeling the problem of recruiting developers (IND, KNO), digital designers and digital marketers in this region (UK).”

Quote 3: “Life style is important also. If affordable housing and transport (DIG, INV) are not addressed the increase in salary that comes with skills and jobs (IND) is negated by the frustration of day to day life.“

Quote 4: “Cambridge City (UK) does tend to be a larger magnet for talent in the region, more needs to be done to show the advantages available to working for businesses around the region.”

Topic	**Survey findings**
Need for skills	Identify what specific skills are needed. Understanding what type of skills are pivotal. Adapt skills learning system to changing skills needs. Emphasise remote working due to the costs of transport. It is difficult to recruit developers. We need more BSc/MSc/Phds. Long ‘organic’ lead time from school education to industry. Provide more makerspaces, adult education, apprenticeships. Support businesses to recruit people.
Quality of living	Living costs are high, public transportation should be improved and flexible work conditions be offered. People want to stay in a place with great life style and balanced life between family and work.
Demographics	Even focus should be on skills development at the young age, digital skills support should be provided to adult groups too.
Locations	Ensure free movement of talented people. Demonstrate advantages working around the region. Cambridge is the talent magnet in the region. Create other than Cambridge, places where people can excel in their career.
Resources	Invest in skills development across the region. Teach the teachers about latest technologies.
Institutions	Education can be delivered not only by Universities but by other institutions and private companies.
Funding	High cost of university education Grants for SMEs/Startups to employ students. Offer grants to those who want to study STEM subjects.
Brexit	Brexit is already affecting recruitment.

QUALITATIVE INPUT ON TECHNOLOGY INFRASTRUCTURE

Role in the value chain
Technology

Models
Technology infrastructure
Cost

Locations
Public places

There are several practical issues mentioned in the survey results such as lack of mobile phone coverage in rural areas, on train lines, fibre cable not reaching to where businesses are (IND), or into new built environment (TAL). CPCA region should be better than average in connectivity, a test bed for 5G (INV), networks available in public places. More competition is asked for reducing the price of being connected to fast networks (IND).

> Quote 1: “Connectivity for the wider population (TAL) to get more support and investment (INV) across the community as a whole, particularly by improving public services and locations such as schools, hospitals, libraries etc.”
>
> Quote 2: “A review of the not-spots as in Norfolk, to identify and prioritise areas for investment (INV)”
>
> Quote 3: “We need to be developing new technology for digital networks (e.g. 5G core), not just buying from USA and China (EXP).”
>
> Quote 4: “1) Mobile phone coverage would be useful in our postcode! (TAL) 2) Ensure coverage on all rail lines in the region 3) For any new build and not just for larger developments, to require Fibre to the Premises (IND, INV).”

Topic	**Survey findings**
Technology	Infrastructure is more than fibre cable only, it is also about better mobile connections, access to street lights, electric vehicles. Mobile phone coverage in rural areas as well as all rail lines. All new built environment should be connected to fibre networks. Region should be a testbed for 5G. More competition between providers is needed.
Role in the value chain	Embrace the emerging technologies within the region for the testbed purposes.
Locations	CPCA region should be higher than the national average in connectivity.
Models	Use connectivity and infrastructure to change people’s behaviours (e.g. Smart cities). Shared leased lines for small businesses in rural areas, subsided.
Cost	Identify the areas that should need an investment. Incentivise providers to build fast fibre network.
Public places	Improve the connectivity in public places for public services and locations such as at schools, hospitals and libraries.

QUALITATIVE INPUT ON SUPPLY CHAINS

Connecting supply and demand

Supply **Supply chains** Demand

Companies go where they find the best value for meet their needs (IND). This regions is internationally connected (UK, EXP) and buying services from anywhere from the world (EXP) does not seem to be an issue. However, ‘more’ of connecting (NET) the both sides would be win-win. There should be more transparent knowledge sharing (KNO) of what are the needs of the buyers. Also, to give a better access to suppliers to both public and private procurement (IND) would open the opportunities for local companies (IND) to offer their products and services.

> Quote 1: “In many digital supply chains, location is irrelevant as we're purchasing from worldwide suppliers (EXP).”
>
> Quote 2: “Only once have I found a local company (UK) that could supply us, we bought them (INV).”
>
> Quote 3: “The more local start up business (ENT) know about the need of and operational requirement (industrial standards) of large local customers (IND) the better.”
>
> Qutoe 4: “Too much emphasis on local companies supplying other local companies (UK, IND) worries me it looks parochial.”

Topic	**Survey findings**
Demand	For many digital services, location is irrelevant. Do not buy inferior technology for the sake of cost, including from foreign companies. Buy from the best, if they are local that is great. It should be easier to find locally based suppliers. Only once have I found a local company that could supply us, we bought them.
Supply	Supply chain is key for the knowledge transfer and ideas. Support training, innovation and collaboration. Online portal to publish opportunities. It should be easier for local business to tender for public service calls.
Connecting demand and supply	National and international aspects of demand and supply. Networking between suppliers and customers. Support for encouraging local supply of certain products. The more local startups businesses know about the need the better.

	Emphasis on local companies is parochial. Many business can supply but the needs are not well known.

QUALITATIVE INPUT ON HIGH IMPACT NETWORKING

Attendees
Networking needs and topics
Type of networking
High-Impact networking
Regional aspects
Organisers

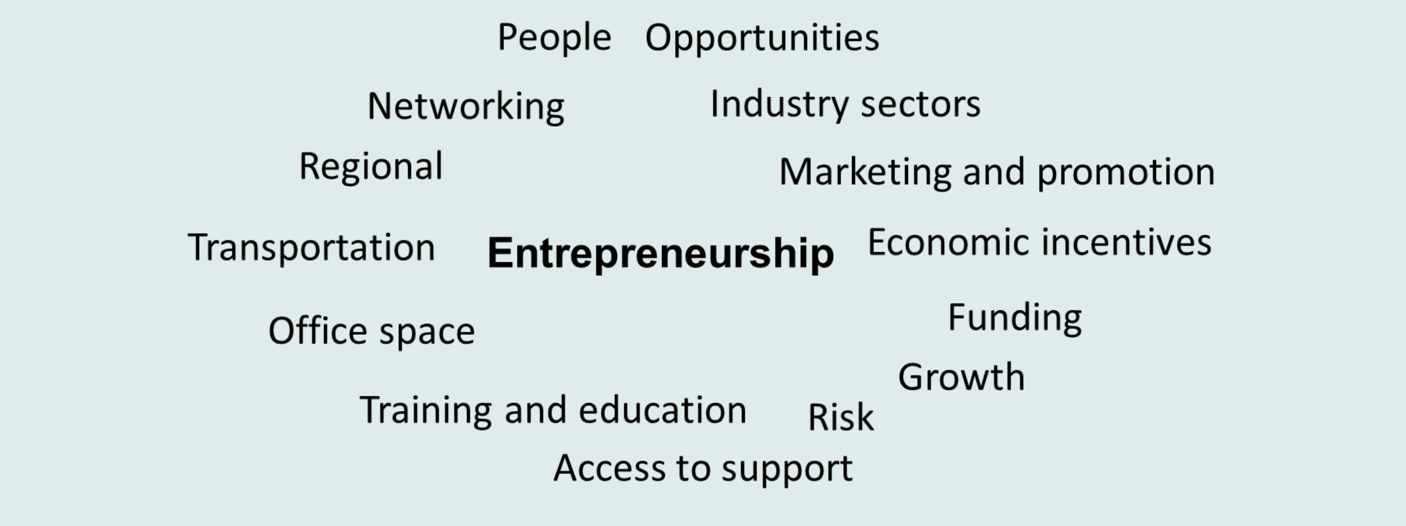
Networking is happening within industry subsectors (IND), as well as across disciplines (UK). There should be more emphasis on attracting businesses (IND) and individuals (TAL) outside of the region to attend the events which often have the same local people attending (UK). Showcase the industry cluster (IND), as well share knowledge (KNO) in events by high net worth individuals from successful businesses (IND). Different parts of the region have different needs for networking. An ecosystem is joined up collaborative network. Access to venues should be easy and region would do better with more medium sized venues. Special topic events (IND) will survive if there is enough demand for them.

> Quote 1: “We need to invite successful startups (ENT) in Cambridge & London areas (UK) to deliver talks about digital skills (DIG) and inspire young generation (TAL) to avail this opportunity accordingly.”
>
> Quote 2: “While there will always be a high concentration of tech businesses in the city, people need (SUP) help everywhere in the region (IND, UK, TAL).”
>
> Quote 3: “Local networking (UK) is almost 'unimportant' as the amount of local customers (SUP) will always be small by the nature of our work.”
>
> Quote 4: “Different parts of the region may have different appetites for networking.”

Topic	Survey findings
Attendees	Get dynamic companies which can bring cross market skills. Too few individuals are engaged and same people in the most events. Too many people trying to sell their services.
Type of networking	Networking should cover both the needs of online and face-to-face meeting needs. There could be a central hub where themes are discussed and opportunities shared.

	Events should be encouraged to invite successful startups from Cambridge and London to share experiences.
Regional aspects	Networking should be done in places with easy access. Different regions have different needs for networking. Networking should support the whole region to join, not just Cambridge. Local networking is not important at all. It is difficult to find a decent location for medium sized events. The volume of possible business is limited by the size of 'locality'.
Networking need and topics	Market forces will finally determine which themes will survive. Local companies to address local problems. Greater range of events. An ecosystem is a joined up network.
Organisers	The credibility of the organisation is imperative. There should be funding available to support existing networking groups to expand.

QUALITATIVE INPUT ON ENTREPRENEURSHIP


People
Opportunities
Networking
Industry sectors
Regional
Marketing and promotion
Transportation
Entrepreneurship
Economic incentives
Office space
Funding
Growth
Training and education
Risk
Access to support

Startups should be supported at different stages of their journey by mitigating some of the risks they take, easier access to funding (INV) and knowledge sharing (KNO). There should be more advice about access to funding and local tax incentives. The region should attract more founders and co-founders and whole region should be promoted to new startups. Startups need affordable working space where they can network and get access to infrastructure (DIG).

> Quote 1: "Lowering the costs of office space and technology (DIG), increasing the available funding and support (INV), and increasing the follow-on business support beyond the first 12 months for new start ups."

Quote 2:"Create sector-specific (IND) opportunities for tech leaders (NET) to come together, share best practices and grow the sector as a whole."

Quote 3: "Key emphasis really needs to be on growth, specifically national and international sales (UK, EXP)."

Quote 4: "Getting more of the entrepreneurial spirit distilled into Fenland and East Cambs (TAL)."

Topic	**Survey findings**
People	Entrepreneurial spirit across the region should be embraced. Learn from people who have created successful business, or those who have failed. Access to affordable skills.
Opportunities	Create sector-specific opportunities and discover new ideas; share co-development opportunities.
Industry sectors	More startups on aging, climate change, sustainability, social enterprises
Marketing and promotion	Promote the region as place to setup a startup
Economic incentives	Give tax incentives to startups
Funding	Support raising funding to scale-up companies; and run 'the winners'. Give grants to early stage companies. Closing the gap between angel investments and VCs. Offer grants and soft loans, micrograntss.
Growth	Support growth through national and international sales
Access to support	Facilitate the access to startup support
Training and education	Train future entrepreneurs to avoid reinventing and making mistakes.
Office space	Affordable office space
Transportation	Improve transport links, public in particular
Regional	Cambridge needs to be deemphasised
Networking	Support networking opportunities with more diverse participation through which entrepreneurs can connect to hubs, academia and the industry.
Risk	Try to support startups by mitigating risks of failure, including investment risk.

QUALITATIVE INPUT ON INVESTMENT AND FINANCE

Financial instruments Access to finance
Policy
Office space **Investment and finance** Investors
Networking Training and education Startups&businesses

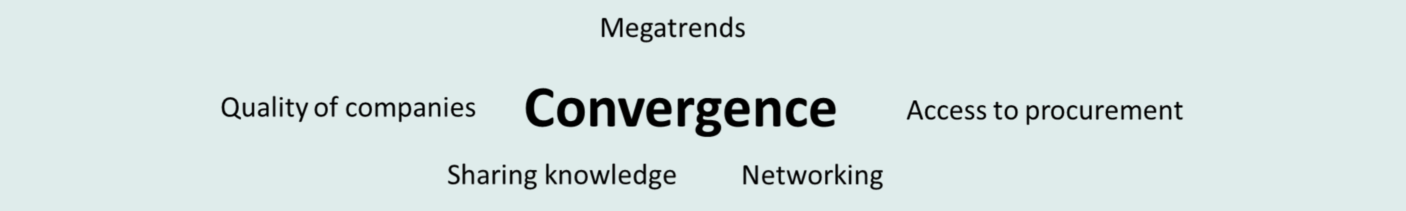
There should be better access (NET) to different types of funding (national, international) which is connected to expertise (mentors, advisers) (TAL, KNOW) in running and growing a business (IND). More advice and training is needed about different types of finance instruments, and tax breaks, especially for the small companies (ENT).

> Quote 1: “More focus on alternative investment (INV) models for early-stage startups. (ENT)”
>
> Quote 2: “The current system either means divesting ownership or gambling on high growth to repay loans and interest - neither results in a patient, lower and more sustainable rate of growth. Pooling growing businesses together (NET) as funding opportunities might help, along with making it easier to match businesses with groups of people (TAL) committing smaller individual amounts, matched by a large fund or organisation (IND), for example.”
>
> Quote 3: “Create a favourable tax environment for small investors.”
>
> Quote 4: “Local tax breaks, incentives or capital grants for cutting-edge equipment.”

Topic	Survey findings
Investors	Pool of investors and funding is too small; London and international investors are needed. Attitude and approach towards funding of businesses should be improved. Traditional banks are not accommodating..
Office space	Investors should be close to businesses.
Networking	There should be centralized point of access to investors.
Startups&Businesses	Pooling growing business together. Understanding the stage of business is pivotal. Diversity of business builds resilience.
Training and education	More financial assistance, support and information about sources of funding is needed.
Policy	Government has a bad track record in investments. Local tax breaks. Market place will sort out this problem.
Financial instruments	Pooling of different types of investors to lower the risk. Public sector could commission innovation. New investment models and funding sources should be advertised.

	Novel investor categories. Crowdfunding training and alternative finance. Grants for micros startups. Angels could offer grants.
Access to finance	There is no lack of finance in the region for high quality companies. Lower the key barriers to access to finance. Customers are the ‘best funding’.

QUALITATIVE INPUT ON APPLICATION IN INDUSTRY (CONVERGENCE)



Share knowledge (KNO, NET) and business opportunities (IND) to create and grow high quality technology companies (ENT) in new technology sectors.

> Quote 1: “More research (KNO) should be done on identifying the current industry trends (DIG) for the local businesses (IND) in this region (UK).”
>
> Quote 2:”It's the link (NET) between equipment makers (IND), technology developers, and process developers (TAL).”
>
> Quote 3: The creation of hubs (NET) to cluster industry in sectors (IND, TAL) and/or related sectors.”
>
> Quote 4: “Speakers at business breakfast/ business friend networks (NET) to bring the new technologies (DIG) to the attention of the market.”

Topic	**Survey findings**
Megatrends	We should look at what roles we have in the technology supply chain in supporting innovation and learning. The problem with cutting edge technology is that it is often demonstrations work. This is a competitive differentiator.
Sharing knowledge	Learn from and share best practices across sectors to identify industry trends. What is available and how accessible it could be?
Quality of companies	Great firms will survive, poor management will fail.

Access to (public) procurement	Small businesses should be involved easier to local public procurement opportunities and systems. Rewarding large business and government for buying from early stage innovators can help both sides.
Networking	Establish links between equipment makers, technology developers, and process developers. The creation of hubs to cluster industry in sectors. Speakers at business breakfast/ business friend networks to bring the new technologies to the attention of the market.

QUALITATIVE INPUT ON INTERNATIONAL TRADE

Supporting exports activity Quality of businesses

International trade Publicity

Finance Brexit Locality

Government should give grants (INV) for companies going international (EXP), to attend international trade fairs and meet customers and potential customers (NET, IND). Startups are born global (ENT) but they need advice about international trade (EXP), taxes. Brexit is causing uncertainty (EXP, INV).

> Quote 1: “Support beyond existing DIT services, to research international market opportunities (EXP, INV), plus facilitate business introductions (NET), through grants (INV) to attend trade fairs, travel, marketing and communications (NET).”
>
> Quote 2: “In the digital sector international trade (EXP) should be seamless, technical barriers are low. “
>
> Quote 3: “Make grants (INV) available for market research in targeted areas (EXP), and use centralized resources to facilitate making first moves.”
>
> Quote 4: “Fight Brexit to avoid a step-change downwards (EXP).”

Topic	**Survey findings**
Support exports activity	The support for businesses should be go beyond existing DIT services. There should be easy access to services and trainings including online resources. Facilitate business introductions and access to real demand. Provide support, advice in trade activities e.g. tax advice.

Quality of businesses	Create and develop high quality businesses that trade to foreign markets. Technology startups are mostly born global.
Finance	Create grants to attend trade fairs, travel, marketing and communications including trade missions.
Locality	Focus on developing skills and capabilities.
Brexit	Brexit uncertainty can create step-change downwards.
Publicity	Publish success stories, also failure.

QUALITATIVE INPUT ON FOREIGN DIRECT INVESTMENT

Brexit
Awareness
Reasoning
Costs
Foreign Direct Investment
Investment
Ownership

Region should offer soft landing services and advice to foreign companies (EXP) considering this region for investment. When businesses visit Cambridge they should be offered to see other places than city of Cambridge (UK, INV). The foreign funding is used to scale up the companies globally (EXP), to bring new knowledge (KNO) and connection (NET) s to the region and wealth. Brexit uncertainty is a serious issue at the moment (EXP).

> Quote 1:" There is a need to protect our region's technology assets (KNO) from purchase and asset stripping but investment in our research institutes and businesses (INV) is crucial to fund further development.
>
> Quote 2:" Areas beyond Cambridge (UK) should be advertised as easier access into Cambridge, also at international level."
>
> Quote 3:" The Foreign firms should be made adopt a few start-ups (ENT) to help them mentor them and grow."
>
> Quote 4:" In my experience, the attraction for foreign investment is to gain teams with unique skills (KNO) and experience rather than any other incentives."
>
> Quote 5: Providing a framework for investment, dealing with due diligence and terms (KNO) as well as introducing investors (INV) and entrepreneurs (ENT).

Topic	Survey findings
Awareness	Demonstrate unified presence at international events. Providing a framework for investment, dealing with due diligence and terms as well as introducing investors and entrepreneurs.
Costs	Foreign technology firms cause costs increase of running businesses.

Investments	Foreign investment should invest in research, businesses on a longer period of time. Areas beyond Cambridge should be advertised. Foreign investment often helps the companies to scale-up and go global markets.
Ownership	We should protect region's technology assets from acquisitions. Foreign firms should adopt, mentor and grow local startups.
Reasoning	Attraction for foreign investment is to gain teams with unique skills and experience. Firms will locate here because of the local talent.
Brexit	Make clear how Brexit affects foreign investments.

QUALITATIVE INPUT ON KNOWLEDGE TRANSFER

Sharing knowledge

Cambridge University, ARU **Knowledge transfer** Roles

Reasoning knowledge transfer

Knowledge transfer between academia and industry can reduce risks and accelerate market entry (IND). Attention should be paid to IP Management, ownership and knowledge transfer processes (SUP). Funding collaboration between industry and academia should be encouraged (INV).

> Quote 1: "Support to share best practices (NET) and what excellence looks like in the development of innovation and IP, including reducing investment risk and accelerating market adoption."
>
> Quote 2: "The universities (Cambridge and ARU) are getting much better at engaging with business (NET) in the region (UK), but it's still hard for smaller businesses (ENT) to collaborate on research and innovation work with them (SUP)."
>
> Quote 3: "SMEs are very cautious talking to large companies because IP theft (ENT) is sadly common."
>
> Quote 4: "The best way to transfer knowledge and experience is people (TAL). The more talent is attracted to, and grown in, the region the more easily business (IND) can learn from each other."

Topic	**Survey findings**
Sharing knowledge	Region should be showcasing local innovation and truly valuable information to support collaboration across sectors. Strategy should identify the more relevant channels to transfer knowledge. Encourage younger people to be involved in the knowledge transfer. Develop, define the culture of knowledge transfer.

Cambridge University Anglia Ruskin University	Harnessing the university IPR by working with smaller business Establish access to resources, skills and technology and support interaction between academia and the industry.
Reasoning knowledge transfer	Knowledge transfer can reduce investment risk, accelerate market adoption Industry and academia can bid for collaborative innovation funding. Develop processes that make knowledge transfer faster, time to market.
Types of knowledge transfer	Programs that fund knowledge transfer between industry and academia e.g. KTPs.
IP Management	How will IP transfer be managed which doesn't go to competitors. Value of IP.
Roles	Regional co-ordinator could work with InnovateUK, KTN, academia on connecting experts to local communities. Visualising the regional actors.

QUALITATIVE INPUT ON LINKS IN THE UK

Networking
Venues
Events
Links within UK
Assets and knowledge
Partnership development

Connecting the region (NET) with other regions is about bringing new skills, talent (TAL), business opportunities (IND) and businesses (INV) to the region. While businesses outside of the region are considering of locating themselves here, they should be also shown other parts of the region than only Cambridge and near-to Cambridge locations (NET).

> Quote 1: "Attracting more partnerships with tech businesses (INV) outside the region by improving the skills (TAL), facilities (DIG), events (NET) and support in the area."
>
> Quote 2: "Technology showcase events (NET). Trade 'Missions' to other networks."
>
> Quote 3: "Skills, industry knowledge exchange (TAL, KNO) and transport links are important."
>
> Quote 4: "Areas of rural development need to offer hi-tech business space (IND) to grow."

Topic	**Survey findings**
Partnership development	Attract more partners from outside of the region which benefit all parties involved.

Networking	Bringing opportunities to businesses in different locations in the region.
Assets and knowledge	Support improving skills that are interest beyond the region. Offer high quality facilities to network with local businesses
Events	Organise technology showcase events. Cross-discpline events that facilitates group thinking, collaboration and creativity in a sustained manner.
Venues and locations	Areas of rural development need to offer hi-tech business space to grow. Getting co-location of this expertise with industry

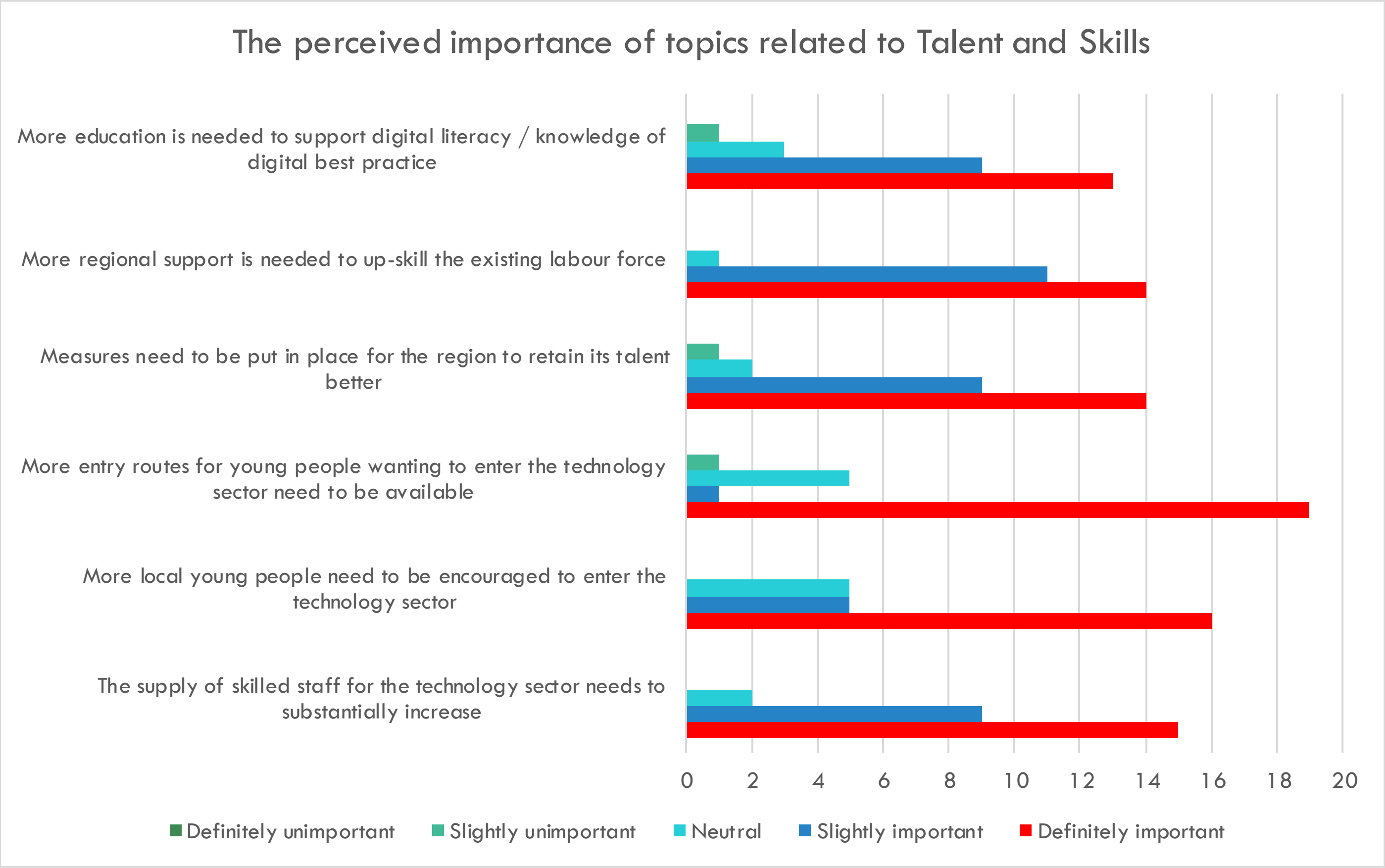
---End of Annex 1---

ANNEX 2

Quantitative findings from primary data

Quantitative survey findings were collected from the survey respondents and analysed at domain theme level. The charts below outline the overall perceived importance of the hypotheses that were being tested per domain, the geographical variation between respondents and variation caused by the respondent's position within the technology supply chain.

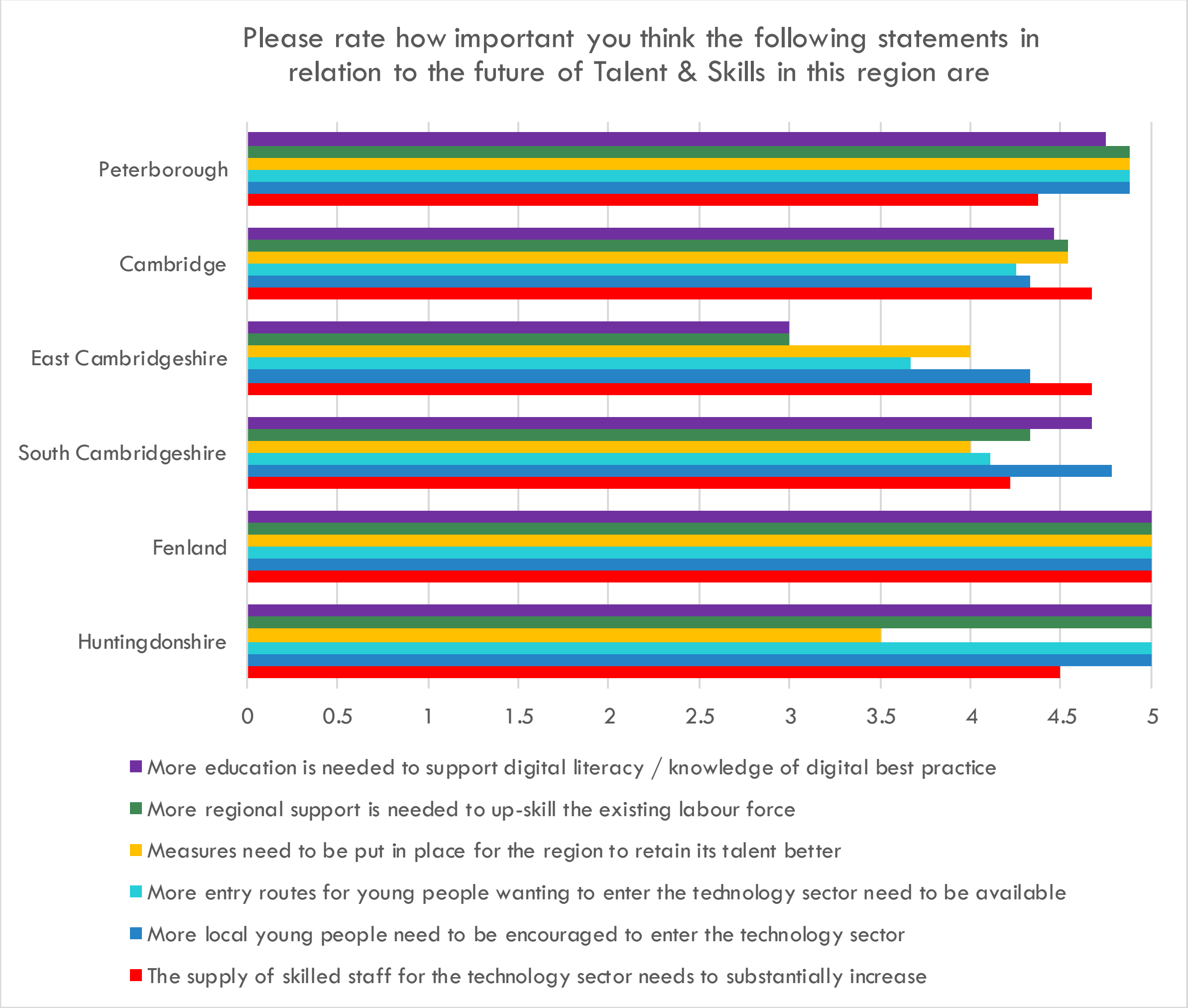
QUANTITATIVE INPUT ON TALENT AND SKILLS



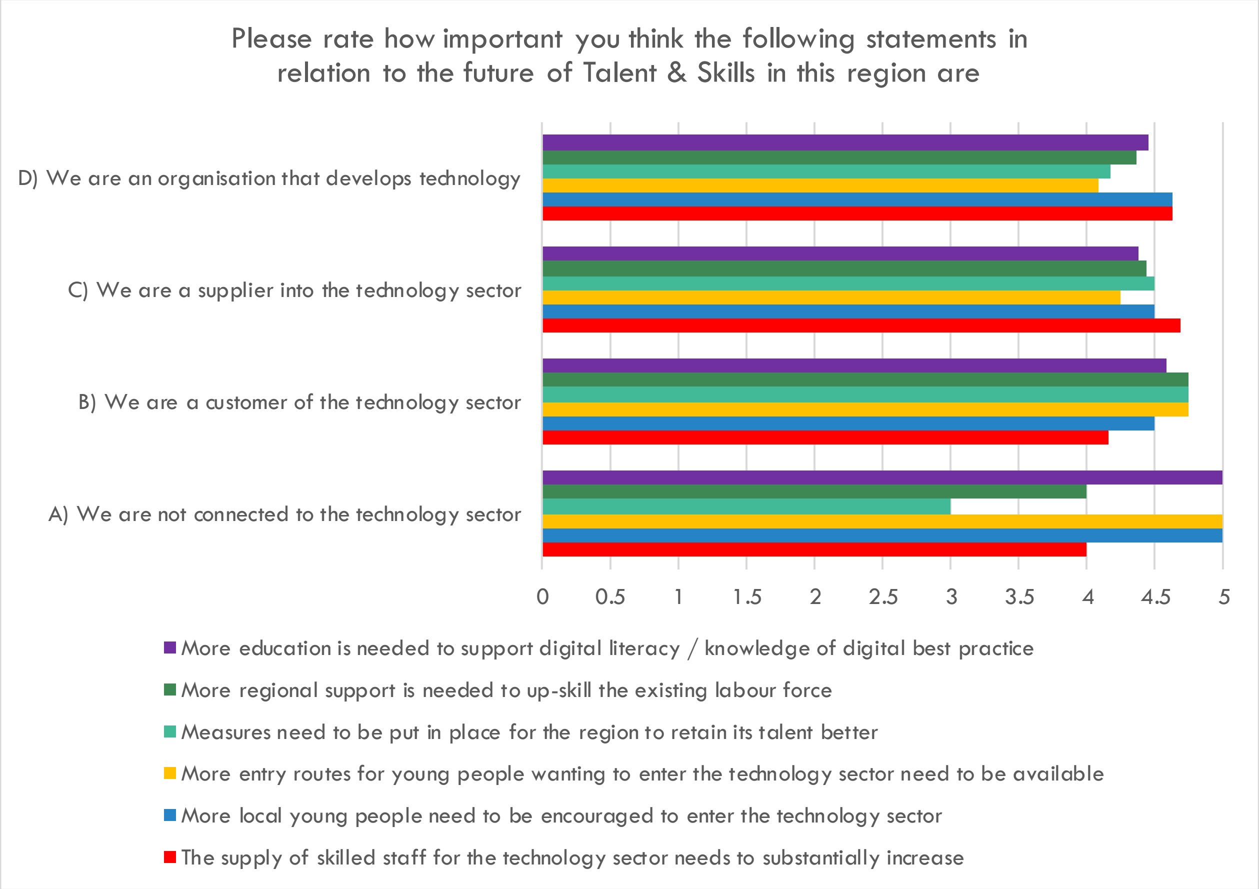
The results become more interesting when looking at the answers disaggregated at district level, one can see that Talent and Skills are perceived as significantly important along all the six priorities in the Fenland, four in Huntingdonshire, three in Peterborough, two in South Cambridgeshire and one each for Cambridge and South Cambridgeshire.

In detail,

- **More local young people need to be encouraged to enter the technology sector,** is particularly relevant in Fenlands, Hunts, South Cambridgeshire and Peterborough, (but it is still relevant also in Cambridge and East Cambridgeshire)
- **More regional support is needed to up-skill the existing labour force,** is relevant in Fenlands, Hunts, and Peterborough
- **More education is needed to support digital literacy / knowledge of digital best practice,** is a relevant issue everywhere apart from East Cambridgeshire
- **More entry routes for young people wanting to enter the technology sector need to be available,** is a particularly relevant issue in Fenlands, Hunts and Peterborough (but also relevant in Cambridge and South Cambridgeshire)
- **The supply of skilled staff for the technology sector needs to substantially increase,** is of key relevance to every region including Cambridge that clearly perceives this bottlenecks.
- **Measures need to be put in place for the region to retain its talent better,** is of key relevance for respondents in the Fenlands, Peterborough and Cambridge

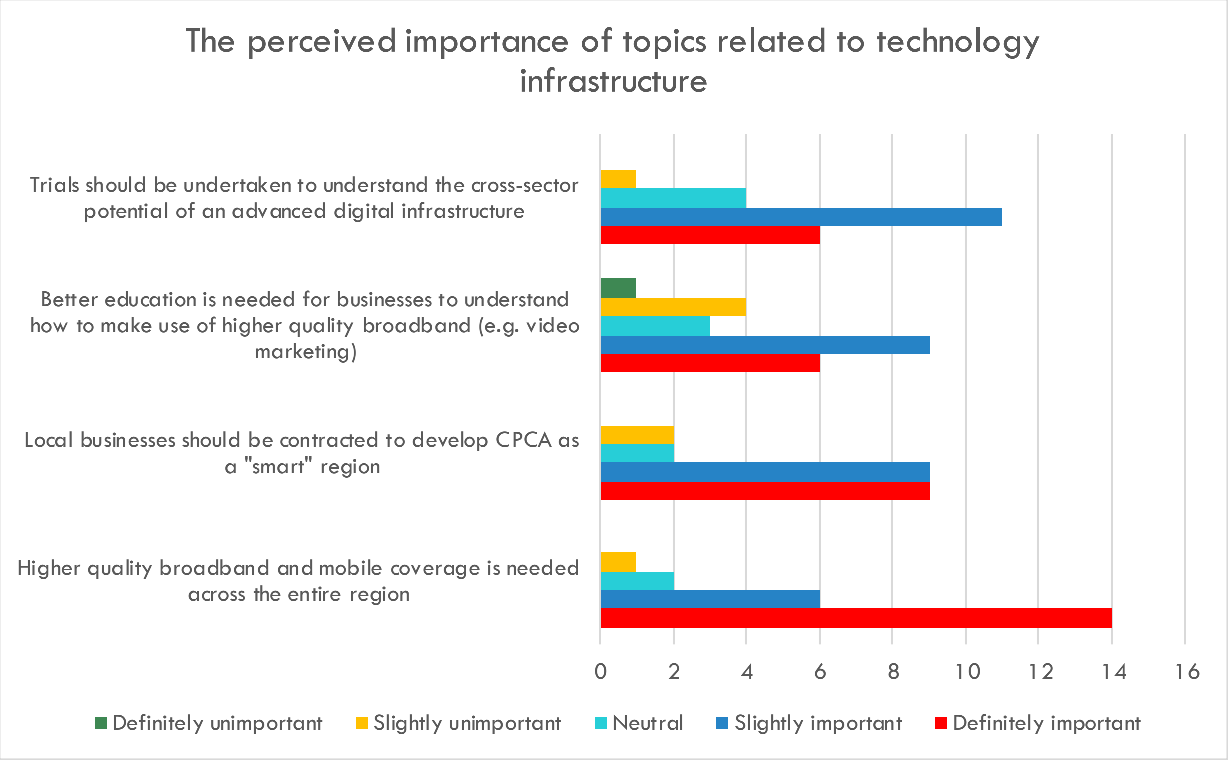


When disaggregating according to the role played in the technology values chain, one can see that the future of Talent and Skills in the Region is perceived as particularly relevant mainly by the respondents that are not connected to the technology sector, and that the key priorities for these respondents are: **More education is needed to support digital literacy / knowledge of digital best practice; More local young people need to be encouraged to enter the technology sector** and; **More local young people need to be encouraged to enter the technology sector.**



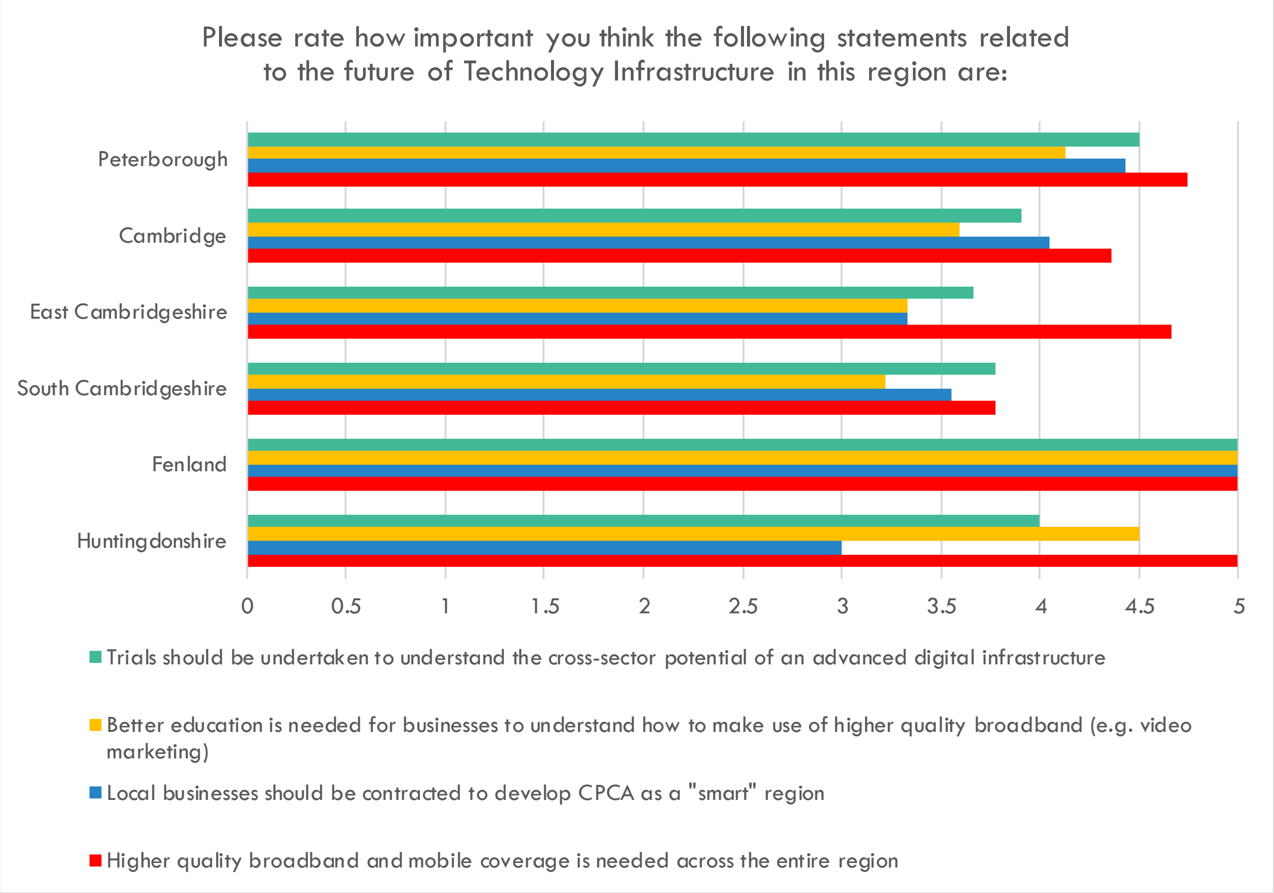
QUANTITATIVE INPUT ON TECHNOLOGY INFRASTRUCTURE

When looking at the perceived importance of topics related to technology infrastructure the aggregate responses show that **Higher quality broadband and mobile coverage is needed across the entire region, is the key priority.**

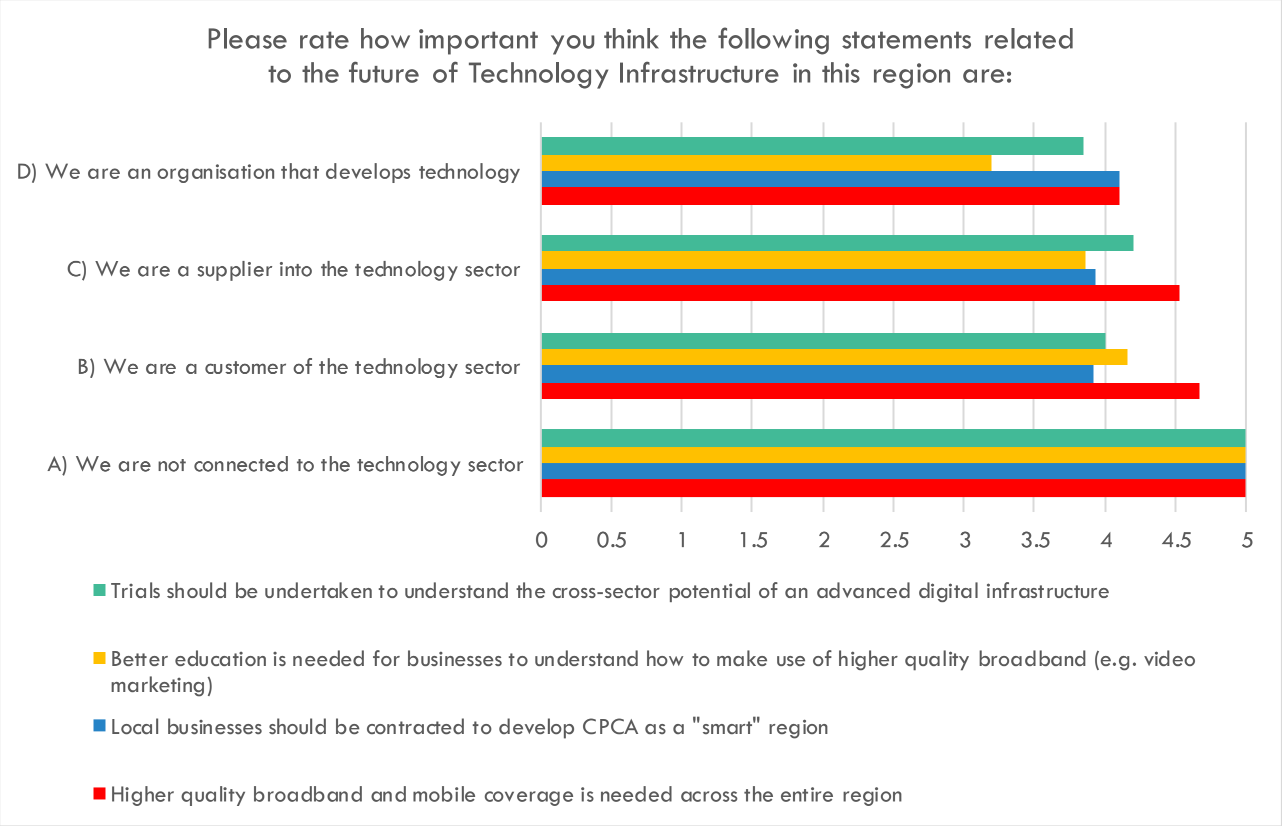


When looking at the disaggregated responses, however, the data show that the Fenlands considered all four options as of key relevance, Peterborough also but with slight less intensity, Cambridge and Huntington focussed on two key issues and East Cambridgeshire on one. In detail,

- **Higher quality broadband and mobile coverage is needed across the entire region**, was a top priority for all areas apart from East Cambridgeshire
- **Local businesses should be contracted to develop CPCA as a "smart" region**, is particularly relevant for the Fenlands, Peterborough and Cambridge
- **Better education is needed for businesses to understand how to make use of higher quality broadband (e.g. video marketing),** was a priority for respondents in Fenlands, Hunts and Peterborough, while
- **Trials should be undertaken to understand the cross-sector potential of an advanced digital infrastructure**, seems to be critically relevant for Fenlands, Hunts and Peterborough.

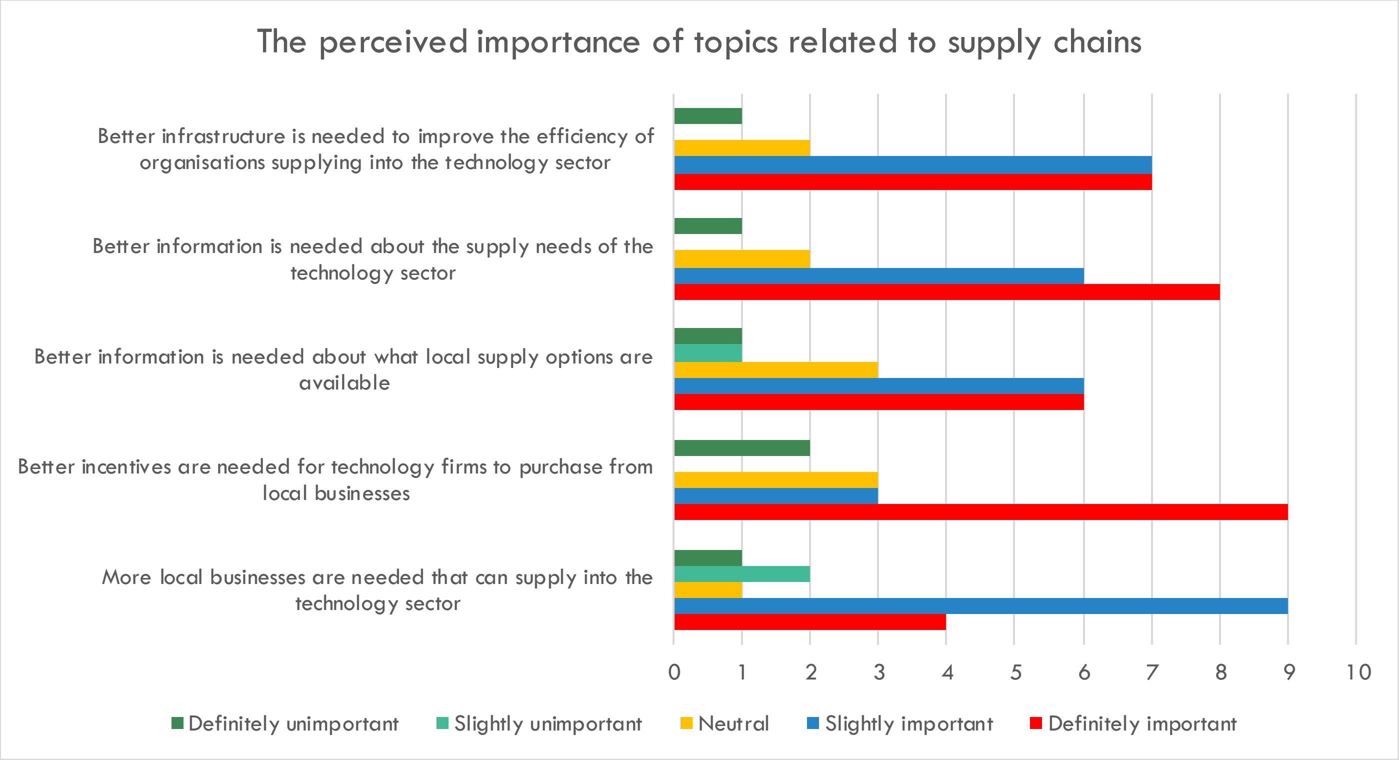


All the priorities were of higher relevance, for the respondents that considered themselves as not connected to the technology sector.

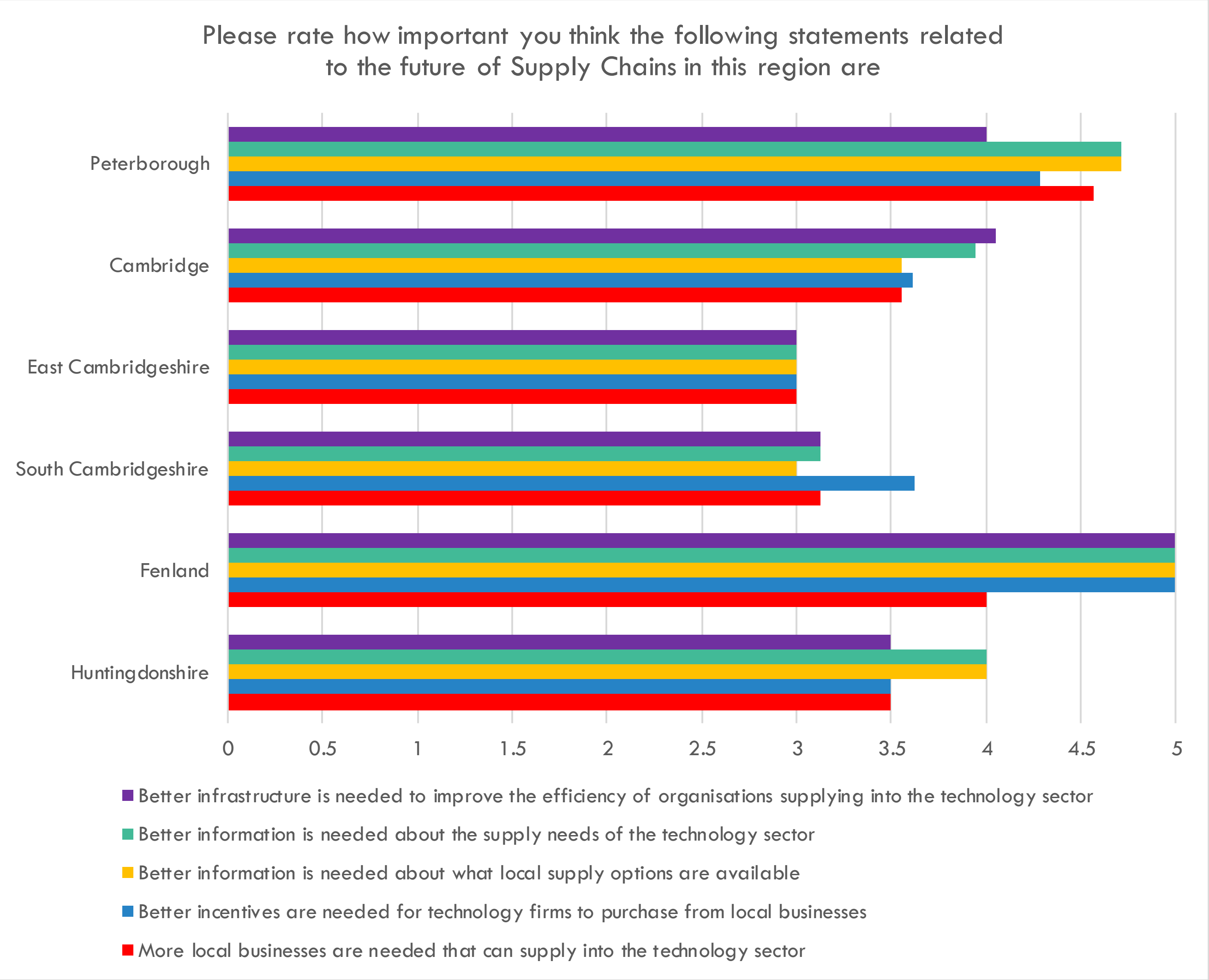


QUANTITATIVE INPUT ON SUPPLY CHAINS

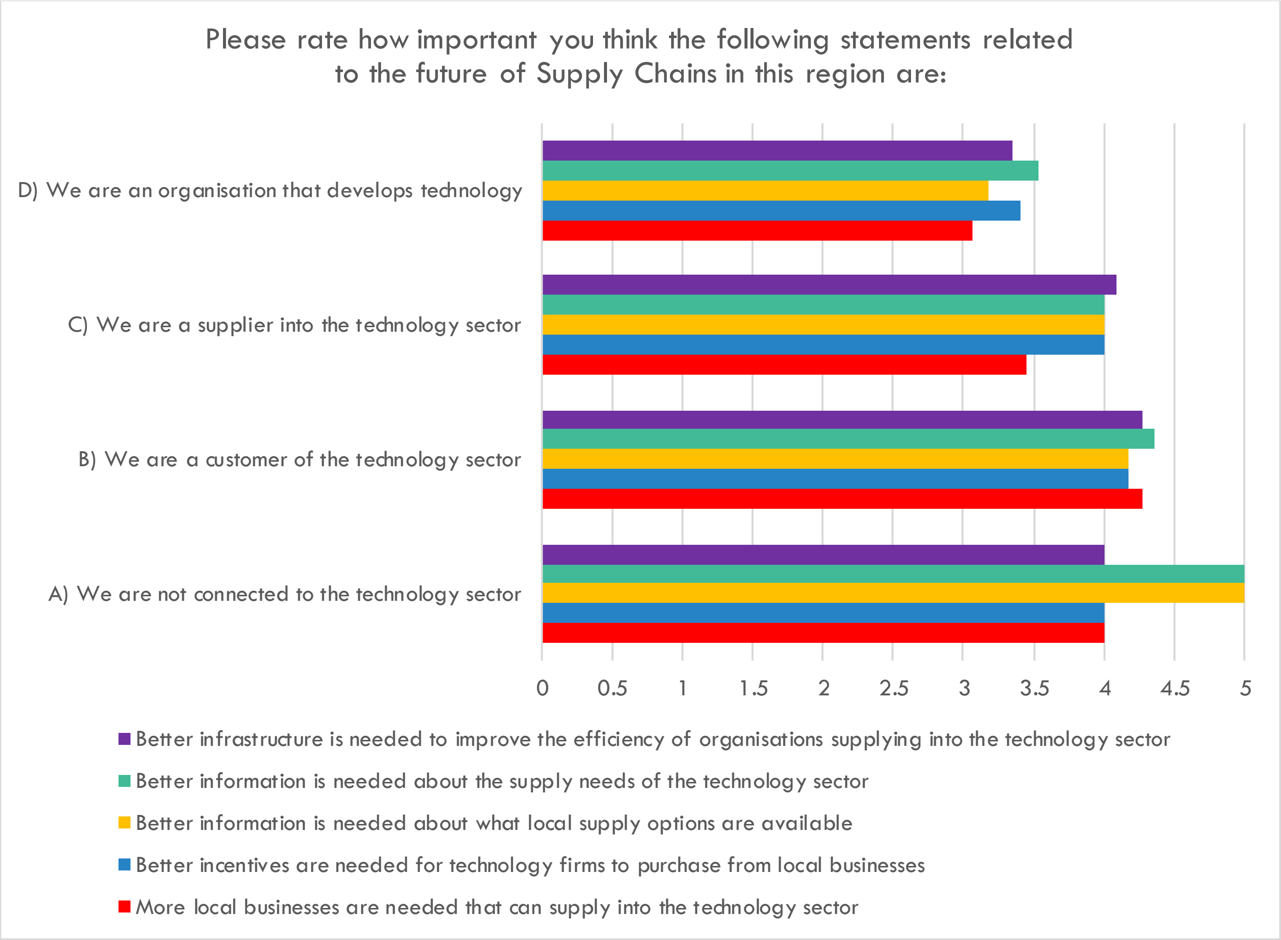
Moving to the perceived importance of topics related to supply chains, one can see that **Better incentives are needed for technology firms to purchase from local businesses,** is the top priority at aggregate level followed by **Better information is needed about the supply needs of the technology sector** and that **More local businesses are needed that can supply into the technology sector is also** relevant for a significant number of respondents.



- **Better information is needed about what local supply options are available**, and
- **Better information is needed about the supply needs of the technology sector,** were the priorities on supply chains for Peterborough the Fenlands and Hunts
- **Better infrastructure is needed to improve the efficiency of organisations supplying into the technology sector,** was a key priority for Peterborough the Fenlands and Cambridge
- **Better incentives are needed for technology firms to purchase from local businesses,** were of high relevance for Peterborough and the Fenlands and, finally
- **More local businesses are needed that can supply into the technology sector, was of high relevance only in** Peterborough and the Fenlands

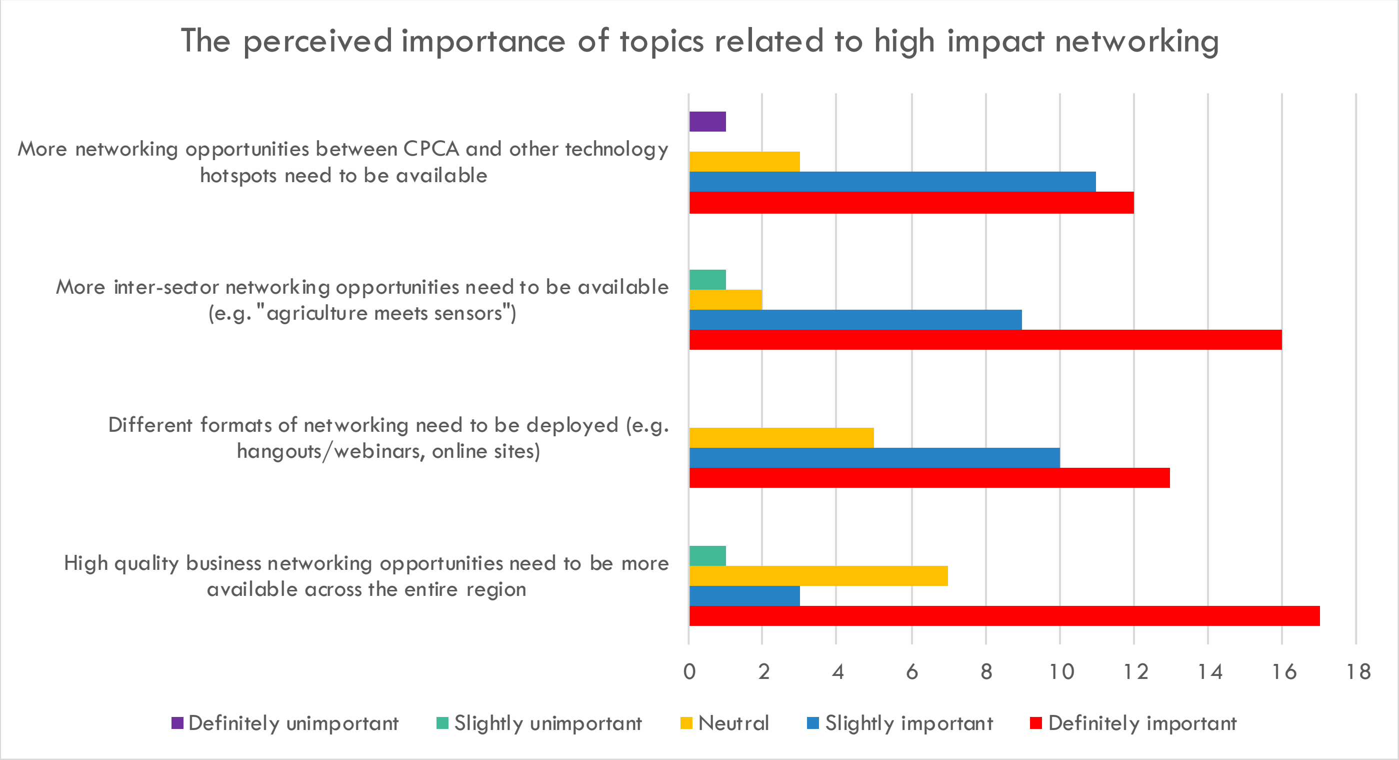


- When focussing on the role in the value chain, **Better information is needed about what local supply options are available**, and **Better information is needed about the supply needs of the technology sector,** were the key priorities, the relevance of which was particularly by the respondents that considered themselves as not connected to the technology sector.



QUANTITATIVE INPUT ON HIGH IMPACT NETWORKING

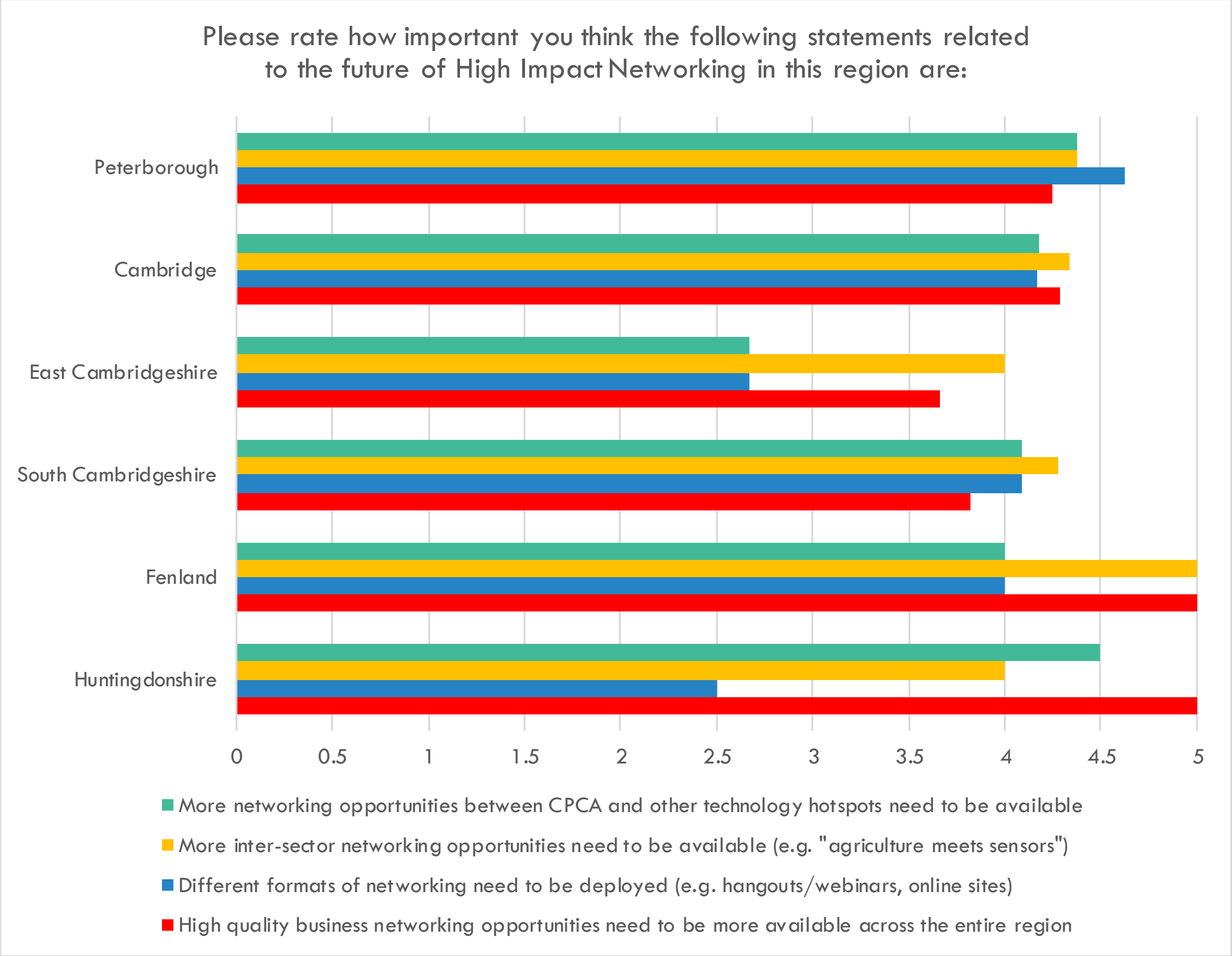
Moving to the perceived importance of topics related to high impact networking, one can see **that High quality business networking opportunities need to be more available across the entire region**, and
More inter-sector networking opportunities need to be available are the two top priorities at aggregate level.



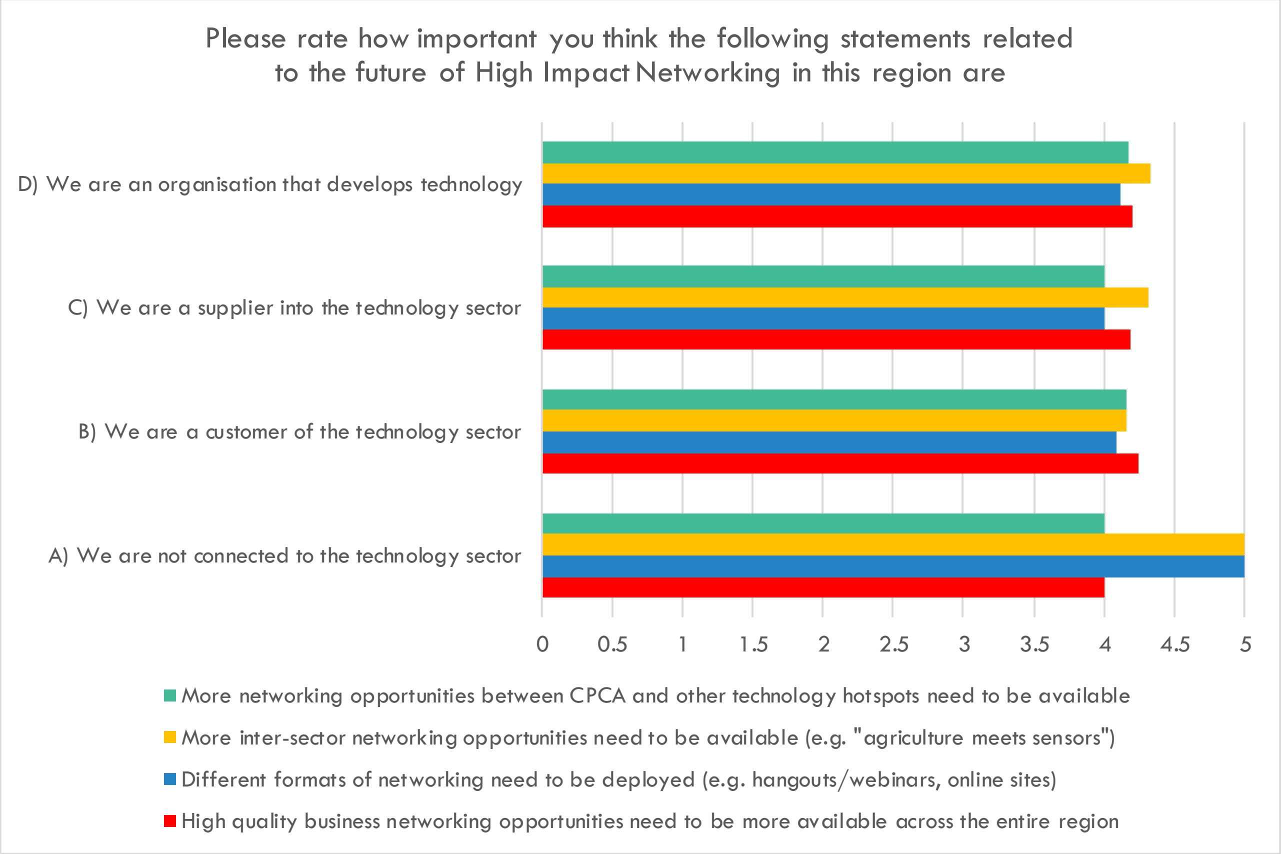
By looking at the geography data, The Fenlands identify these same two priorities as critically relevant:

- **High quality business networking opportunities need to be more available across the entire region**, and
- **More inter-sector networking opportunities need to be available** (e.g. "agriculture meets sensors")

This last priority is critically important also for Huntingdonshire

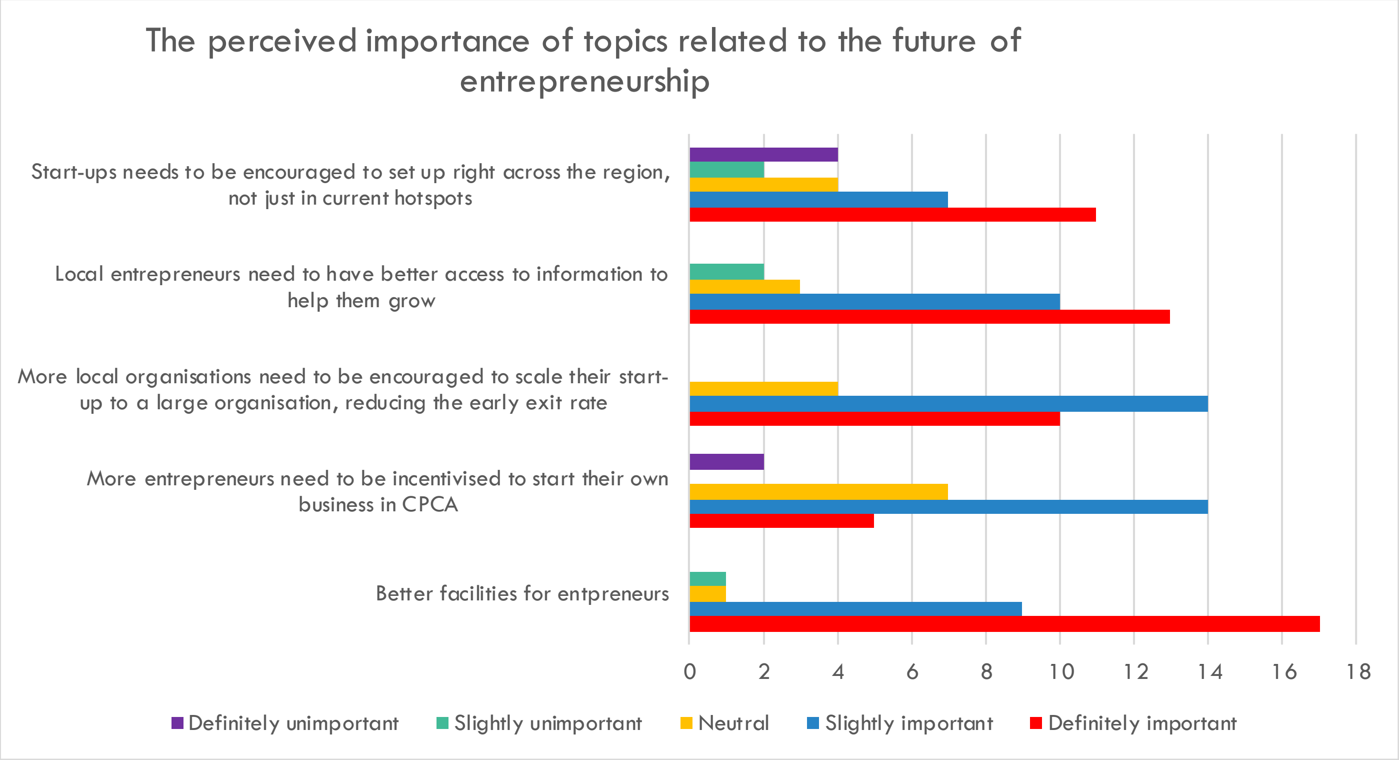


Similarly to the previous domains, the respondents not connected to the technology sector expressed the strongest needs, focussing in particular on **More inter-sector networking opportunities need to be available** and **on different formats of networking need to be deployed**



QUANTITATIVE INPUT ON ENTREPRENEURSHIP

Considering the perceived importance of topics related to the future of entrepreneurship, one can see that Better facilities for entrepreneurs was definitively important for a relevant number of respondents



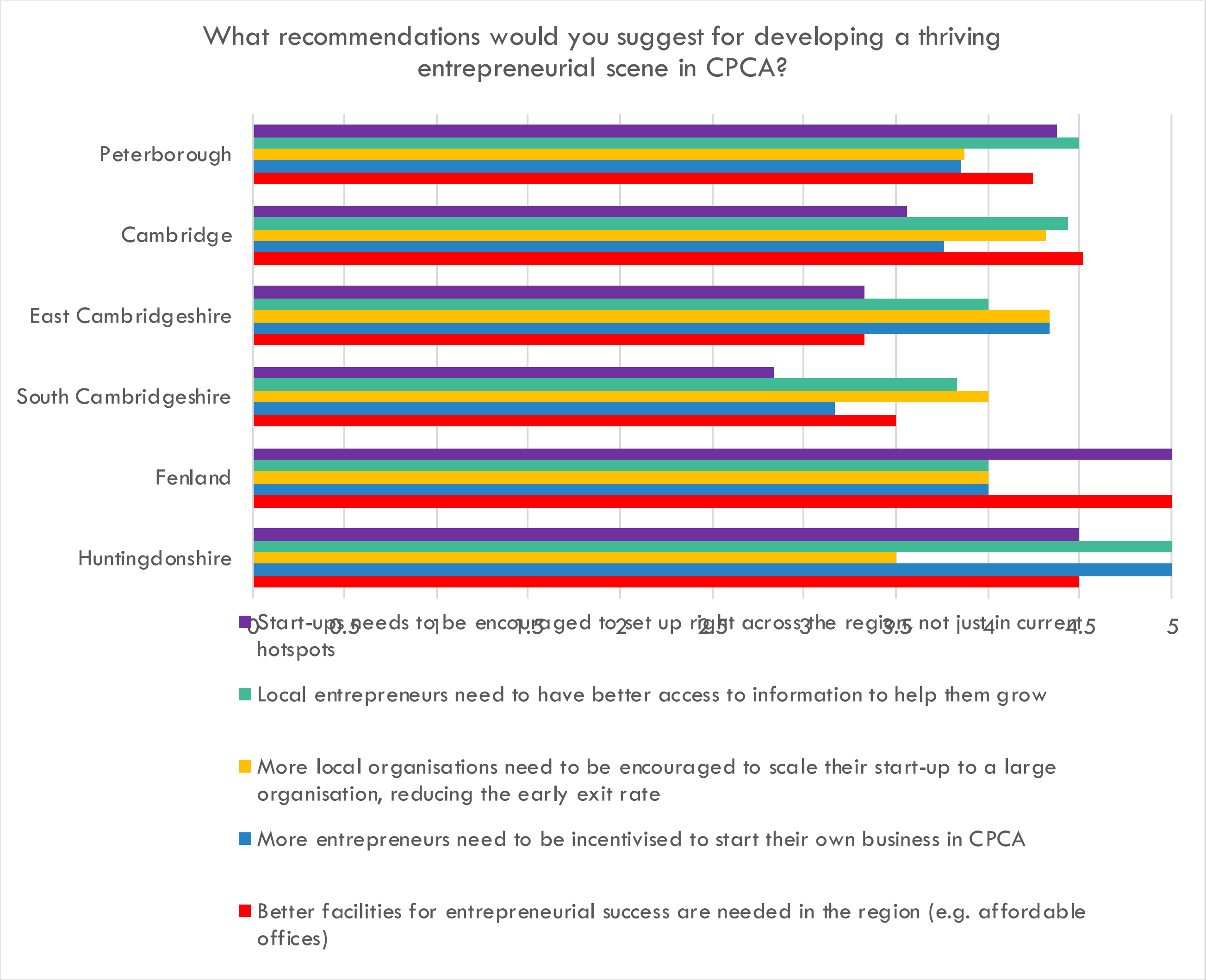
The Graphs below shows the geographic distribution of priorities for developing a thriving entrepreneurial scene in CPCA across areas. The Fenland's answers prioritise

- **Start-ups needs to be encouraged to set up right across the region, not just in current hotspots** and
- **Better facilities for entrepreneurial success are needed in the region** (e.g.affordable offices)

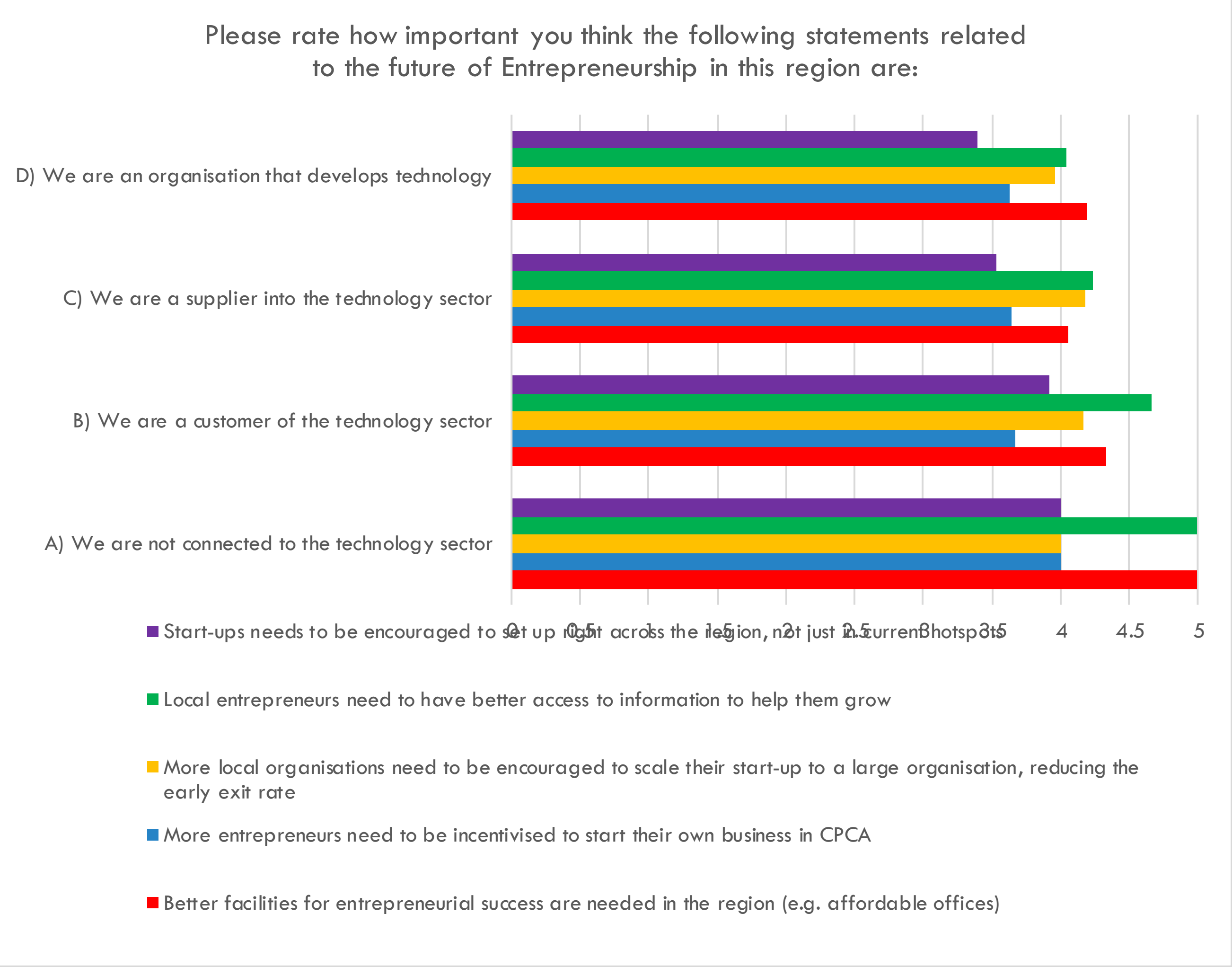
While Huntingdonshire prioritised

- **More entrepreneurs need to be incentivised to start their own business in CPCA** and
- **Local entrepreneurs need to have better access to information to help them grow**

Fenland/Peterborough/Huntingdon do place more importance in start-ups being encouraged around the region than East/South/Cam while the need for start-up facilities is highest in Fenland, followed by Cambridge

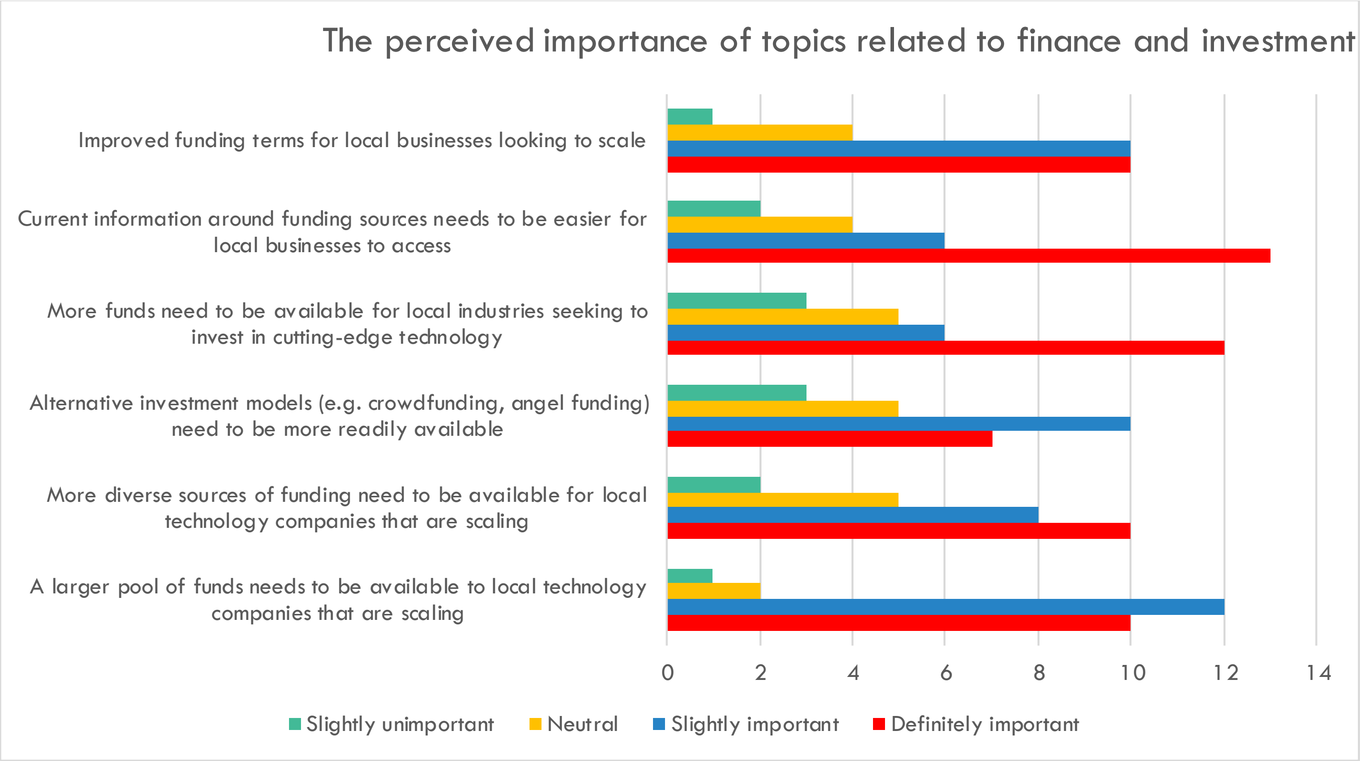


- Also when considering the priorities on entrepreneurship, the respondents non connected to the technology sector indicated the higher priorities as **Better facilities for entrepreneurial success are needed in the region** (e.g.affordable offices) and **Local entrepreneurs need to have better access to information to help them grow.**

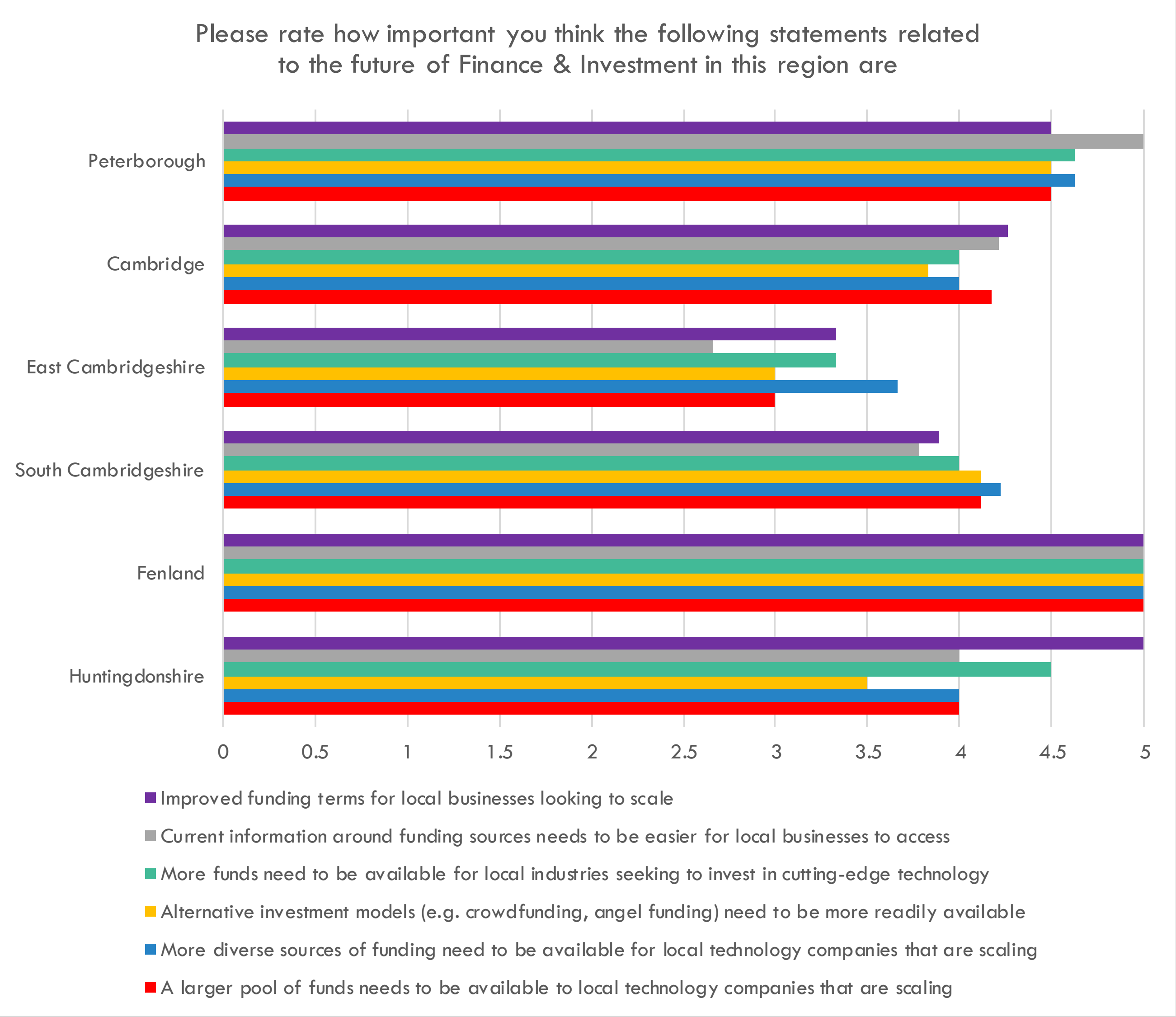


QUANTITATIVE INPUT ON INVESTMENT AND FINANCE

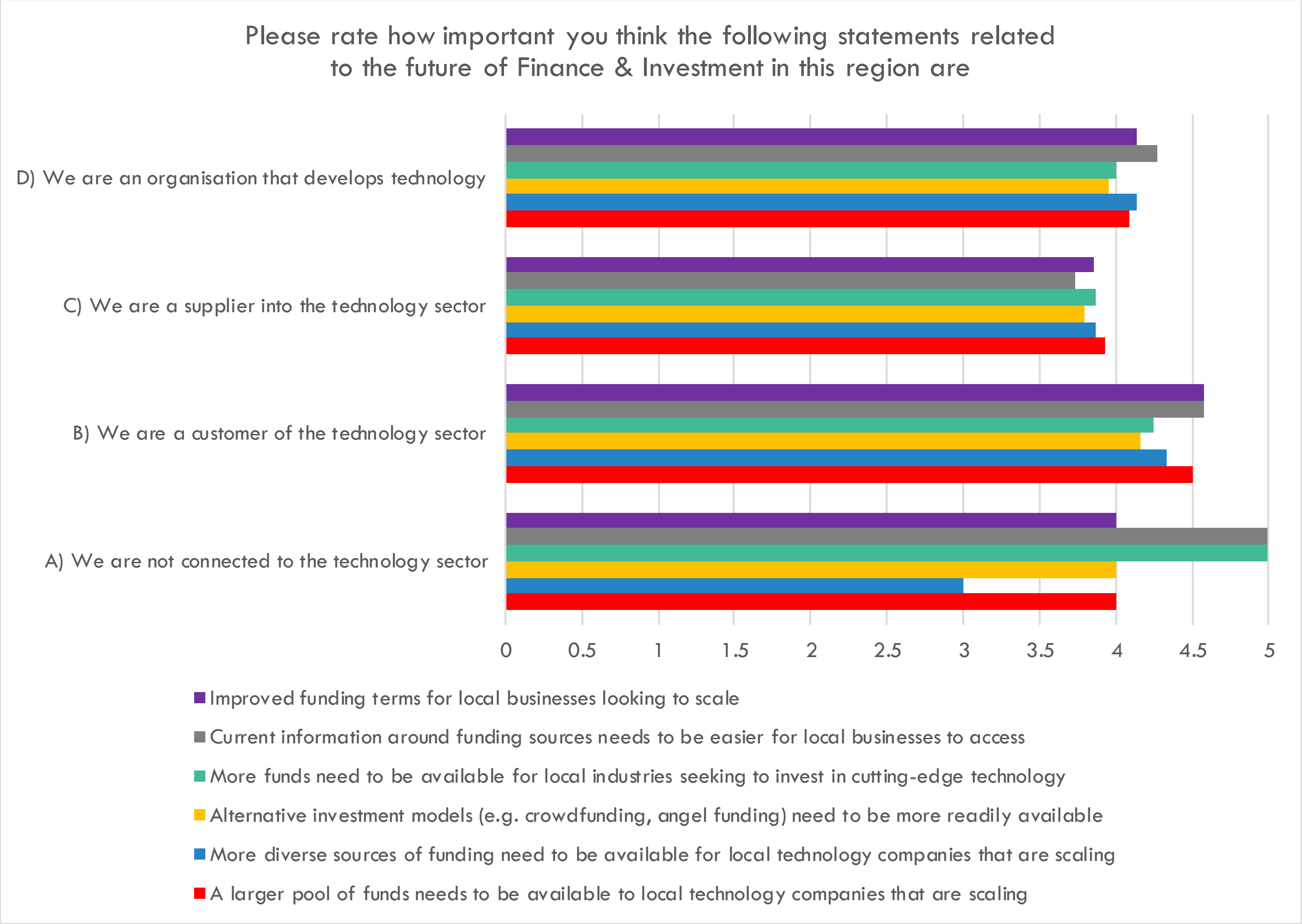
Moving to the answers on the perceived importance of topics related to finance and investment, once can see that the priorities at aggregate level are: **current information around funding sources needs to be easier local business to access** and **more funds need to be available for local industries seeking to invest in cutting edge technology**



When considering the disaggregated answers, at district level, one can see that, The Fenlands identify all these as top priorities, showing a very wide set of needs around finance and investment, while Huntingdonshire identifies the need for **Improved funding terms for local businesses looking to scale** as the key priority indicating the willingness to scale

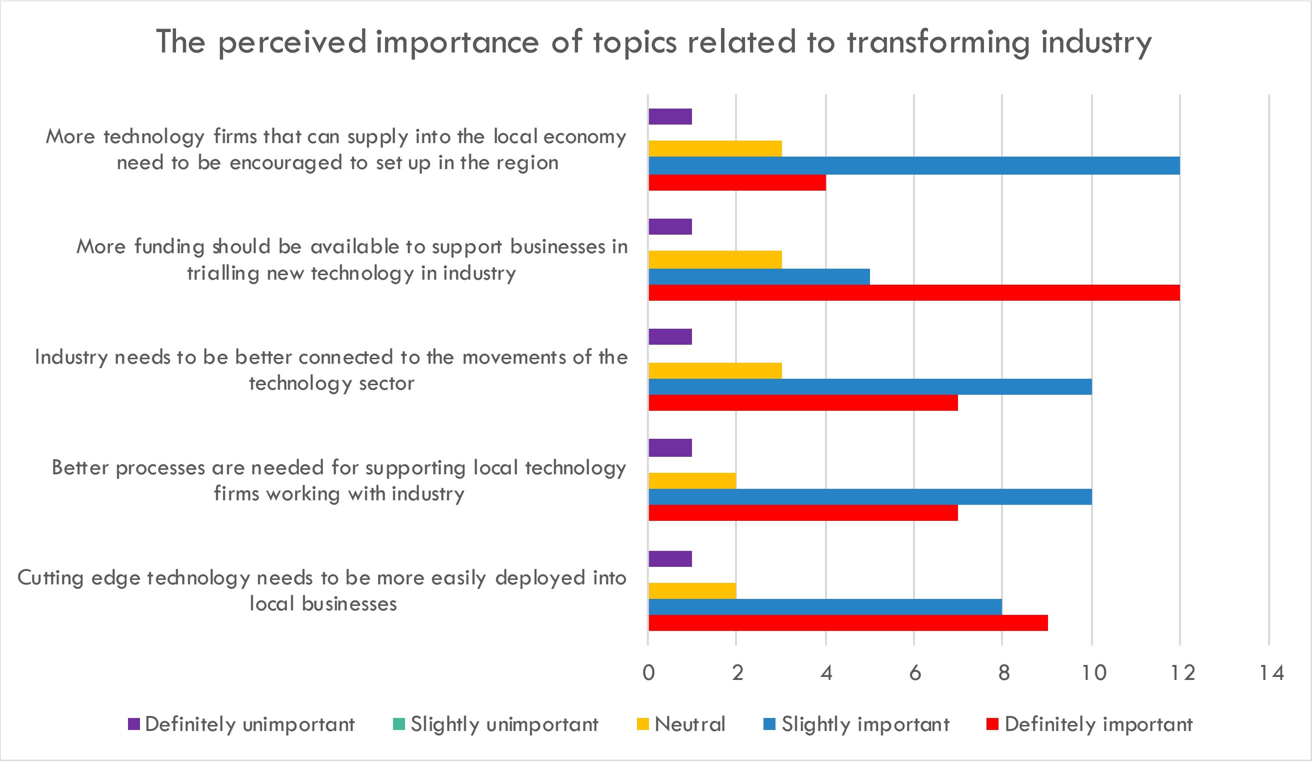


Again, focussing on the role in the supply chain, the respondents non connected to the technology sector indicated the higher priorities, a those on the **current information around funding sources needs to be easier local business to access** and **more funds need to be available for local industries seeking to invest in cutting edge technology.**



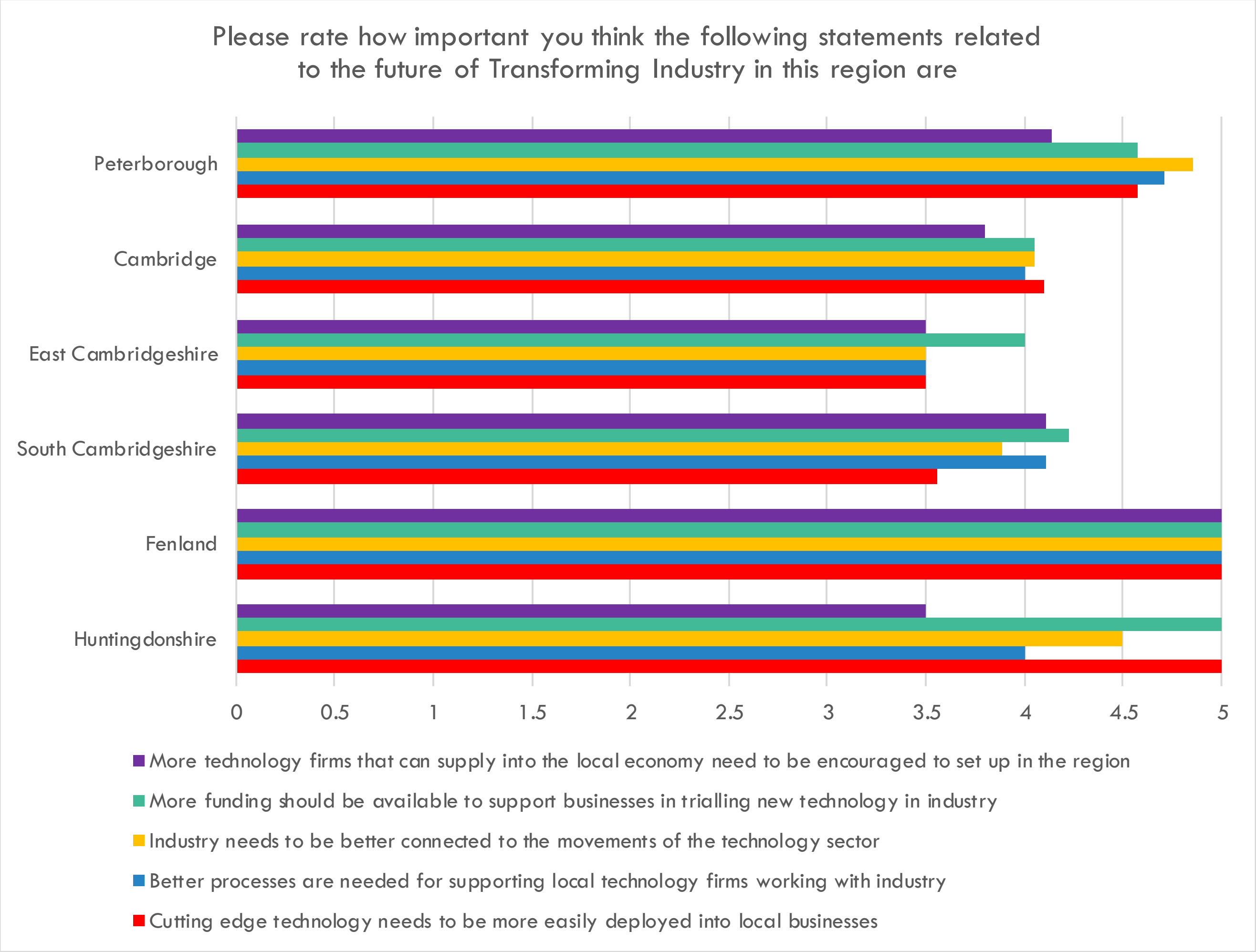
QUANTITATIVE INPUT ON APPLICATION IN INDUSTRY

Moving to the relevance importance of topics related to transforming industry, this question addressed a more active propositive stance, asking to look at the critical elements needed to transform the future. At aggregate leve, the key identified issue is **More funding should be available to support businesses in trialling new technology in industry,** followed by **More technology firms that can supply into the local economy need to be encouraged to set up in the region.**

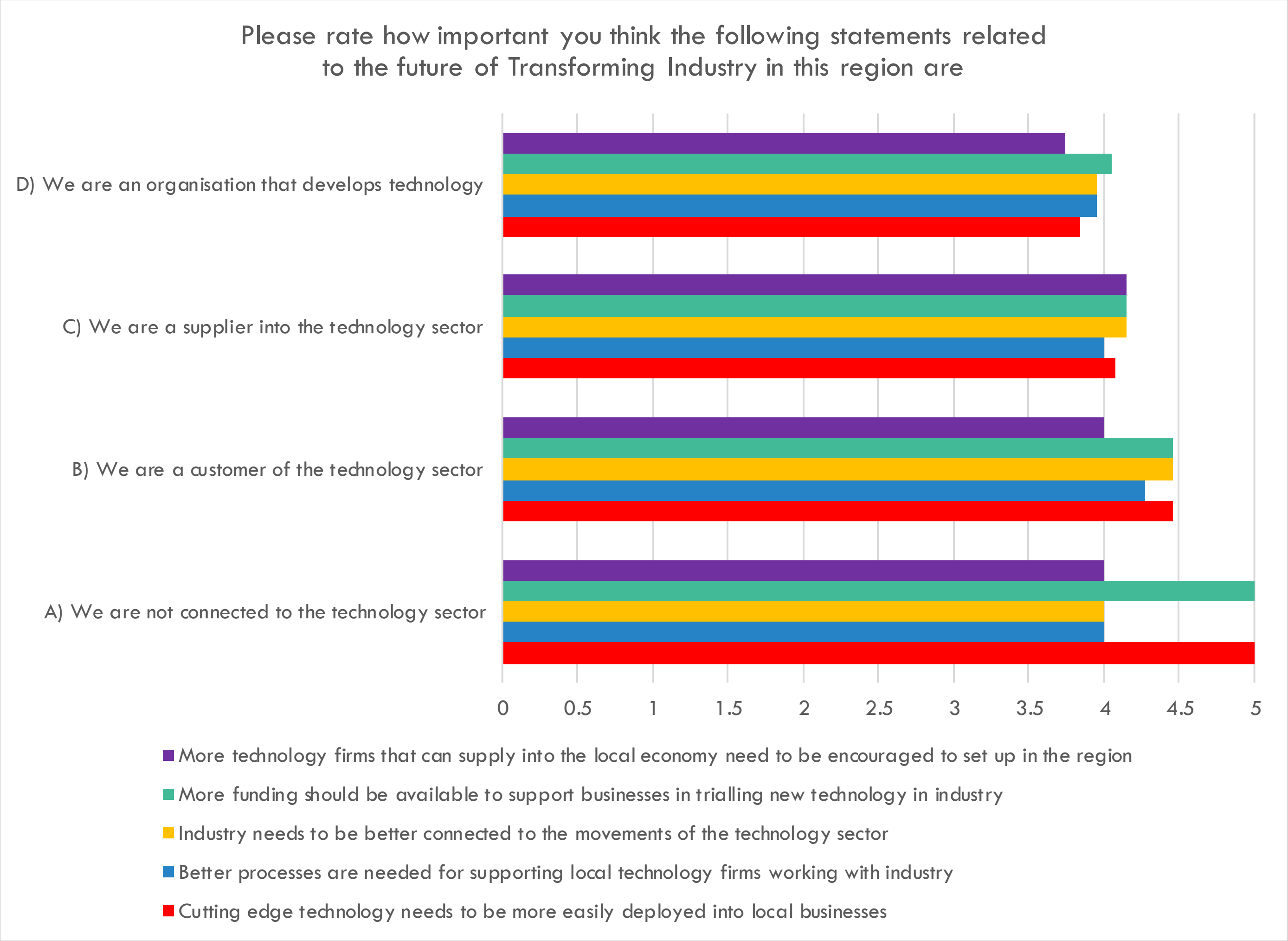


Shifting to focus on the district level, one can see that, again, the Fenlands considered all issues as being of critical importance as well as Peterborough and Hunts, though with slight less intensity. In detail, both

- **Industry needs to be better connected to the movements of the technology sector and**
- **Cutting edge technology needs to be more easily deployed into local businesses,** were of key relevance for the Fenlands Peterborough and Hunts as well as Cambridge
- **Better processes are needed for supporting local technology firms working with industry**, are critical for Fenlands Peterborough and Hunts, South Cambridgeshire as well as Cambridge
- **More funding should be available to support businesses in trialling new technology in industry** is, as expected, relevant for all areas, even though with some variation in intensity, while
- **More technology firms that can supply into the local economy need to be encouraged to set up in the region,** was relevant for Fenlands Peterborough and, South Cambridgeshire

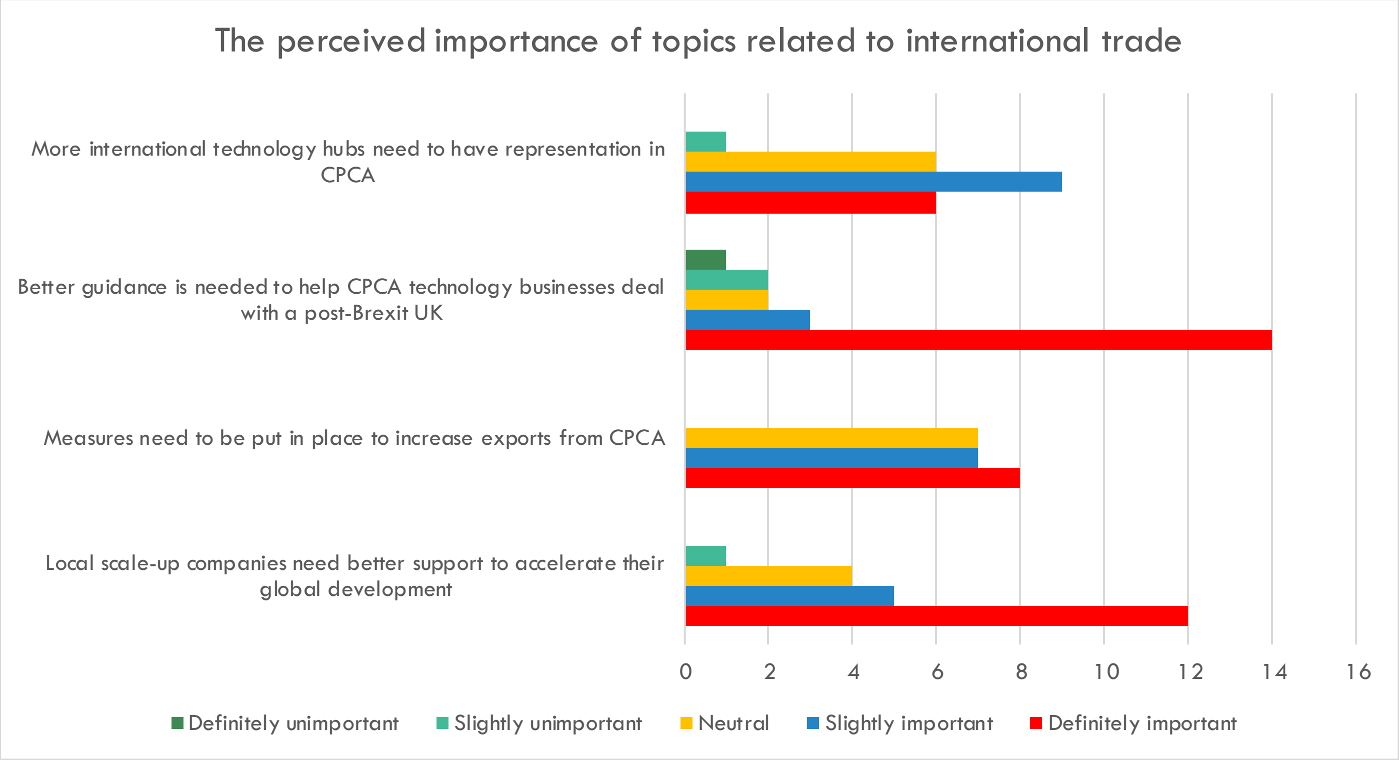


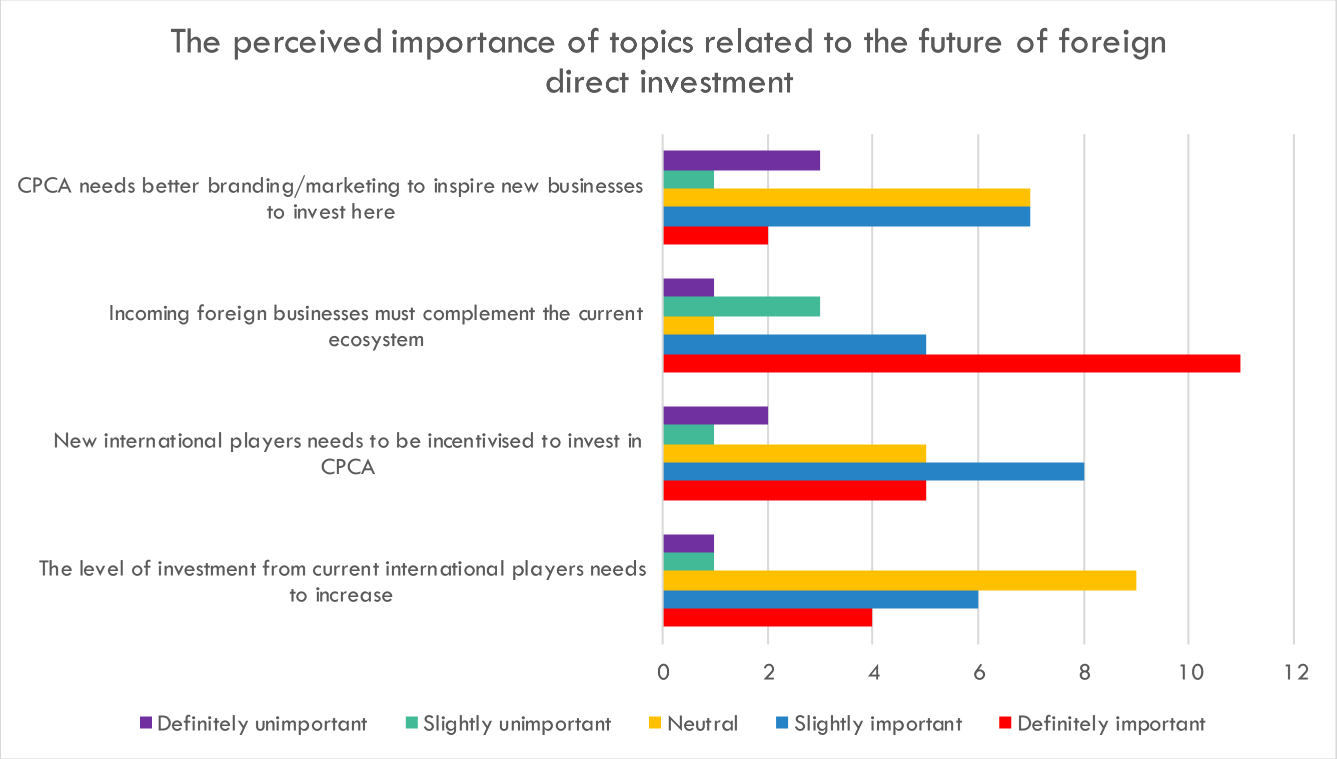
When focussing on the role in the supply chain, the respondents non connected to the technology sector indicated the higher priorities, are those prioritising the relevance of **More funding should be available to support businesses in trialling new technology in industry** and **Cutting edge technology needs to be more easily deployed into local businesses**



QUANTITATIVE INPUT ON INTERNATIONAL (TRADE AND FDI)

- Moving to the perceived importance of topics related to international trade and FDI the clear priority is **Better guidance is needed to help CPCA technology businesses deal with a post-Brexit UK,** followed by **Local scale-up companies need better support to accelerate their global development.** While concerning more specifically FDI the top identified priority was **Incoming foreign businesses must complement the current ecosystem**





Moving to the district analysis of these factors, the Fenlands and Huntingdonshire showed two key areas of concerns, East Cambridgeshire and Peterborough one.

In detail

- **Local scale-up companies need better support to accelerate their global development** is top priority and shared between Fenlands Huntingdonshire and East Cambridgeshire, next comes
- **Better guidance is needed to help CPCA technology businesses deal with a post-Brexit UK,** as a top priority in the Fenlands and Peterborough
- **Measures need to be put in place to increase exports from CPCA**, is of top importance for Huntingdonshire

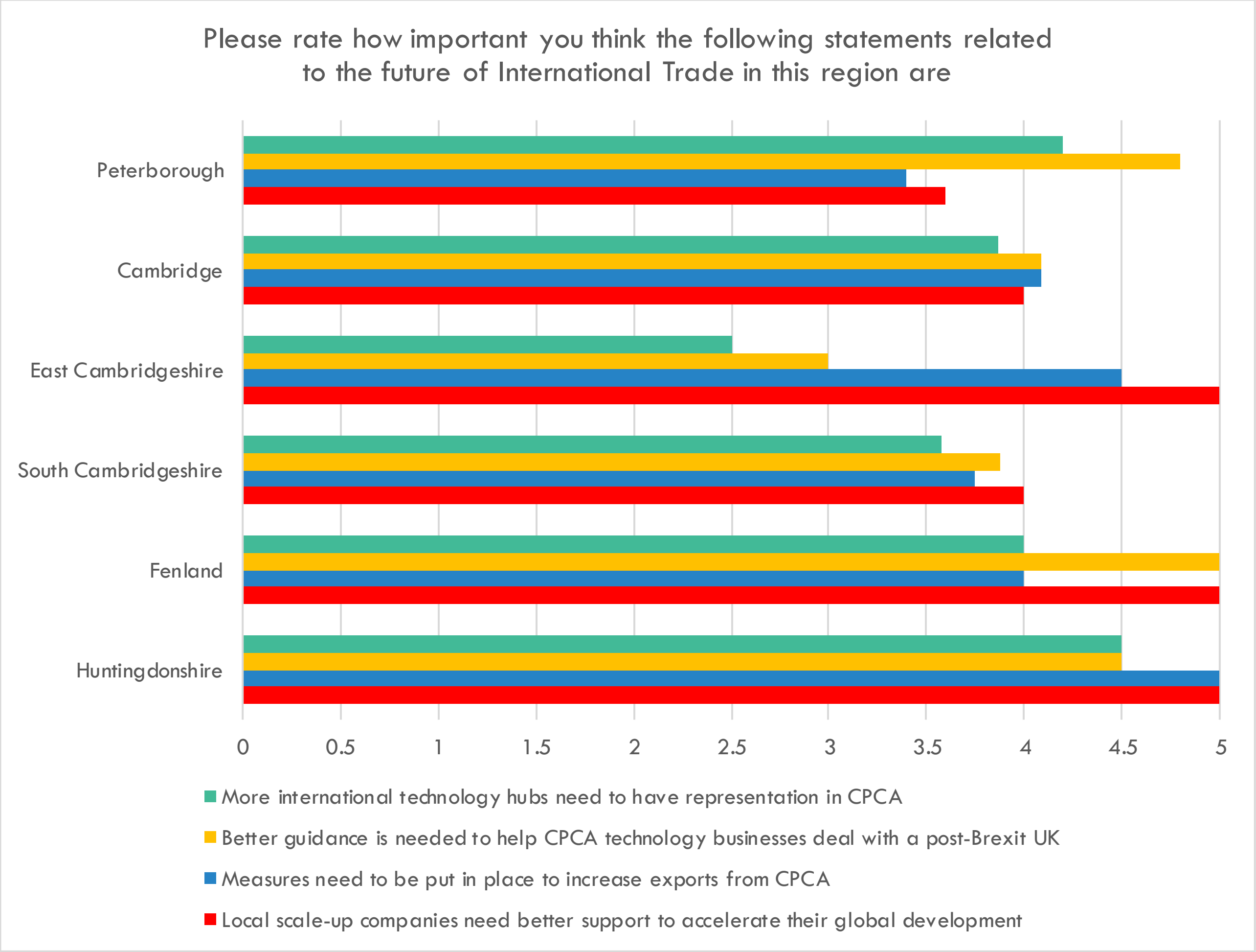
FDI presents three main areas of concern, perceived as highly relevant. In the Fenland, the key issue is that

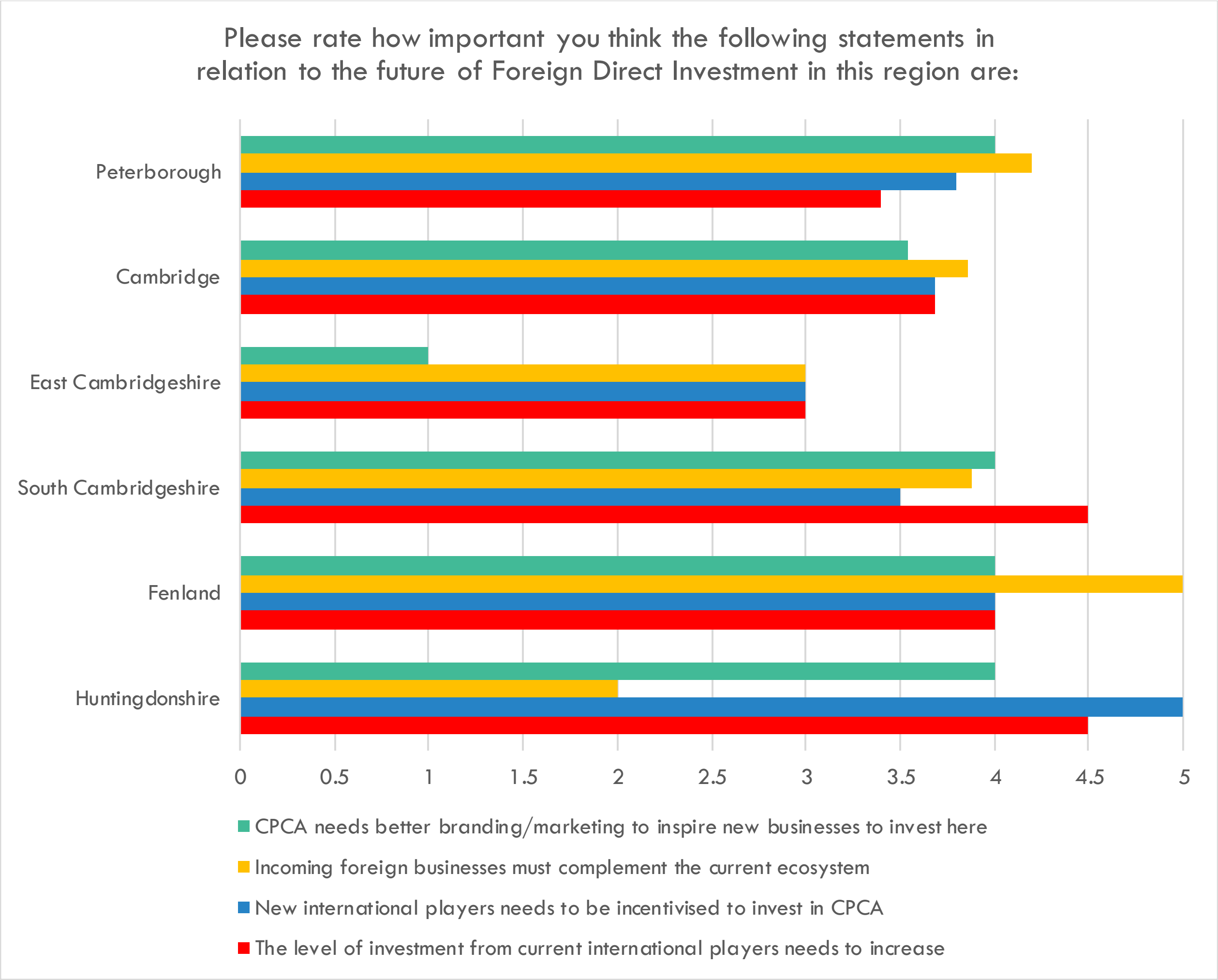
- **Incoming foreign businesses must complement the current ecosystem**

In Huntingdonshire is that

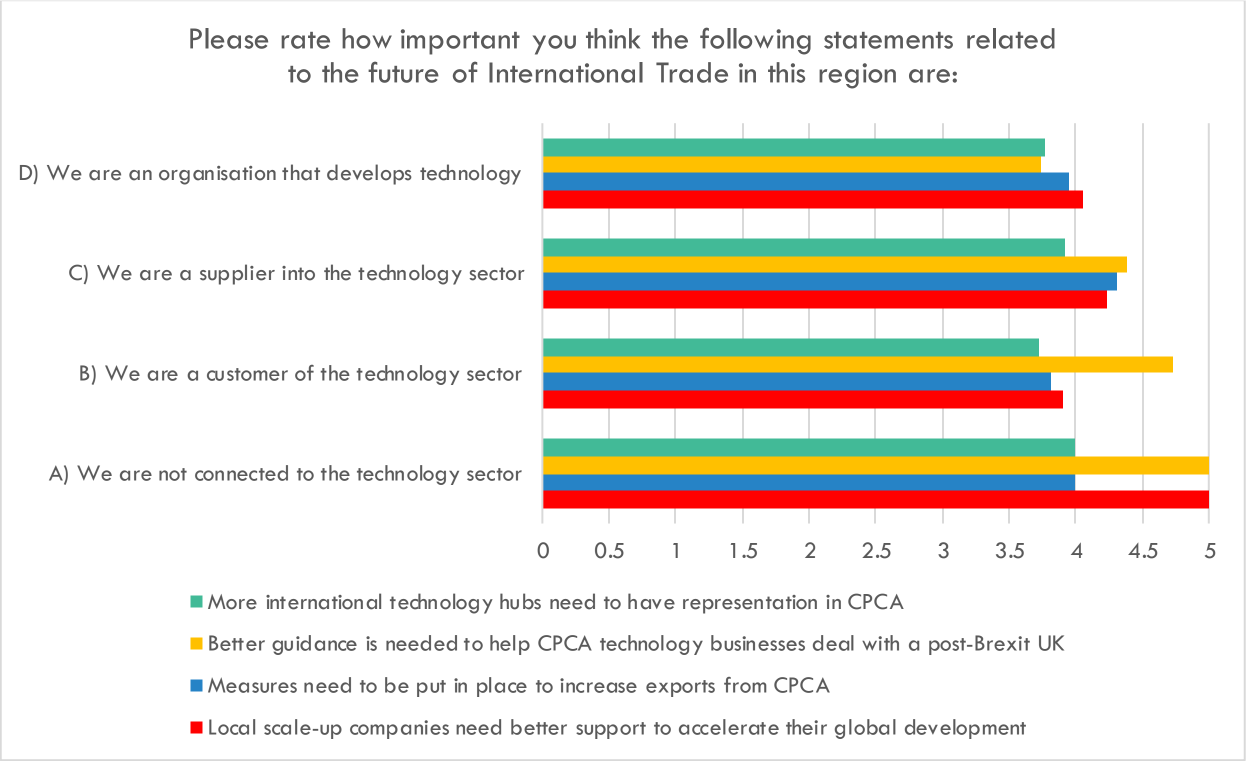
- **New international players need to be incentivised to invest in CPCA and**
- **The level of investment from current international players needs to increase**

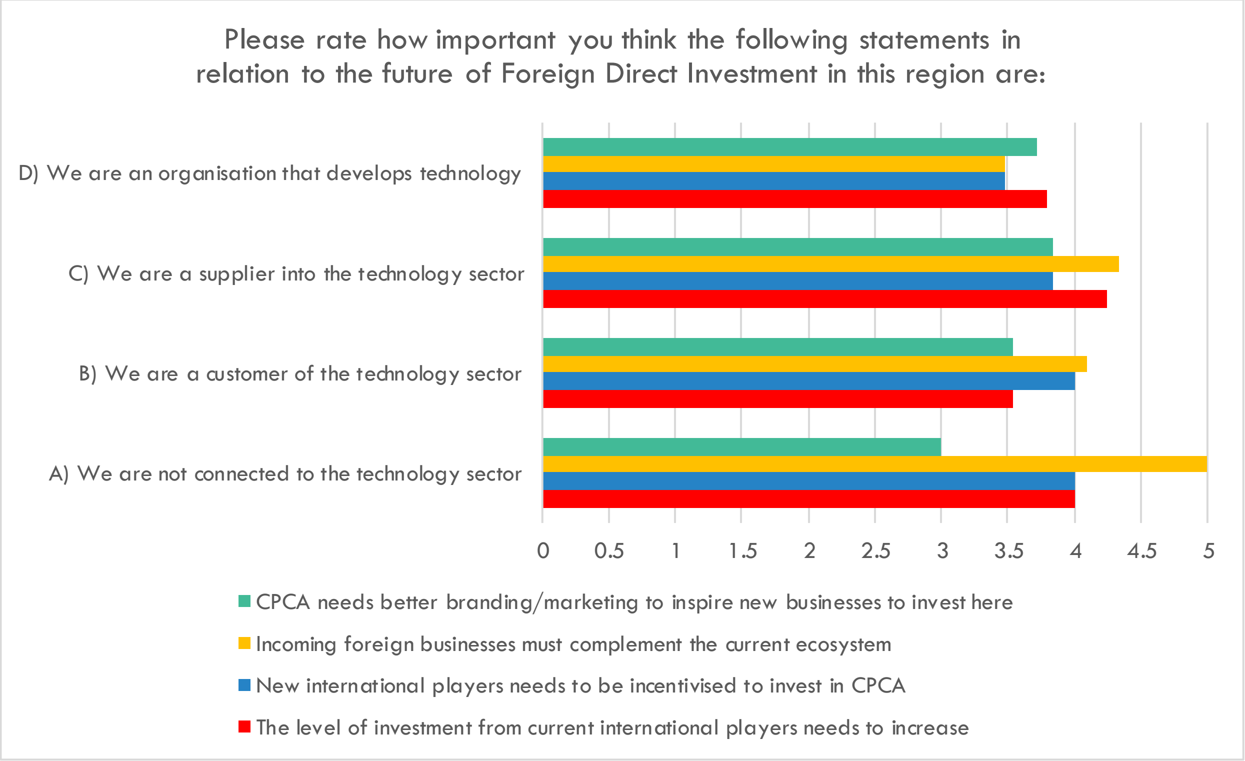
An issue, this last one also of key relevance for East Cambridgeshire.





Finally, the relevance of international issues according to the position in the supply chain sees again the respondents not connected to the technology sector see **Local scale-up companies need better support to accelerate their global development** and **Measures need to be put in place to increase exports from CPCA** as key priorities concerning the future of International Trade in this region and **incoming foreign business must complement the current ecosystem**, as the key priority concerning FDI



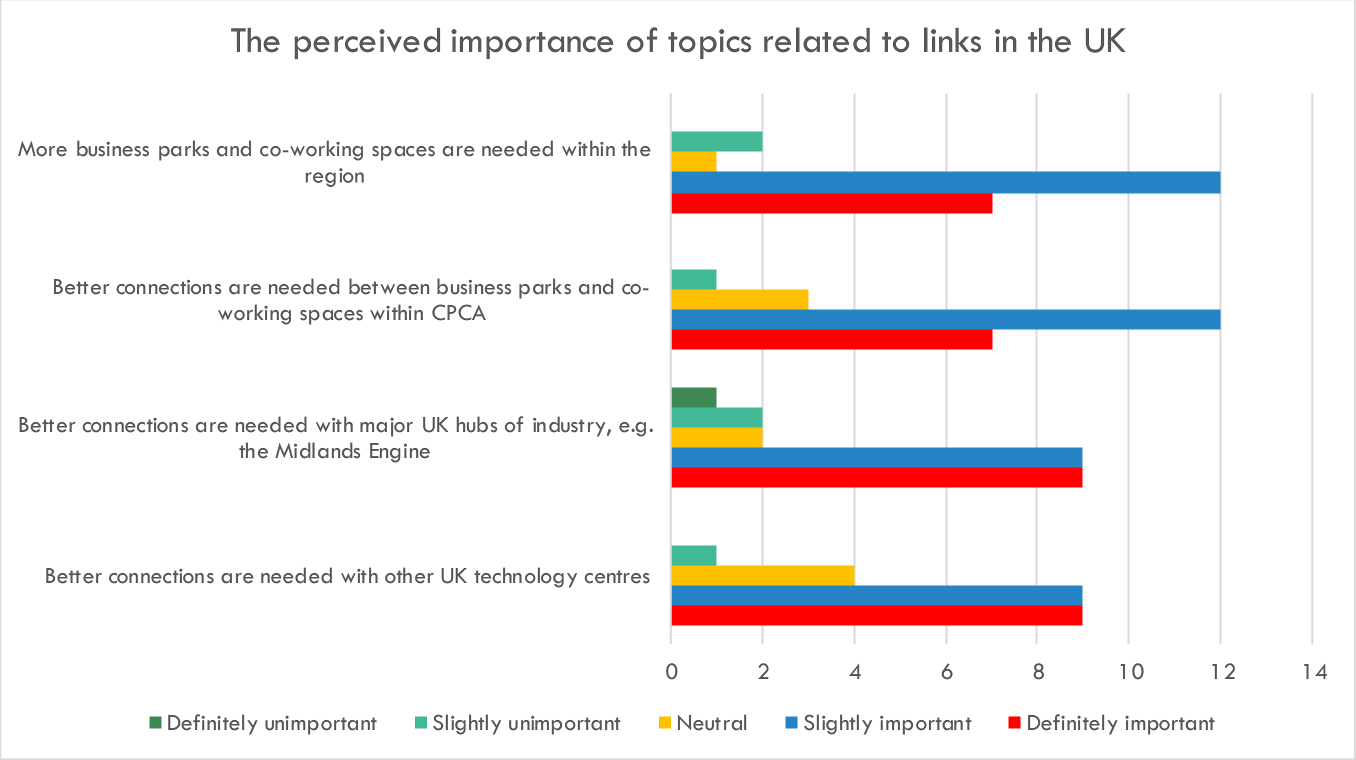


QUANTITATIVE INPUT ON KNOWLEDGE TRANSFER

The analysis concludes with the perceived importance of topics related to links in the UK. At aggregate level, one can see that **Better connections are needed with other UK**

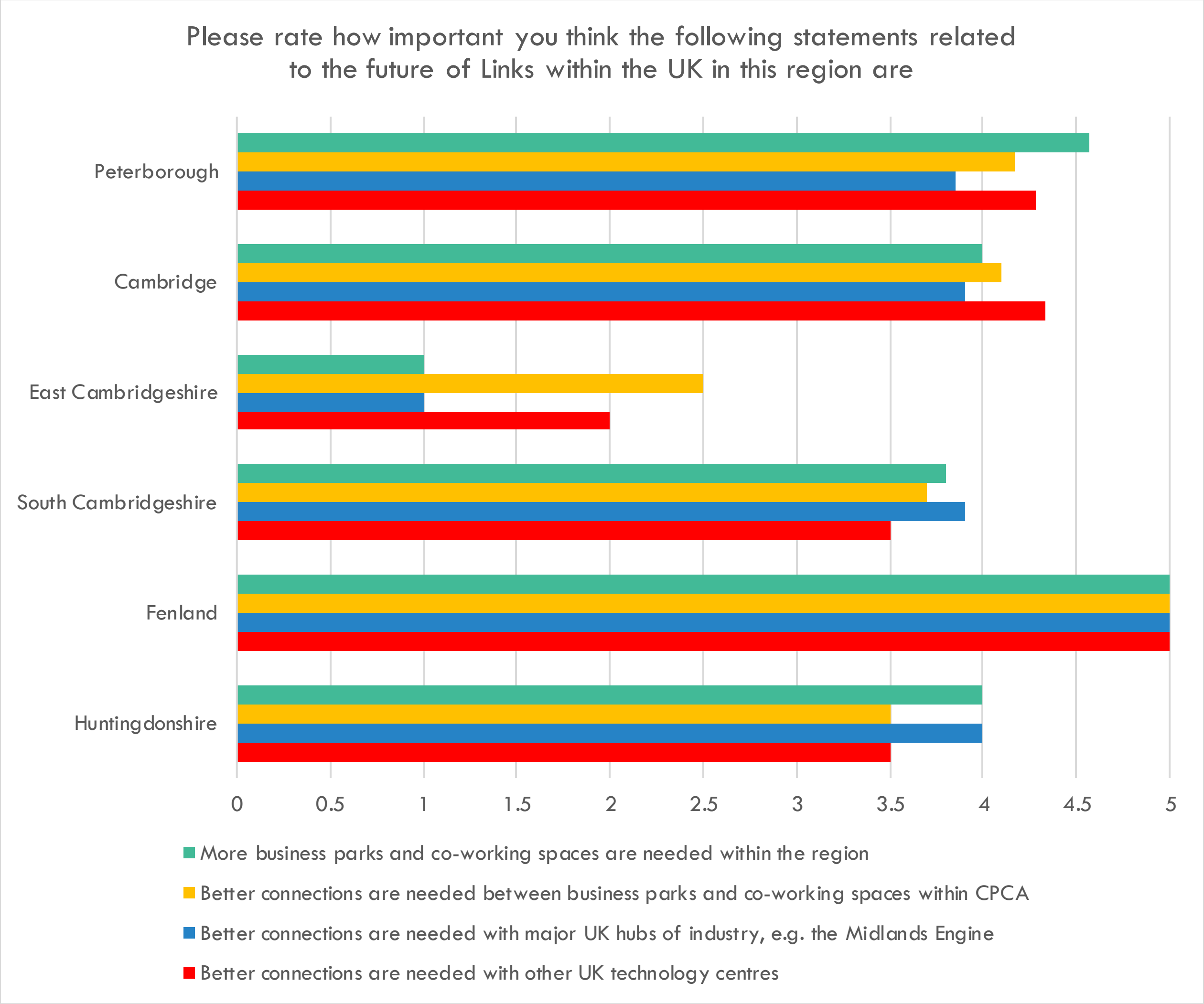
technology centres and **Better connections are needed with major UK Hubs of industry,** are perceived as definitively important by a majority of respondents

one can see that regarding the future of Knowledge Transfer in this region

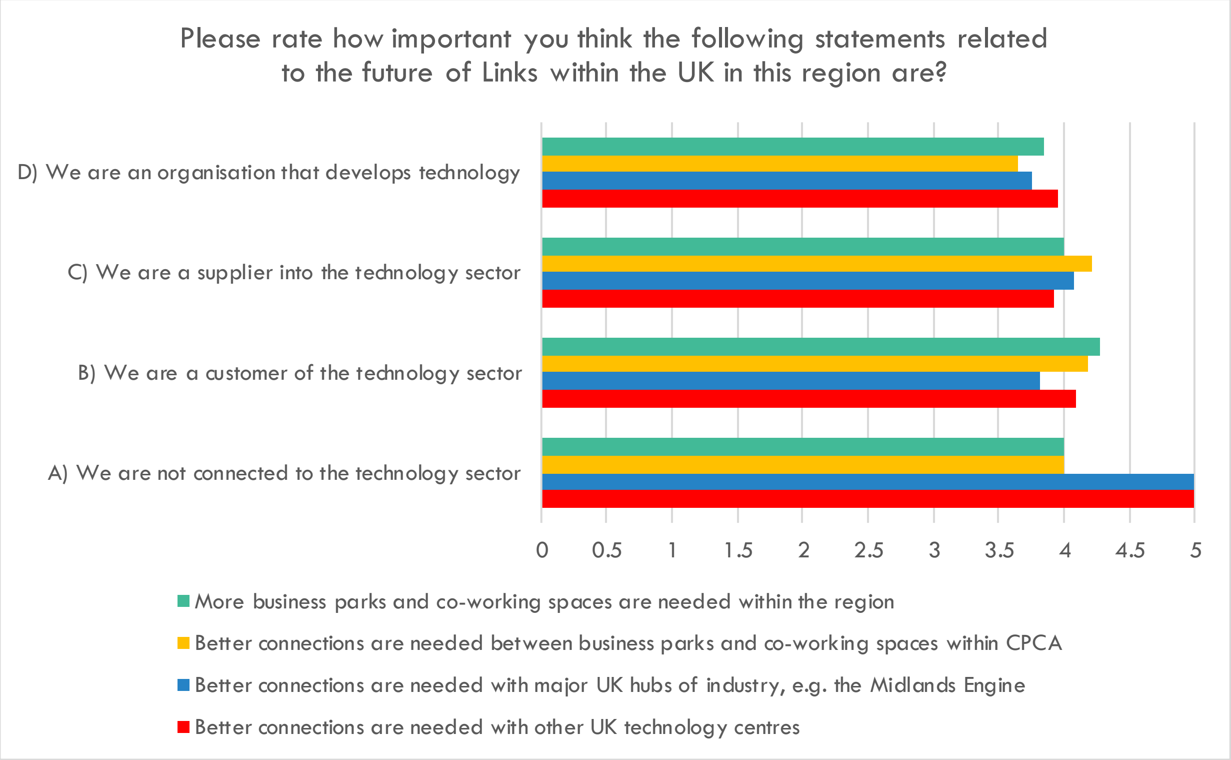


On a disaggregate level by district, the issue of Links within the UK is of particular relevance to the Fenlands, whose respondents selected all four issues as critically relevant, While Peterborough highlighted three areas and Cambridge two. In detail:

- **More business parks and co-working spaces are needed within the region,**
- **Better connections are needed between business parks and co-working spaces within CPCA**
- **Better connections are needed with other UK technology centres,** were all a key issues in the Fenlands in Cambridge and in Peterborough

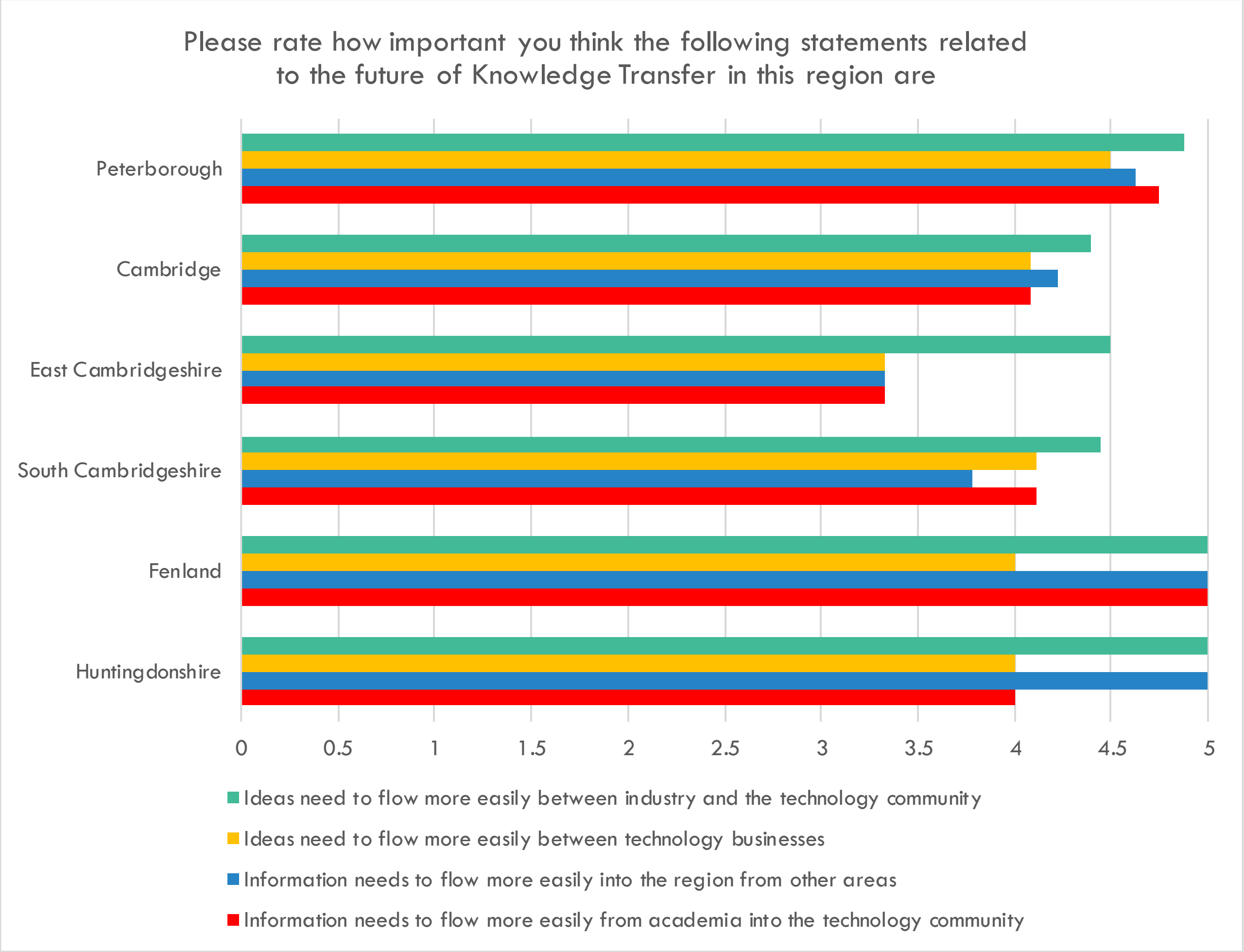


Concerning to the future of Links within the UK in this region, the respondents not connected to the technology sector identified again as top priorities **Better connections are needed with other UK technology centres** and **Better connections are needed with major UK Hubs of industry,**

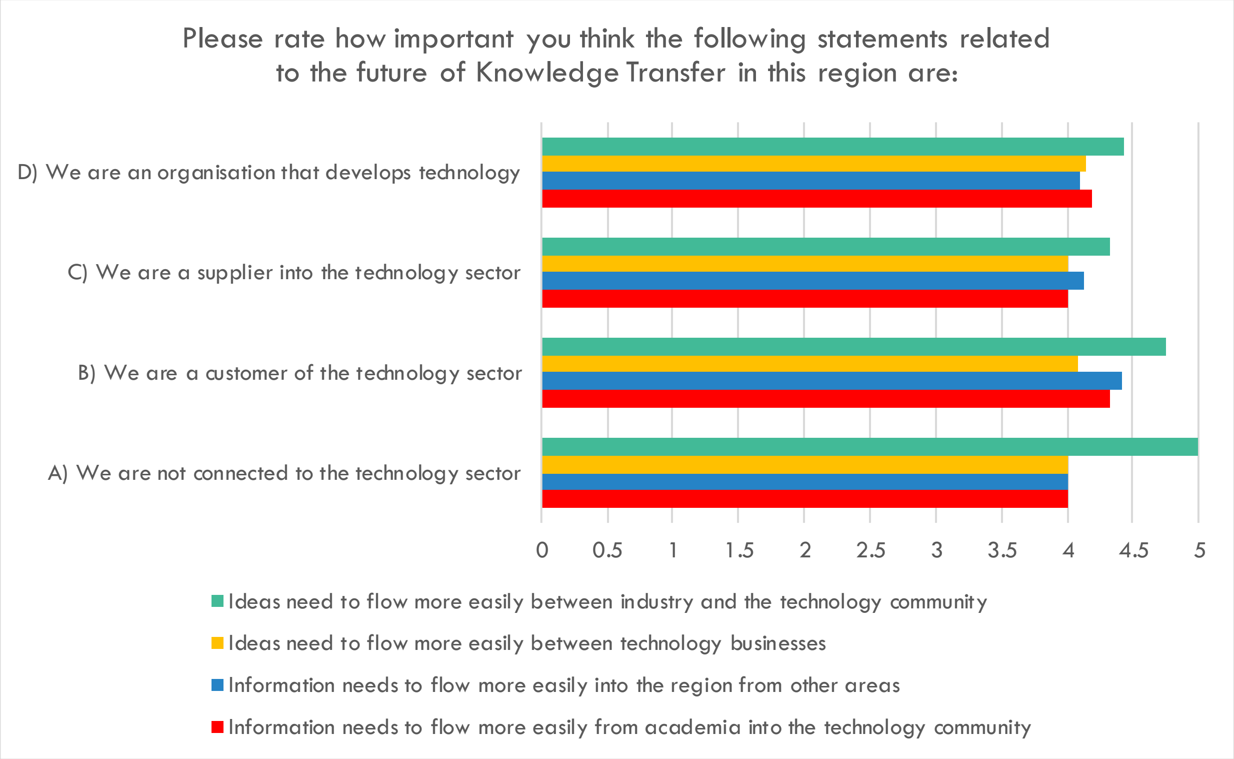


Moving to how important to the future of Knowledge Transfer in this region the following topics are, one can see that the Fenland have three key priorities

- Ideas need to flow more easily between industry and the technology community
- Information needs to flow more easily into the region from other areas, and
- Information needs to flow more easily from academia into the technology community
- Interestingly, two of these priorities are perceived are significantly important also in Huntingdonshire
- Ideas need to flow more easily between industry and the technology community
- Information needs to flow more easily into the region from other areas, and
- while also in Peterborough the perception that Ideas need to flow more easily between industry and the technology community, is highly important



While the role in the value chain identifies as key priority **Information needs to flow more easily from academia into the technology community** for the respondents not connected to the technology sector



---End of Annex 2---