The Magic Roundabout:
Exploring a young digital cluster in Inner East London

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Abstract [to complete]

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1/ Introduction

Since the late 1990s, a vibrant high-tech scene has been developing in Inner East London. Neighbourhoods around Clerkenwell and Shoreditch form the core, with the Old Street roundabout – 'Silicon Roundabout' – at its heart. In recent years substantial public and policy attention has been focused on the area. The Coalition Government is leading a high-profile drive to accelerate development – the 'Tech City' initiative. Drawing on Silicon Valley imagery, David Cameron has set out an ambitious agenda to develop 'one of the world's great technology centres' (Cameron, 2010). George Osborne has hailed Tech City as key to the Government's industrial policy (Osborne, 2012), locating the initiative within the Coalition's emerging interest in 'industrial strategy' (Department for Business Innovation and Skills, 2012, Cable, 2012).

The Government has been keen to help the cluster grow, with more than one Minister expressing the predictable desire to 'build the UK's Silicon Valley' (Nathan, 2011); at the same time strategy has sought to leverage the image of the area to attract large-scale foreign investment into East London. Related to this, Ministers are also keen to harness the Shoreditch scene to the economic legacy of the 2012 Olympic Games, and specifically to the iCity initiative in the Olympic Park, which aims to develop a further technology cluster on the site of the Games' Media and Broadcast Centre (Osborne and Schmidt, 2012). The London Mayor and East London boroughs have also been keen to make their mark on 'Tech City', and so there has developed a raft of national and London-level policies covering finance, workspace, connectivity, business development, immigration and public-private competitions and research

collaborations as well as a new agency, the Tech City Investment Organisation (TCIO) to lead the cluster's development. [1]

The area also matters to researchers as well as to politicians. We pick out three reasons for this. First, the East London 'system' has developed in an organic fashion, with apparently minimal direct policy intervention. In this it is the opposite of the top-down 'official' clusters developed in some other countries, notably France, Russia and Malaysia. Second, unlike some other well-known high-tech clusters (such as Silicon Valley and Silicon Wadi) its industrial roots are in the digital and creative economy, rather than hardware and military-funded research (Saxenian, 1994, Bresnahan and Gambardella, 2004a).

Third, and perhaps most attractive to the research community, very little is known about the East London system, even down to the count of firms in the area: 'official' estimates vary from 410 to over 1100 businesses (see section 4). These knowledge gaps also include the extent and nature of interactions between firms in the area; between these firms and other actors; and the likely impacts of the Tech City initiative. In turn, this raises serious questions about the current strategy and policy mix (Nathan, 2011). Given that active cluster development policies seem to have been largely unsuccessful (Duranton, 2011), it is important for UK policymakers to get this mix right.

These UK-centric concerns also have echoes in larger, on-going academic and practical debates about the desirable scope and shape of industrial policy (Rodrik,

[1] http://techcity.io/, accessed 24 June 2013.
[2] Manual checking by the Secure Data Service using firm names and postcodes from the Tech City Map to the BSD confirms that this is the case for technology companies in East London.
[3] www.techcitymap.com, accessed 24 June 2013.

2004). Shifting patterns of globalisation, the current economic crisis in many Northern states, and environmental challenges have all led to a resurgence of interest in active industrial management, especially in high-value sectors such as the digital economy (Aiginger, 2007, Harrison, 2011, Foray et al., 2012, Aghion et al., 2013). Notably, policymakers in the US (Regional Innovation Clusters) and in the EU (Smart Specialisation) have both endorsed cluster strategies as part of the industrial policy armoury (McCann and Ortega-Arguilés, 2011, Yu and Jackson, 2011).

This paper performs a detailed quantitative and qualitative analysis of the Inner East London digital ecosystem, and assesses its future prospects. We ask: 1) how large is the Inner East London 'hotspot' and does it function as a cluster? 2) What are the opportunities and challenges facing local firms? 3) What are the likely impacts of the Tech City initiative?

Building on work commissioned by the Centre for London, the paper is one of very few robust studies to do explore these issues in detail. There is an existing discursive policy literature on the area (BOP et al., 2011, McKinsey, 2011) but we know of only two pieces of primary research: Vandore (2011) surveys companies on the seminal 'Silicon Roundabout' list compiled by Wired magazine in 2007, while Foord (2013) combines recent small area mapping with a firm-level survey. In contrast, we use rich, enterprise-level microdata from the UK's Business Structure Database to track the long-term growth of the cluster from 1997-2010, and conduct over 30 detailed semi-structured interviews. We also explore early impacts of the Tech City initiative on firms in the cluster, and speculate about likely longer-term policy effects.

The paper is organised as follows. Section 2 sets out key definitions and concepts, and reviews relevant empirics. Section 3 outlines our methodology and data sources. Sections 4 and 5 present results from the quantitative and qualitative empirical strands, respectively. Section six concludes.

2/ Framework and evidence review

The Inner East London system is centered on the 'digital economy'. This is not straightforward to define, as it refers to both a set of industries, a set of outputs (products and services), and a set of inputs, production and distribution platforms used at varying intensities across the economy as a whole (Department for Business Innovation and Skills et al., 2010). For this paper we follow the UK government's sectoral definition of the digital economy, which comprises a group of 'Information and Communications Technology' industries (hence ICT) and a group of 'Digital Content' industries defined according to SIC5 industry codes (Department for Business Innovation and Skills and Department for Culture Media and Sport, 2009).

SIC codes aggregate a good deal of detailed information, which it is worth disaggregating a little. The ICT component is defined in terms of outputs, encompassing systems (such as broadband networks), hardware (such as computers), software, and related services (such as sales, installation and maintenance). Digital content encompasses both outputs (such as films, music and publishing), digital inputs 'embedded' in the production of physical objects (such as CAD in architectural

services), and the distribution of digital content using physical or electronic platforms (such as in radio, TV and cinemas) (Centre for International Economics, 2005).

This means that the delineating a set of content industries is not straightforward, as businesses in many industries (such as advertising) are increasingly integrating content production and distribution, and operating across a range of online / offline platforms (Cities Institute, 2011). Equally, new techniques such as 'big data' analytics are starting to spread across the economy as a whole (Bakhshi et al., 2012). Given these complexities, the UK definition of the digital economy is inevitably approximate; it is also is at the restrictive end, not currently including (for instance) online retail or financial services, and restricting the 'embedded' and 'distribution' to those industries intensively using digital platforms, or pushing largely digital content.

2.2 / Cities and the digital economy

As with other parts of the knowledge economy, many digital economy industries exhibit high levels of spatial clustering (Moretti, 2012). Urban economics and the New Economic Geography highlight productivity-enhancing functions of cities, particularly for high-value sectors (Marshall, 1918, Fujita et al., 1999, Glaeser, 2011). Cities offer agglomeration economies to firms via thick labour markets, shared infrastructure, dense networks of suppliers and customers, and via local knowledge spillovers. These help firms in cities – and in urban clusters – become more productive as the city or cluster grows; conversely, the costs of urban/cluster location will also rise as firms compete for limited resources (Combes et al., 2005). Similarly, agglomeration economies in a given urban area will attract a large number of firms to

that area. New entrants may enhance knowledge spillovers, increase levels of competition or both (Markusen and Venables, 1999). If competition forces the least productive out of the market, this also has the effect of raising aggregate productivity (Melitz, 2003).

The digital economy is characterised by high levels of innovation, low entry barriers, and thus by large numbers of small, young firms. A growing set of literatures explores how urban areas enable innovative and entrepreneurial activities. By facilitating the flow of ideas, big, economically diverse urban cores act as 'nurseries' for start-ups and SMEs (Jacobs, 1969, Duranton and Puga, 2001). Innovation systems analysis emphasises how networks of interdependent public and private actors shape innovative activity (Freeman, 1987, Cooke et al., 1997, Breschi and Lissoni, 2009). At local level, for example, activist universities may play roles in generating innovations and helping cluster growth (Hausman, 2012).

A number of studies also emphasise the role of historical factors, and highlight how given clusters develop from earlier 'versions' of themselves. Duranton (2007) argues that the location of an urban industry is partly determined by the location of past breakthrough inventions, with firms relocating to the urban areas where these occur: these shifts will amplify the both positive and negative agglomeration channels discussed earlier. A number of evolutionary economic geography studies explore these trajectories in more detail, with a focus on identifying different modes of technological 'branching' (Boschma and Frenken, 2011).

Entrepreneurs are carriers of new ideas (Schumpeter, 1962) and the urban entrepreneurship literature identifies many of the same channels as innovation studies, in particular the affordances of large, diverse urban environments for start-ups and SMEs, and the role of spin-outs from larger to smaller firms which will tend to be higher in bigger urban economies. In their recent review, Chatterji, Glaeser and Kerr (2013) also highlight the strong links between initial levels of entrepreneurial activity in an area and that area's subsequent growth; both case studies and econometric work show the long-term importance of local cultures of entrepreneurship (Saxenian, 1994, Glaeser et al., 2012).

Real world urban areas exhibit a number of different 'cluster shapes' (Kerr and Kominers, 2012) and industry-specific factors will help to govern these. For example, while ICT manufacturing can operate at very large scale and may not be particularly location-sensitive, many digital content industries have a notable tendency towards 'micro-clustering' at very local scales, with densely linked networks of firms and supporting actors (Hutton, 2008, Storper and Scott, 2009, Chapain et al., 2010). Core production activities are labour-intensive, with an emphasis on complex information that requires face-to-face communication. The presence of lots of small firms and freelancers means that informal networks, social knowledge and the use of 'soft infrastructure' such as bars and cafes are important in sourcing collaborators and opportunities (Currid, 2007). As a result, knowledge spillovers appear very localised, decaying within a few blocks (Arzaghi and Henderson, 2008).

This organising logic may apply to other actors on the production side – auxiliary services such as lawyers and accountants – but not necessarily to customers. Low-

cost digital sourcing, storage, communication, marketing and sales platforms are beginning to allow even SMEs and micro-businesses to operate over large distances: so-called 'micro-multinationals'(Keeble et al., 1998, Varian, 2005).These technological shifts may also be acting to uproot activities in the production circuit from specific local environments, with firms adopting a mix of 'global' and 'local' organisational modes.

2.3 / Area policies for the digital economy

In theory, clustering should occur organically, as firms should gradually sort into their optimal locations (Glaeser, 2008). In practice, spatial equilibrium may not occur because of poor decisions, imperfect information or other constraints. Given the evident externalities from clustering, this creates an in-principle case for policy intervention (Harrison and Rodríguez-Clare, 2009, Chatterji et al., 2013, Nathan and Overman, Forthcoming). In practice, most area-based industrial policies are cluster policies (Porter, 1990, Porter, 2000). Borrowing from the UE and NEG frameworks described above, cluster models emphasise physical location as a container for interacting firms, their upstream / downstream markets, and supporting industries; cluster policies seek to bring together public and private actors to map and promote the cluster, replacing traditional sectoral interventions with an area-level approach. In a related approach derived from innovation systems perspectives, the 'Triple Helix' approach focuses on interactions and networks between the private sector, local/regional government and universities' 'third mission' activities (Leydesdorff and Etzkowitz, 1998).

Cluster frameworks have been widely criticised on conceptual grounds – as too loosely defined to be useful, ignoring negative effects of agglomeration and entry, and glossing over detailed channels (Martin and Sunley, 2003, Duranton, 2011). Notably, Duranton (ibid) argues that clusters should be seen as the outcome of individual actors' actions, not their determinants. Empirical analysis also tends to find little impact of cluster policies on area-level outcomes (Van der Linde, 2003, Mason and Nathan, 2013). The empirical literature gives no strong sense of what more effective policies might involve, although a recent international study highlight the importance interventions to encourage entrepreneurial activity, and developing individual firms' managerial and absorptive capacities (Bresnahan and Gambardella, 2004b). Similarly, Nathan and Overman (Forthcoming) argue for more spatially-sensitive horizontal programmes, combined with policies to promote urban-level agglomeration. Within this strategic approach, questions remain about the appropriate roles of FDI, export promotion, public procurement policies, and U-I linkages (Javorcik, 2004, Uyarra and Flanagan, 2009, Lawton Smith and Bagchi-Sen, 2011, Aghion et al., 2012).

3/ Methodology and data sources

The discussion so far generates a number of 'issue clusters' that we explore further in the primary research. The first is about digital firms' initial location decisions, and how within-firm actors assess the potential pros and cons of a given area. We will want to look for common salient factors (such as market access, price, amenities) as well as historical factors (such as the existing presence of similar firms, and the area's evolving industry mix). Second, and related to this, we will want to explore digital

firms' tools for production, distribution and sales, and in particular whether 'global' and 'local' modes of organisation are complements or substitutes. The third set of issues relates to firm-firm interactions, and emergent area properties. We will need to explore if and how physical proximity fosters production-side sharing and learning between actors; if and how these vary within different parts of the digital economy; and how (in)formal networks develop. We will also want to look at the existence (or not) of previous cultures of entrepreneurship, and how these do (or do not) shape current actors' behaviour. Similarly, we will want to explore how as the cluster grows it generates potential downsides, such as higher levels of firm entry, and greater competition for resources (such as property and skilled workers).

Fourth, we will need to trace out how a policy shock – here, the Tech City initiative – might affect the area. The literature suggests that policymakers have limited abilities to shift an area's trajectory through deliberate action, and we will need to look for unintended consequences of such interventions. The shock might thus play out through a combination of channels: 1) area reputation effects; firm entry leading to 2) knowledge spillovers and/or 3) increased competition; and 4) property market effects, in particular accelerating costs. These effects may be moderated by subsequent policy responses, which in turn influence location decisions by future generations of firms.

3.1 / Data sources

Our empirical strategy has two strands. First, we conduct detailed microdata analysis from 1997-2010, using the Business Structure Database (BSD) and associated aggregates (notably the Business Register and Employment Survey, or BRES). This

allows us to get a detailed fix on the aggregate size of the cluster and its long-term evolution, as well as patterns of co-location within-area and within-industry.

The BSD is a large administrative micro dataset that provides close to a universe of UK firms in a series of cross-sections from 1997 onwards (Office of National Statistics, 2012). We aggregate the data to industry level and look at the set of BIS-DCMS digital economy SIC codes, allowing us to create a continuous series of ward-level firm and employment counts over a substantially longer period than previous studies. The disadvantage of the BSD is that it excludes firms below the UK VAT threshold or those without employees on the PAYE system. As such, it structurally excludes digital economy firms.[2] While employment estimates will be minimally affected, firm tallies may be substantial undercounts.

Our second empirical strand is qualitative, and involved semi-structured interviews with randomly sampled local firms and a snowballed set of stakeholders. This allows us to get a 'street-level' sense of the cluster, firms' location decisions and ways of working, and to get an early sense of Tech City impacts. We used the Tech City Map, the largest business directory for the area, to create the firms sample.[3] The Map is constructed from separate lists of software/tech start-ups and digital content firms, plus a number of firms who have signed up online. We drew a sample of 100 firms, stratifying on these groups.[4] Within the sample we identified five firms from Wired Magazine's list of 'Silicon Roundabout' firms (Wired UK, 2010). These are likely to be older, more established and successful businesses. Contacting the sampled firms

[2] Manual checking by the Secure Data Service using firm names and postcodes from the Tech City Map to the BSD confirms that this is the case for technology companies in East London.
[3] www.techcitymap.com, accessed 24 June 2013.
[4] Random sampling without replacement, n = 1050 firms.

via phone and email yielded 36 face to face interviews in 34 companies, all with founders / senior managers. We also assembled a control group of technology firms from outside the area, using the DueDil/Tech Hub London-wide list of 'real tech start-ups' (DueDil and TechHub, 2011), and conducted three semi-structured interviews by phone. Finally, a series of face-to-face stakeholder interviews were conducted across the public and private sectors.[5]

4/ Findings: quantitative analysis

4.1 / Mapping

The boundaries of the Inner East London 'system' are fluid, but it is possible to identify some foundational geographies. By common consent the core is the Old Street roundabout; from here the system runs north and northeast into Hoxton and Haggerston, south to the City, west into Farringdon, and east towards Bethnal Green and South Hackney. The first attempt at mapping the system was Matt Biddulph's speculative, jokey 'Silicon Roundabout', covering 15 firms around the junction (Bradshaw, 2008). In early 2010 Wired magazine expanded this to 42 companies (Wired UK, 2010). Most recently, and following the area's official branding as 'Tech City', the Tech City Map provides a live mapping of over 1,000 digital economy firms.

[5] Interviews were anonymised and transcribed. Manual text coding was done using Dedoose.

Taken together, these mappings imply exponential business growth between 2008 and the present day. None of these surveys is designed to be comprehensive, however, and existing estimates of cluster size vary wildly (see Table 1).

Table 1 about here

Our analysis re-maps the cluster using richer, time-consistent industry and firm-level data. We first create a rough mapping using BRES to identify digital economy employment density across central London (Figure 1). This highlights a series of contiguous hotspots across inner London, with Inner East London at the eastern end of the corridor, spanning the boroughs of Islington, Hackney, the City and Tower Hamlets.

Figure 1 about here

Within the area we identify three 'core wards' – Clerkenwell, Hoxton and Haggerston – and nine 'wider wards' – the three core wards, plus Bunhill, Cripplegate, Portsoken, Spitalfields, St Peter's and Whitechapel.

The mapping shows both the spatial continuity with other well-known creative economy hotspots in London, and the temporal continuity with previous 'versions' of the area, notably its past official incarnation as the 'City Fringe' (Hutton, 2008). Echoing Foord (2013) we also find suggestive evidence of 'micro-clustering', with ICT and digital content industries have subtly different jobs patterning (Figure 2).

Figure 2 about here

The mapping shows not only dense co-location but some clustering of like-minded businesses at very small scale. In turn, this implies the likelihood of close interactions between these firms, and the local knowledge spillovers typical of a Marshallian industrial milieu (Marshall, 1918) or Porterian cluster (Porter, 2000). This is confirmed by our qualitative analysis, discussed in section five.

4.2 / Counting

Having identified the outlines of the cluster, we use enterprise-level data from the BSD to look at the growth of firms and employment from 1997-2010 (the latest available data at the time of the primary research). For 2010, we find over 1,500 firms in core wards and over 3,000 in the wider area. Note that these are substantially higher than official counts, even with under-counting built into the data structure.

Figure 3 about here

Also note the substantial growth in firms – and jobs, below – before the area's unofficial 'naming' as Silicon Roundabout in 2008, and its official 'branding' as Tech City in late 2010. Overall, firm counts have doubled from 1997-2010. Within this period, we can see four phases in the area's development (Figure 3): slow growth in the late 1990s, with a peak in the first dot com boom; then gradually accelerating growth in the mid-late 2000s, and a tailing-off in the last few years. (Some of this last phase may stem from the newest firms not appearing in the VAT rolls.) Strikingly,

growth has been driven by digital content firms; these have closest functional and product linkages to the wider creative economy, and so this result is suggestive of a 'branching' from the creative economy towards the digital.

Within the nine wards, the digital economy supported over 48,500 jobs in 2010. Digital economy employment rose a lot faster in Inner East London than in the city as a whole, more than doubling between 1997 and 2010 (compared with a change of 44 percentage points in Greater London). As with firm counts, digital content jobs have outnumbered ICT (Figure 4).

Figure 4 about here

Notably, while digital economy employment in Greater London fell by 16,000 in 2009-2010, it rose inside the cluster. This was driven by digital content sectors, with falling employment in ICT businesses.

Figure 5 about here

Figure 5 uses employment shares to give a sense of local concentration of employment. The clear trend is Inner East London's increasing dominance of the digital economy within Greater London; although note that employment shares start to flatten off in the mid-2000s both locally, in London as a whole and in the UK. Given that job counts for Inner East London have risen overall during that period, this suggests some area diversification in the wider local economy.

We also conducted further within-sector analysis to explore the industrial composition of the area's digital economy. Given the limitations of SIC codes, the results are less informative than one would like; the ICT sub-sector is dominated by telecoms and computer hardware consultancy, while digital content is more diverse, with software consultancy, advertising, radio and TV, news and publishing taking the largest shares.[6] Exploratory analysis by the Tech City Map and others indicates a huge diversity of content activities hidden in these broad categories. For instance, a survey of 774 Tech City Map firms found that 16% work in digital marketing, and more than half are 'creative tech' firms such as 3D and animation designers (Star, 2011).

5/ Findings: qualitative analysis

Qualitative analysis highlights a number of notable features. We begin with some pen-portraits of the firms and their founders; then go on to discuss ways of working, affordances of the area, perceived future challenges and finally, views of policy.

5.1 / Founders and firms

Our interviewees were predominantly male, white and UK-born. This is perhaps not surprising given the industry, but the group is notably less gender and ethnic-diverse than the local community, or the average London start-up. Over 40% of the group were in their 30s, with 2/3 over 30. This is some way from the popular image of scruffy tech geniuses barely out of their teens, but corresponds to other research on the demographics of successful tech entrepreneurs (Wadhwa et al., 2008). In

[6] Full results are available on request.

particular, those in our sample from the 'Wired list' – broadly, the largest and well-known businesses – were exclusively in the late 30s age bracket. Some of those on the 'Wired list' were classic serial entrepreneurs who had been around the area since the first dotcom boom and founded a number of businesses. The sample is also highly educated: almost all had a degree, around a third have postgraduate qualifications (not all in computer science) and around a third had been to Oxbridge.

By contrast, the profile of the firms is very different: 21 out of 34 are less than five years old, a lot younger than the Greater London SME average (7.9 years) and the UK digital economy average (7.6 years).[7] 17 of the firms are start-ups – defined as companies less than three years old, including spin-outs from large firms (Blank, 2011). This is slightly less than Vandore's earlier survey, where 60% of respondents were in the start-up phase (Vandore, 2011).

All the firms are SMEs. Over half are micro-businesses (10 employees or less); a third were small businesses (11-50 employees) and there were five medium-size firms. Six of the firms were branches of larger businesses, often new branches deliberately placed in East London; one firm had recently been acquired by a much larger multinational.

Sectors were a broad spectrum, from software development to viral media to digital PR. Echoing the quantitative analysis, the vast bulk were in digital content industries, although a few might be placed in ICT sectors such as 'computer hardware consultancy' (7210). Perhaps not surprisingly, when we asked firms if they

[7] Unless otherwise stated, 'firms' refers to enterprises. In a few cases, sites visited are local units of a larger business.

considered themselves 'tech' companies less than half (15/34) said yes, and many found the question very hard to answer:

> *To be honest it's virtually impossible to explain what we do. I've been battling with it a while…we are a tech company definitely but we are also equally a creative company. (E12, C11)*

> *We're tech savvy in that everybody is… most people are from an engineering or a computer science background. But in terms of… we probably see ourselves as a games company now. (E23, C21)*

5.2 / Ways of working

Strikingly, firms exhibited a mix of global and local working patterns, particularly for production-side networks. While the core workforce was typically located in East London, and important networking, selling and business development went on there – see next section – we also uncovered extensive international operations. Around 40% of our sample (14/34) had bases in more than one country, the majority in two to four locations, with a couple of present in six or more. Given that only six of the sample are MNE branches, the majority are Varian's 'micro-multinationals':

> *It's one or two people in all of those countries. Potentially just getting business and using freelancers to deliver. And coming back to us for advice on intellectual property and things like that … what we do export quite a lot of is consultancy advice, and the code potentially, and the products that we're building up. (E2, C1)*

> *You can find very highly skilled IT people based in Russia and the Ukraine, for about a third of the price of the UK or even less, and they work harder, you haven't got to manage them so much because they can work from home over there. (E11, C10)*

As the quotes suggests, we found a combination of the accidental and the strategic. In the former category, some founders had opened (say) a 'New York office' because they'd found a programmer living there who they wanted to work with; in the latter category, we found some low-cost attempts to internationalise – for example, buying a US landline number that re-routed calls to the founders' UK mobiles.

Customer networks had multiple geographies, with firms selling to the rest of London, the rest of the UK or internationally. Customers within the Inner East London area were notably sparse – but many firms appreciated the area's proximity to large customer markets in Central London (see next section).

5.3 / The area

We found substantial differences between location decisions of older firms (and older founders) and younger businesses. For the former, the decision was often by chance: founders lived there or nearby, or they had been offered free/cheap space:

> *So I've always lived in Hackney when I've lived in London, around Hackney central area, so I had a flat back there, and I moved back into that flat … and from a friend … he actually found … some bit of Hackney council who will put you in touch with landlords if you need an office … So we actually, through that, we found a, literally a room above a pub … So we moved into that, spent £50 on the cheapest possible IKEA furniture, and moved in there. … And we yeah, we just more or less stumbled on the fact that this was a really good part of town to be in. And yeah, so word of mouth, other friends ended up renting other rooms in that type of pub, and you started to have even that tiny network effect. (E18, C16)*

By contrast, younger businesses (especially start-ups) had made deliberate choices, often informed by awareness of 'Tech City':

> *We didn't know the area very well actually. An agent that [we] had talked to, who by chance knew about [this co-working space], said you should check this out, maybe you'll like it. First of all, this place was half as expensive as any serviced office. And secondly, there was an article in the Economist… and we saw that … and said, 'well, there's a lot going on.' (E6, C5)*

The area supports firms' global-local production techniques, as well as providing strong market access to customers, both local and further afield. Cited advantages strongly echo the existing research on creative clusters, including cheap space (both historically, and versus more central parts of London); excellent amenities (especially food, coffee and nightlife); easy access to the rest of London; presence of similar firms, and general 'buzz'.

Notably, 'buzz' delineated at least three distinct things: a kind of social wallpaper that helps attract and maintain staff; a source of ideas; and a source of collaborators, with formal and informal networks, serendipitous meetings and the area's 'soft infrastructure' of bars and cafes playing important roles.

> *You have no problem, ever, persuading someone to work here. Whereas, if we were on a Science Park in Newbury, I'm certain we wouldn't find good calibre developers when we needed them, or that if we could they wouldn't want to move to where we were. So that's the first thing. Apart from that, it's kind of handy being close to other like-minded companies…. I actually don't think you get many pearls of wisdom in those conversations, but it just makes you feel less isolated. (E32, C30)*

> *If someone's sort of interested in streetscape and visual culture then this is a good place to be. There's lots of new ideas, inspiration. Though we're not at all a creative agency, we work a lot with creative agencies. We consult with them. It helps that we have a sense of what's fresh and what's new. (E28, C26)*

> *I like the fact that you bump into interesting people or people that you might sort of read something that someone's written online and then meet them*

> *down at the pub. Which is nice. … when I worked in South Kensington that never happened.(E8, C7)*

As one 'Wired list' interviewee pointed out, the lack of a traditional, physical supply chain for many of these firms means that they are much more sensitive to softer factors affecting production. Such affordances also help shape firms' location choices within the area. Echoing our mapping, we found evidence of very careful sorting within the 'hot zone', sometimes very tight geographies of a few hundred metres: for example, one social media firm had moved four times since its inception – staying within the same 200-yard radius of Brick Lane.

> *I don't want to move anywhere else. I wouldn't ever dream of going to Soho. I would probably go kicking and screaming to Clerkenwell. (E16, C14)*

For most, the upsides of locating in the area vastly outweigh any negatives: in many interviews firms had to be actively prompted to think of any downsides. The most common complaint is rising rent, the inevitable consequence of the attention the area is receiving (see section 4.5). Other complaints cited by a few included the ugly streetscape, lack of amenities for mothers, and the lack of obvious 'Tech City' signifiers. Notably, crime was only mentioned by a couple of firms.

5.4 / Future challenges

Firms highlighted various growth barriers, in particular access to finance, finding and retaining skilled workers, and management capacity. Table 2, below, list the most-cited issues.

Table 2 about here

Many of these are generic to SMEs. But there are digital economy 'twists' to some that make them substantially harder to overcome. Some of these were rooted in the global structure of the digital sector; others in the inherent novelty of digital economy activity; yet others were features of the relatively young East London system.

First, the inability to find skilled staff was often cited as the most important issue by interviewees. Firms argued that there was an undersupply of skilled developers in the UK – often blaming school and university syllabuses – and forcing them to rely more on immigrant workers. Given the global distribution of technology clusters, this often meant hiring from outside the EEA (and notably from North America, South or South-East Asia).

> *No [UK] education coupled with visa restrictions is not a particularly good combination. (E6, C5)*

In turn, current UK migration rules caused problems, especially the time taken to process applications through the Points Based System, and perceptions of cost and bureaucracy. Firms were typically too small, or lacked capacity to take advantage of the more relaxed rules on inter-company transfers. (The oft-cited 'Entrepreneur Visa', while potentially useful for the supply of new business founders, has no effect on existing firms seeking skilled *staff* from outside the UK.)

Second, while barriers to entry in technology sectors are often very low (especially in software development), risk levels are high and most new firms do not survive. This

means that potential investors have to be both risk-loving and very well-informed about these sectors, something not generally true of the current UK early investor community. We found three groups of firms in our interviews; a small group who'd been able to rely on personal contacts; another group who had been bootstrapping (and who as a result, often felt unwilling to look for external later stage finance); and a third group who'd had to look for angel or VC money, with mixed results. Many complained about UK investors' risk aversion and focus on established prospects:

> *In Silicon Valley you can get investment based on an idea. And that's because they're used to investing in tech. (E2, C1)*

> *Investors need to understand what tech investment is all about. It's not about technology investment necessarily, it's more early stage investment, equity investment, VC investment with high risk, very improbable returns. Understanding that needs to be put forward. I've been in VC for four years now and it's quite hard to educate someone around this … . (S1)*

Third, then, the East London cluster is still embryonic compared to (say) the South Bay Area, and this issue also has consequences. Investors are reacting to many business plans from new and inexperienced companies, suggesting that the 'supply' of high quality entrepreneurs also has to improve (Rigos, 2011). Interviewees also highlighted the UK early stage investor community's small size:

> *We're at the classic stage where we've got angel funding pre-product, which enabled us to build the product, and start a bit of a sales pipeline. And now we need a second round of funding to actually develop it. If we were in the US we would probably have gotten it all at once. But we're not in the US. So we've had to split it up into a number of small steps. (E24, C22)*

Of the ten UK Enterprise Capital Funds, only one specialises in digital economy investments. We found only a handful of banks, VCs and angel investors specialising

in the digital economy who were physically located in the area.[8] Other research has also highlighted how the relatively small size of UK funders creates co-ordination problems in assembling finance (Reed, 2010, Lerner et al., 2011, Marston et al., 2013).

More broadly, one interviewee remarked on the lack of 'elder wisdom' in East London compared to the US West Coast, 'where I've had my most useful conversations':

> *It's either being able to call someone when you've got a problem, you know, whether it's, you know, a web server scalability problem, or whether you're about to raise a round of funding and you're wondering what to do about, you know, salary rises for your early employee or issuing equity … (E18, C16)*

Older entrepreneurs and venture capital providers in London we spoke to are often happy to help with advice – but young entrepreneurs lack networking skills and partly because networks are still nascent (S1, S4).

5.5 / The Tech City initiative

Contrasting messages about the Tech City strategy emerged from our interviews. Awareness was lower than we'd thought: around a third of interviewees had little or no knowledge about the initiative (this is likely to be vanishingly small now). Those who did have views split down the middle, with equal counts of positive and negative opinions. Optimists welcomed the attention and exposure Tech City could bring:

[8] This has been changing since the primary research period, with Silicon Valley Bank and other investors opening offices in the area.

Tech City's great. I think all of this helps to push the ecosystem generally, because it gets into people's minds … (E24, C22)

It's creating a lot of similar-minded people in the area as well, and all of those people can feed off each other and the different ideas, the sense of community, can really make each of their businesses better. (E11, C10)

Pessimists – often older firms or more experienced founders – were more sceptical:

Tech City is what government people call it. I don't think I've heard anyone call it Tech City without sort of air quotes. (E18, C16)

My personal perception of Tech City is very much a government jumping on the bandwagon, and sticking a label on it. (E23, C21)

There was some confusion about the governance of the initiative – some knew about TCIO, but at the time the organisation had a low profile. Ministers' public interest in the area had also led some to think the initiative was 'Cameron's baby' or similar.

Notably, there was little interest in relocating to the Olympic Park, which was seen as lacking the critical mass of Shoreditch, and with little connection with the area:

It feels like the kind of thing where there'd be a first user disadvantage to that space. There'd be a worry that you would be moving out onto a tumbleweed strewn cul de sac, and would be cut off from the vibrancy … associated with this particular area. So I suppose it will come down to financial incentives, but I don't know whether or not that will be enough. (E33, C31)

Others had concerns about the accessibility of Stratford:

For us it is not an option to be based in Stratford. Because we have to be in close proximity to our clients. (E5, C4)

Some of these concerns arguably reflect perception over reality – transport connections to Stratford are very good, even if the Olympic Park is harder to reach. Nevertheless, the iCity initiative, which has taken over the Broadcast / Media Centre in the Park, will clearly have a big job to persuade smaller firms to locate in the campus, especially as there are already multiple sub-markets for technology firms around London (for example in Dalston, London Bridge, Canary Wharf and west of Soho). A minority of our interviewees suggested that the existence of a community of like-minded small firms in iCity would make locating there more attractive, and this offers one possible route for policymakers to take.

At the time the research was conducted, only suggestive evidence of policy 'impacts' was available. While views of the initiative were mixed, no one doubted it had raised the profile of the area. There was some resentment of the tech City 'brand' from older firms and founders, echoed more recently in the public discussions about the possible redevelopment of Old Street roundabout.[9] In turn, the bright light shone on the area had already had an effect on location decisions, with many younger firms deliberately choosing to locate in 'Tech City'. It was impossible to tell whether new entry has been felt most keenly through the spillovers channel or the competition channel, although some worries were expressed about poaching of ideas and staff. What *was* already evident were significant property market effects.[10] Around 40% of interviewees were worried about the cost of office space, with many contemplating relocation:

[9] We explore the political economy of the area's successive naming and branding in a companion paper (Nathan, Vandore and Voss, forthcoming).
[10] As a senior GLA politician put it at the launch of the original research (July 2012), 'even if a third of firms in tech city haven't heard of it, you can bet every estate agent has.'

> *One of the disadvantages of being in an area that's getting trendier and trendier and trendier is that the rents are going through the roof. It's on the edge of being sustainable. (E29, C27)*

For very young firms, the shared workspace market is thriving, with new providers entering the market (notably Google Campus) and existing providers expanding (Tech Hub, the Trampery, Hoxton Mix, Central Working). Some higher-priced warehouse space is also available for larger firms in spaces like the Tea Building and Zetland House, but this is limited. The core streets around Shoreditch have also historically lacked large floorplate offices, with little opportunity for new construction at this scale given the urban grain. Given these constraints, some stakeholders (S2, S3) worried about estate agents and landlords exploiting the 'Tech City' buzz to raise prices or tighten lease conditions in a way that would push out younger firms, and might ultimately be unsustainable. The government's stress on attracting large multinationals to East London on the back of 'Tech City' was seen as particularly unhelpful.

6/ Discussion

Inner East London's digital economy is a striking example of a cluster, with a number of distinctive features. It has evolved organically, with minimal policy intervention until very recently. Rather than industrial roots in military / defence interests or computer hardware, it has emerged out of technological shifts in the creative industries, and maintains important structural links to the wider London creative economy. At area level, this manifests itself in evidence of technological 'branching' from the creative to the 'creative digital' industries over time. Silicon Roundabout is

also tiny compared to Silicon Valley, and is centred on a few highly specific neighbourhoods, with specific sectors micro-clustering within the zone. The system is also striking for the historical lack of HE actors or 'Triple Helix' activity: so far universities have acted as providers of skilled people, nothing more. This may now shift: a series of high-profile partnerships (notably between UCL, Imperial and Cisco) have recently been announced, and the rising area profile will generate further links.

The launch of the Tech City initiative has hugely raised the profile of Inner East London, and may have created an inflection point in the area's development. In turn, this means setting the optimal policy mix is important, especially given the less than glorious history of cluster policies.

Early Tech City strategy had three broad goals: to develop the area, to raise levels of FDI, and to generate a halo effect for the Olympic Park. It is easy to see tensions between these objectives, and our research has highlighted many of these. The impacts of FDI on incumbents are not straightforward, and may generate benefits (via knowledge spillovers) or costs (via competition in the marketplace, for inputs or both). The absorptive capacity of incumbents matters – to identify collaborators and battle competitors (Meyer and Sinani, 2009). Given the still-developing state of the cluster, it is not clear that simply maximising the *level* of foreign investment is helpful if the aim is also to develop London and the UK's competitive position. Rather, policymakers should identify complementary investments (such as finance providers, auxiliary services and workspace managers) and seek to attract the right *mix*, as well as helping locally-based firms with support in international expansion and exports.

Encouragingly, there are signs that the TCIO is moving to such a model (Tech City Investment Organisation, 2012).

Equally, policymakers should downplay the Olympic Park as a natural extension of the Shoreditch cluster; as our interviewees make clear, this is not credible. The Broadcast / Media Centre site is a natural campus space for much larger organisations, and it is striking that the first set of iCity tenants include a university (Loughborough) and a large multinational (BT)[11]. It is not clear whether the site can also develop a Shoreditch-style industrial district, although it will include a space for start-ups managed by TechHub. The challenge will be turning this into a living milieu, rather than just a set of spaces to work. A more serious issue that there is no obvious locational logic to the iCity site: as our mapping makes clear, there are already a number of digital economy hotspots in London, and a number of related property sub-markets (Savills, 2012). Analogies to Canary Wharf are misleading – technology firms have far more spatial choice than financial services firms then did.[12]

A final set of issues concerns the future governance of the initiative. The East London system faces a number of challenges, not all of which are amenable to area-based cluster initiatives: in particular, changes to finance markets, to skills and to migration policies involve largely or wholly national policy levers. The multi-level issue set calls for careful governance arrangements, which are able to both reach across local private actors (entrepreneurs, firms, investors, landlords, local amenities), local public actors (the London Mayor and GLA, Boroughs, universities and colleges) and

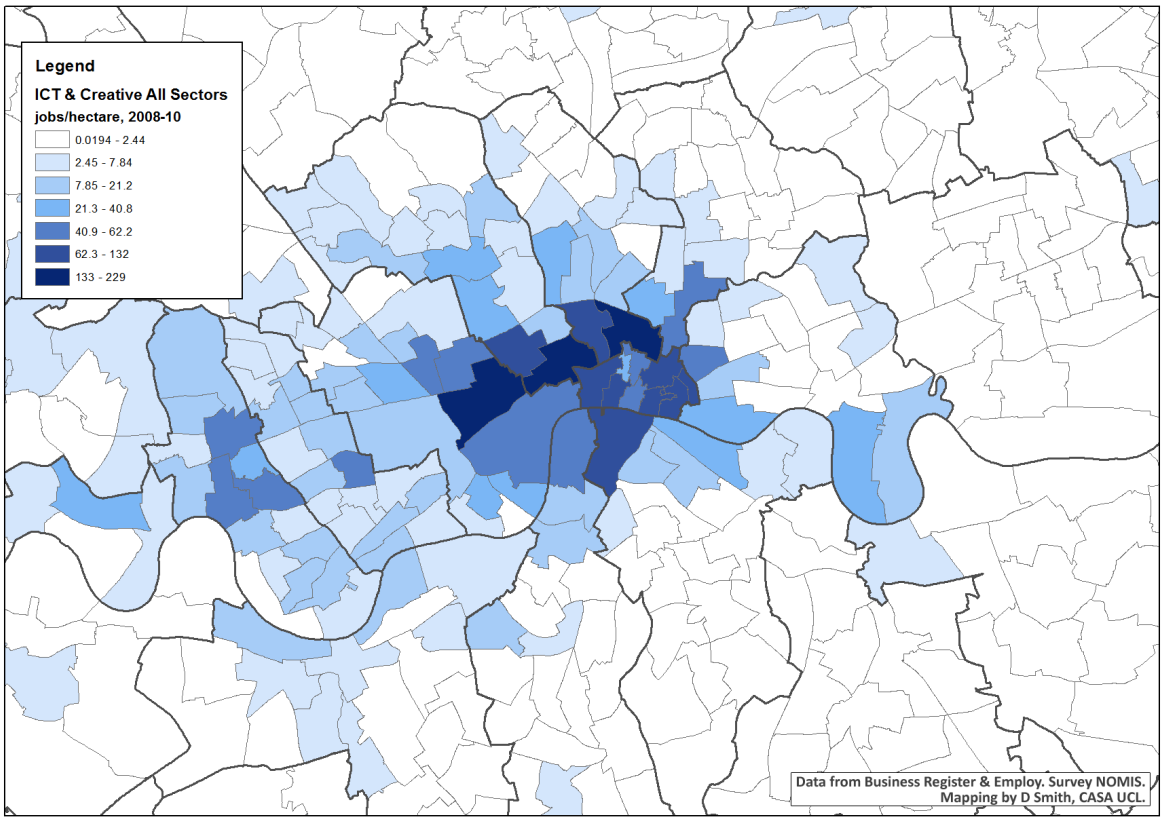
[11] http://icitylondon.com (accessed 24 June 2013).
[12] In an ironic twist, the former head of TCIO has now set up an incubator space for technology start-ups in One Canary Wharf. Level 39 is 'Europe's largest accelerator space for finance, retail and future cities technology companies.' (http://www.level39.co, accessed 24 June 2013.)

national actors (the Department of Business (BIS) and 10 Downing St). The politics of Tech City is also unstable. Early Tech City thinking was dominated by 10 Downing Street, where a couple of key officials, Steve Hilton and Rohan Silva, took a keen interest. Both have now left Government; BIS is taking a more active interest in the 'information economy', and this may presage further active interest in Tech City agenda. The London Mayor has shown sporadic interest in the area: GLA officials are developing a number of small-scale initiatives, but it is not evidently a political priority. Finally, the Tech City Investment Organisation now has a powerful new head (Joanna Shields, formally of Facebook) and has shed many of its original staff. The months ahead will start to show the shape of these shifting power dynamics.

[7659 words]

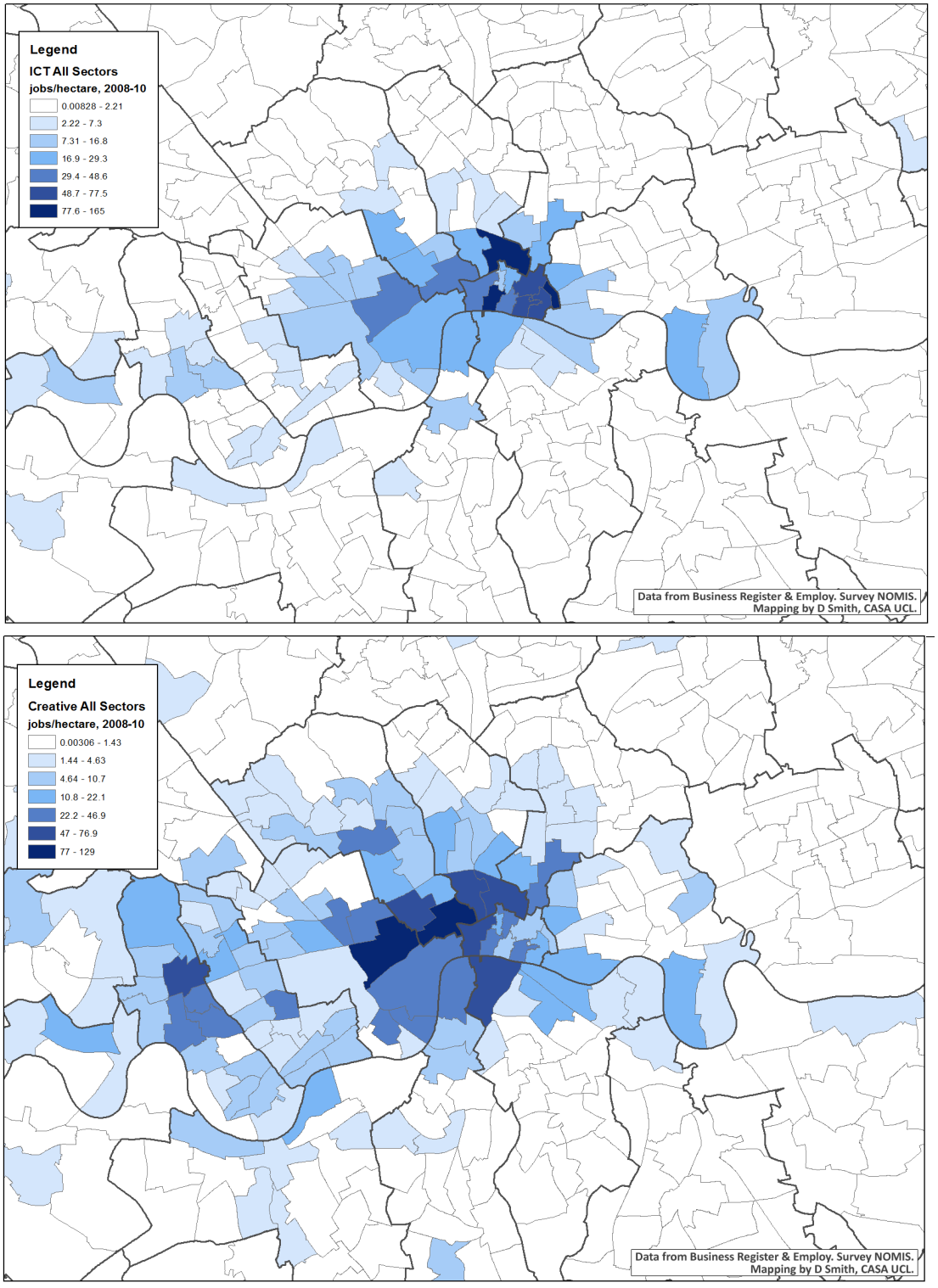
List of tables and figures

Figure 1. Inner London's digital economy: job density 2008-10.



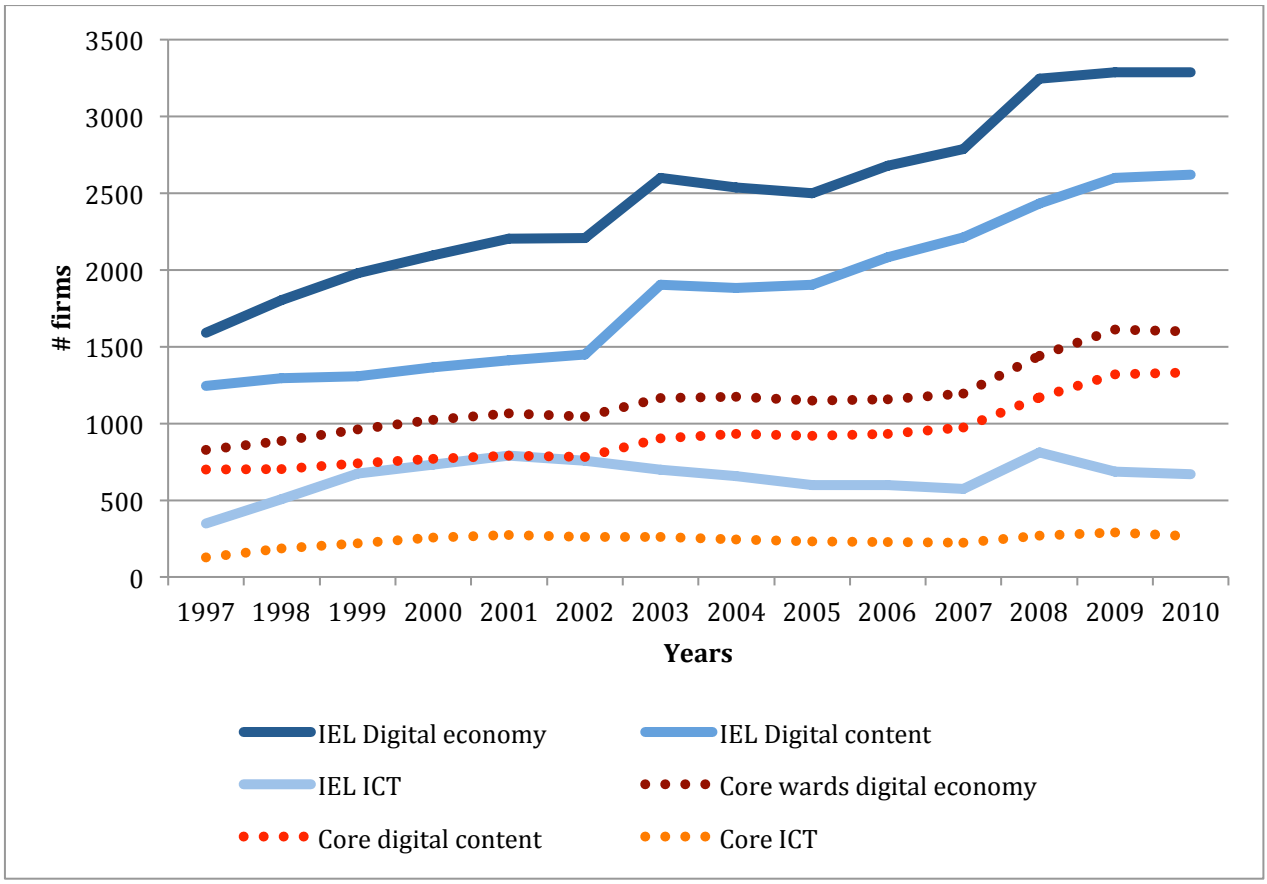
Source: BRES / NOMIS. Map by Duncan Smith.

Figure 2. Sectoral job densities, 2008-10. Information and communications technology (top panel), digital content (bottom panel).



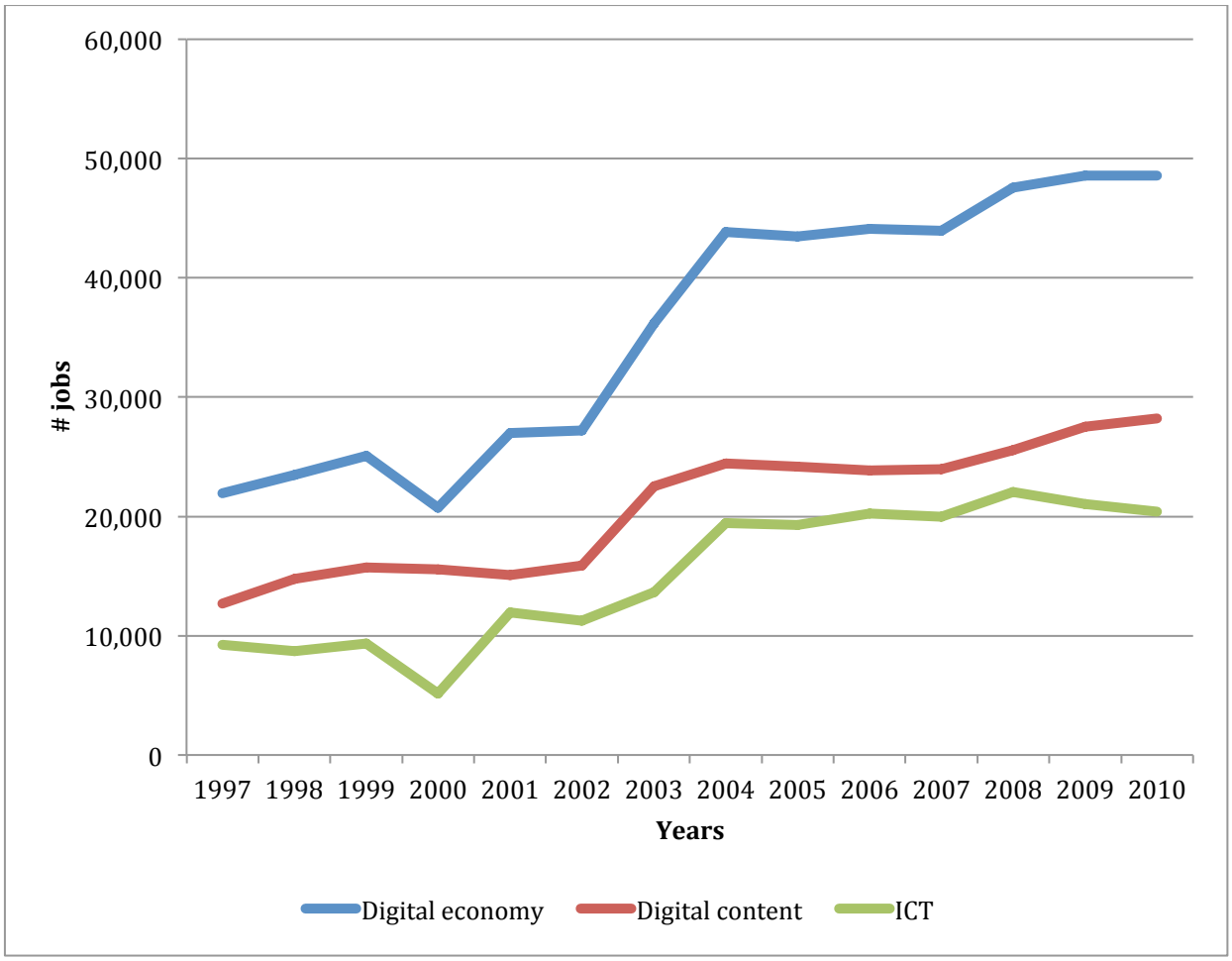
Source: BRES / NOMIS. Map by Duncan Smith, CASA/UCL

Figure 3. Digital economy firm counts in Inner East London, 1997-2010.



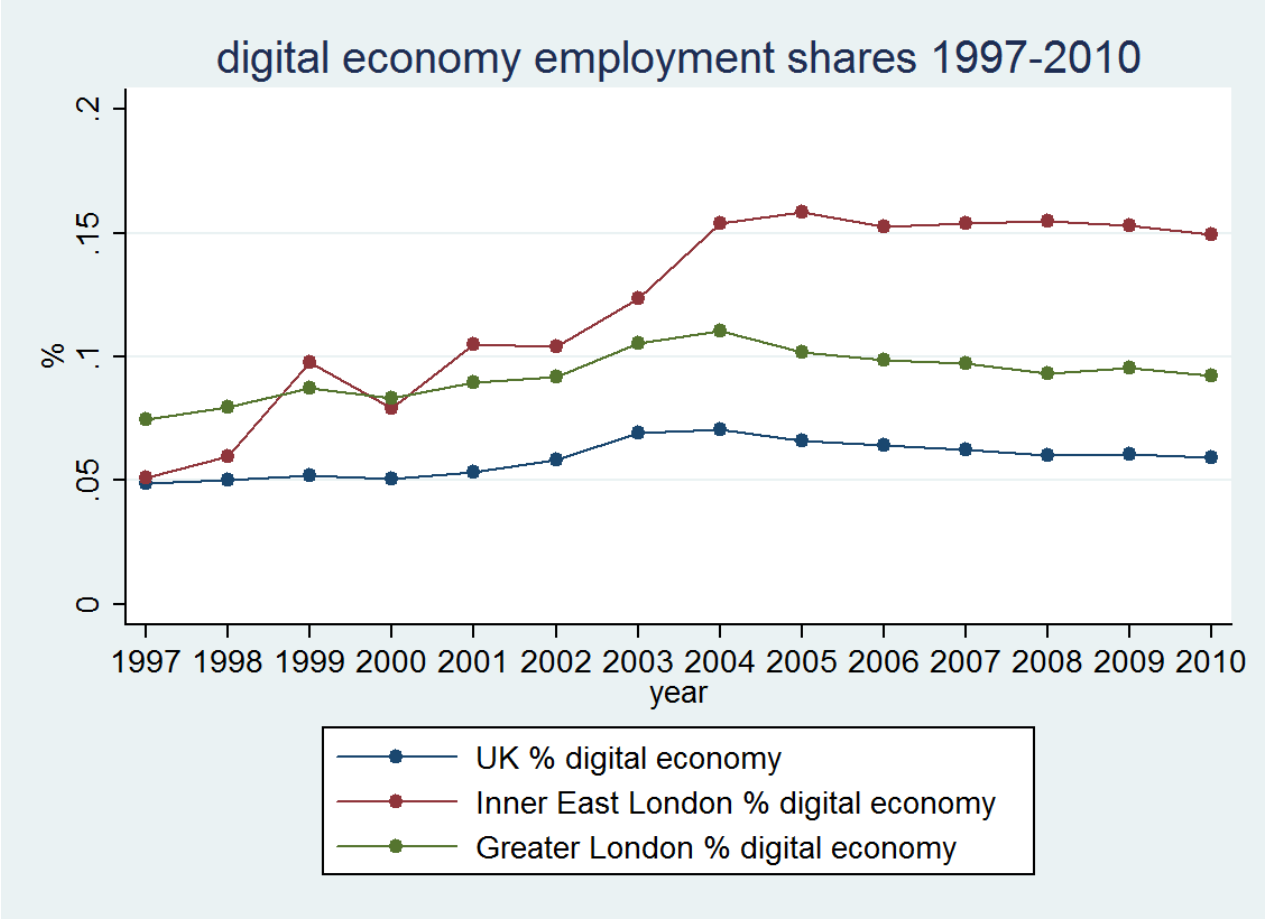
Source: BSD / ONS.

Figure 4. Digital economy employment counts in Inner East London, 1997-2010.



Source: BSD / ONS.

Figure 5. Digital economy employment shares, 1997-2010.



Source: BSD / ONS.

Table 1. How many technology firms in Silicon Roundabout?

Source / focus	Year	Count
Matt Biddulph	2008	15
Wired	2009	42
McKinsey / 'technology-orientated companies'	2010	'Over 170'
DueDil & TechHub / 'tech startups'	2011	107
Digital Shoreditch / digital economy firms	2011	774
Gateway to London / tech startups	2012	410
George Osborne and Eric Schmidt / 'digital companies'	2012	'Over 700'
Tech City Map	2012	1153

Sources: Bradshaw (2008), Wired UK (2010), McKinsey and Co (2010), DueDil/TechHub (2011), Chris Orange, Tech City Map (2012), Osborne and Schmidt (2012).

Table 2. Key challenges for inner East London firms.

Issue set	Number of firms citing as challenge
Business development	19
Access to finance	17
Skills gaps	14
Mentoring and management advice	13
Workspace access and cost	13
Connectivity	13

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