EMERGENCE OF A DIGITAL CLUSTER IN EAST LONDON: BIRTH OF A NEW HYBRID FIRM

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DIGITAL CLUSTERS IN EAST LONDON: BIRTH OF A NEW HYBRID FIRM

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Abstract

Purpose – This article is investigates the composition and geography of an emerging 'creative digital' cluster in the context of cluster theory and practice, arguing that this cannot be divorced from the wider regional creative and digital economy and that its inter-dependence with a small number of 'content' industries is critical to its formation. The significance of the 'creative digital' firm blending design, communications and technological development is highlighted as is its unique position in enabling such firms to flourish.
Design Methodology/approach – The research is based on spatial analysis of firm level business data using GIS mapping software; online questionnaire survey of firms within this cluster; participant observation of firm meet-ups over a three year period; and face-to-face interviews with a sample of firms/owners.
Findings – This new tech cluster confirms the benefits of co-location in an industrial district with proximities to a range of advanced producer services and cultural content provision. This has revealed an emerging 'techno-creative habitus' (Scott 2010) which has been able to take advantage of market fluidity through a network of communities of interest firms which have reshaped an existing global hub locally anchored by a highly porous locale.
Originality/value – The research is novel in combining spatial data analysis with qualitative research into firm behaviour and place-based factors that support the growth of this cluster. This has revealed new insights into the hybrid nature of tech firms that integrate content with hardware and software applications and who innovate and grow through inter-personal cluster networks.
Keywords - Creative Clusters; Digital Shoreditch; Tech City; Creative-Digital hybrid firm
Paper type - Research paper

Introduction

The emergence of digital clusters in seemingly unlikely inner city locations has gained traction since the advent of the Silcon Valley phenomenon in southern California (Saxenian, 1994). Itself built on industrial districts formed out of forerunner IT/hardware and military R&D establishments (and often occupying the same facilities/buildings), this model and hub of innovation, attracting skilled labour, investment and serving markets from around the world, has been emulated in inner city and urban fringe locations – from Silicon Roundabout (London), Silicon Sentier (Paris), Silicon Allee (Berlin), Silicon Glen (Dundee), to 'corridors' focusing on digital production, R&D and education (e.g. Kuala Lumpur, Seoul, Tel Aviv) (Evans, 2009, Ratti, 2015). On the one hand, the agglomeration of complementary/competitive firms, intermediaries and institutional facilities in close proximity and in areas of high connectivity, conforms to the traditional Marshallian industrial district and contemporary theory and practice of clusters (Belussi and Caldar, 2009; Porter, 1998; Asheim, Cooke and Martin 2006), but on the other hand, geographical clustering is surprising and perhaps counterfactual in this case, since the digital sector is less reliant on place or proximity in order to develop new products, services, and to communicate with and access markets (which are largely B2B) and skilled expertise (e.g. remote/online working).

High costs of entry and constraints on growth in many of the city locations where digital clusters have emerged would suggest that lower cost, and more attractive environments would be chosen by enterprises and entrepreneurs, including those closer to universities/research establishments (Laursen, Reichstein and Salter, 2011; Garcia et al., 2015; Fitjar and Gjelsviok, 2018). Whilst many of these urban

clusters have developed organically and not as a result of government or university intervention or incentives (Evans 2017), they have subsequently been adopted by local and city authorities, as part of place branding efforts (Evans, 2014) and economic development strategies (Evans, 2009). In some cases (e.g. Tech City UK, 2017), this has included national initiatives to attract inward investment to these local clusters even though, as Scott warned: 'the experience of many actual local economic development efforts over the 1980s demonstrates it is in general not advisable to attempt to become a Silicon Valley when Silicon Valley exists elsewhere' (2000: 27). This article discusses the cluster formation and conditions in the case of an emerging digital economy district of inner east London in the conext of the wider digital economy in the city-region, and cluster theory, notably the growing phenomenon of creative clusters (De Propis et al. 2009; Chapain et al., 2010; NESTA, 2016).

Literature Review

Over the last 20 years the formation and growth of post-industrial business clusters has been widely recognised. Building on Michael Porter's initial work (1998; 2000) and that of economists and geographers (Fujita et al, 1999; Ashiem, Cooke and Martin, 2004; Storper and Venables, 2004; Boschma, 2005; De Propis, Chapain and Cooke, 2009), recent research suggests that the agglomeration and co-location of businesses can fuel co-operation, competition and, in particular circumstances, significant innovation (Bathelt and Cohendet, 2014; Bathelt and Glucker, 2011; Chapain et al., 2010).

It is widely argued that by clustering, firms gain shared advantages. Research has also suggested that locating in a cluster and collaborating with other firms, either directly or through supporting institutions such as universities or business support agencies, has helped maximise potential for innovation throughout the cluster - not only meeting clients' and customers' current needs but also shaping future markets (Picard, 2008). The argument is that as clusters become established they draw in additional firms and labour working in similar and related sectors, increasing agglomeration through co-location and therefore maximising the benefits of a particular locality (De Propris et al. 2009). Although there are fewer analyses of creative clusters than of industrial clusters more generally, there is increasing evidence suggesting that creative industries are as likely to cluster geographically as any other industry (Lazaretti et al, 2008).

Several definitions for creative clusters have also emerged, mirroring the diversity of cluster concepts more generally. In the UK, the Culture Ministry defines creative clusters as 'groups of competing and co-operating businesses that enhance demand for specialist labour and supply networks in a particular location. Such infrastructure depends not only upon the vitality of the creative sector itself, it is also underpinned by public policy and significant public investment' (DCMS, 2006: 56). Bakhshi *et al.* (2008) also found evidence that creative businesses stimulate innovation in the wider economy through their supply chain relationships with businesses in other sectors. Successful creative clusters are thus seen to create (De Propris, 2008; Evans, 2004):

- communities of creative people who share an interest in novelty and new things (wherever they occur)
- a catalysing place – where ideas and connections are sparked
- diversity of experience and freedom of expression
- dense but open networks of personal relationships that permit identities and uniqueness to flourish
- knowledge pipelines and external (international) markets, even if cluster is highly 'localised'

A point is sometimes reached when a firm will be disadvantaged if it does not locate within the locality of a cluster. There is disagreement however over the impact of large cities on clustering. It has

been pointed out that diverse urban agglomeration economies with complex markets can have the same effect as clustering – drawing in firms and labour. Some sectors do concentrate (and cluster) within core cities. However this tends to be when firms rely heavily on urban centrality, connectivity and diverse/cosmopolitan cultures (for example in Finance and in the Creative Industries - De Propis and Chapain, 2009). This diversity, it is argued, favours cross-pollination of ideas, technologies and knowledge between diverse sectors, which is a source of radical innovation. Every cluster, therefore, has its own internal dynamics. These are elucidated here for the 'creative-digital' cluster in inner east London.

Methodology

In order to shed light on the emergence and context of this urban digital cluster phenomenon, this article investigates the case of Silicon Roundabout (or as it came to be known by local firms, Digital Shoreditch named after the district), located in the city fringe of inner east London. A combination of quantitative and qualitative methods were employed to interrogate the macro and micro economic features and factors that define this business cluster. Firstly, digital spatial data analysis and cluster mapping was undertaken utilising GIS software, followed by an online questionnaire survey (n=261) to profile firms in terms of their formation, size (emoployees, turnover), business activity and markets, and location choice. From this survey sample, interviews were held with individual firms (n=20) and four focus groups held to discuss and validate the survey findings and to further understand the cluster advantages and location factors. Over a 3 year period, participant observation took place at monthly network meet-ups with firms - a critically important networking activity, as observed in digital SMEs in general (NESTA, 2016).

From this research, the characteristics, conditions and evolution of the cluster are analysed in the context of the wider digital economy of the city region. As well as highlighting the cluster as a distinct but inter-related agglomeration, the research has identified the emergence of a hybrid 'creative-digital' firm and entrepreneurial mileu, and the importance of co-location, which have together determined the growth and success of the cluster. This in depth approach also seeks to respond to Simmie's observation that: 'the cluster idea has taken many academics and policy makers by storm. It has become the accepted wisdom more quickly than any other major idea in the field in recent years…at the expense of previous explanations and lacking in relevant empirical evidence' (2006: 184), suggesting the need for both qualitative research, and more robust and relevant data (Wolfe and Gertler, 2004).

Mapping London's Digital Economy

In the Digital Economy (BIS/DCMS/IPO, 2010 – see Appendix I) the convergence of technologies and platforms, content and creativity, has opened up seemingly limitless potential for entrepreneurship. This is one of the few sectors that was predicted to grow over this decade (BOP, 2010). In a fast moving business culture where micro enterprises and global firms sit side by side, it is suggested that spatial clustering within a metropolitan centre takes on a particularly significant role. This role is increasingly evident in inner east London on the fringes of the City of London central business district (CBD) where the rapid emergence of 'creative digital' and 'technology' firms was noted by industry insiders, the technology and wider press and by government (McKinsey 2011, Cities Institute, 2011, Foord, 2012). Here, (re)location on the fringe of established business and creative clusters has facilitated new forms of convergence between sectors of the economy (notably Publishing, Printing & Advertising with Software & Data Services) encouraging early adoption of digital formats. Early adopters engage with software developers and the cycle continues.

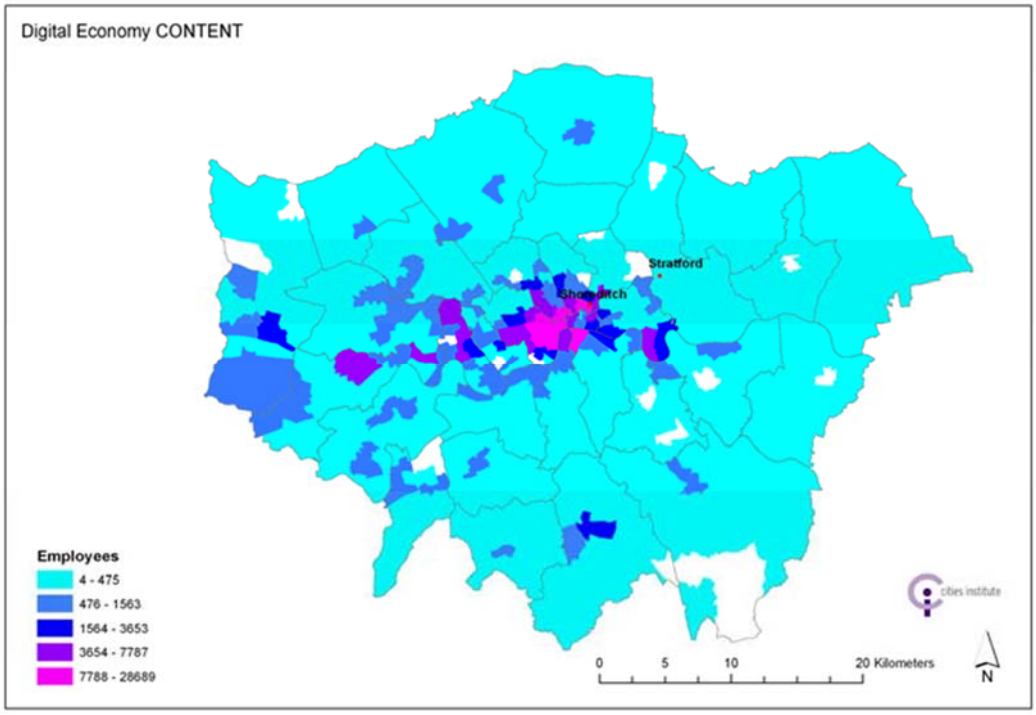
The emergence of tech start ups in east London can be explained by many of the advantages cited in work on other creative clusters – London's overall relative wealth and appeal to global talent; dominance of English as the business language; diversity of communities; and proximity to global firms, government, universities and cultural institutions (Foord, 2012). Local entrepreneurs stress the draw of 'the East' – its offbeat youth and arts culture, ethnic quarters, relatively cheap rents, continual arrival of new comers and the area's non-conformity compared with central and west London; the 'can do' innovative culture and the speculation about which firm will be next to 'strike tech gold' and negotiate a lucrative buy-out.

Clusters are not, therefore, solely defined through location. As well as geographical proximity, *institutional proximity* describes how organisations are bound together through the same norms and incentives (e.g. shared political environment). On the other hand, *social proximity* refers to the highly embedded personal relationshships and connections between firms (Granovetter, 1985), whilst *cognitive proximity* (Moliona-Morales, 2015) represents the degree of mutual learning through a shared knowledge base, which is particularly beneficial to network dynamics. All of these proximity concepts are present in the digital cluster and network of firms presented here.

A better understanding of the dynamics of this sub-cluster can also be gained from examining its position within London's wider regional Creative and Digital Economy. The UK Digital Economy, as with the wider creative industries, is over-represented in London. The emergence of an east London sub-cluster has therefore both regional and national significance. For example, cluster analysis undertaken for this research identifies over-representation of the Digital Economy in a continuous central corridor from west to east London, with most concentration in the city core and outlying pockets of significance. This confirms that Shoreditch (the district wherein Silicon Roundabout is based) marks the eastern edge of a digital corridor, with aspirations by government (city and national) to extend this cluster further east to the site of the London 2012 Summer Olympics at Stratford (DCMS, 2012). The strength of London's Digital Economy is not only its concentration, but also its hybridity. It combines an established ICT sector (including Telecoms and Computer Wholesaling) with concentrations of 'Content' industries including a number of core creative industries – TV & Radio, Film & Video Production, Publishing, Design and Advertising (Appendix I). The growth of London's Digital Economy's eastern edge therefore suggests new sectoral developments with particular spatial requirements. This cluster can be characterised by both specialisation in creative content, representation and reproduction, and sectoral diversity, with software, data services and design. It is therefore both *part of* and *distinct within* the London regional Digital Economy.

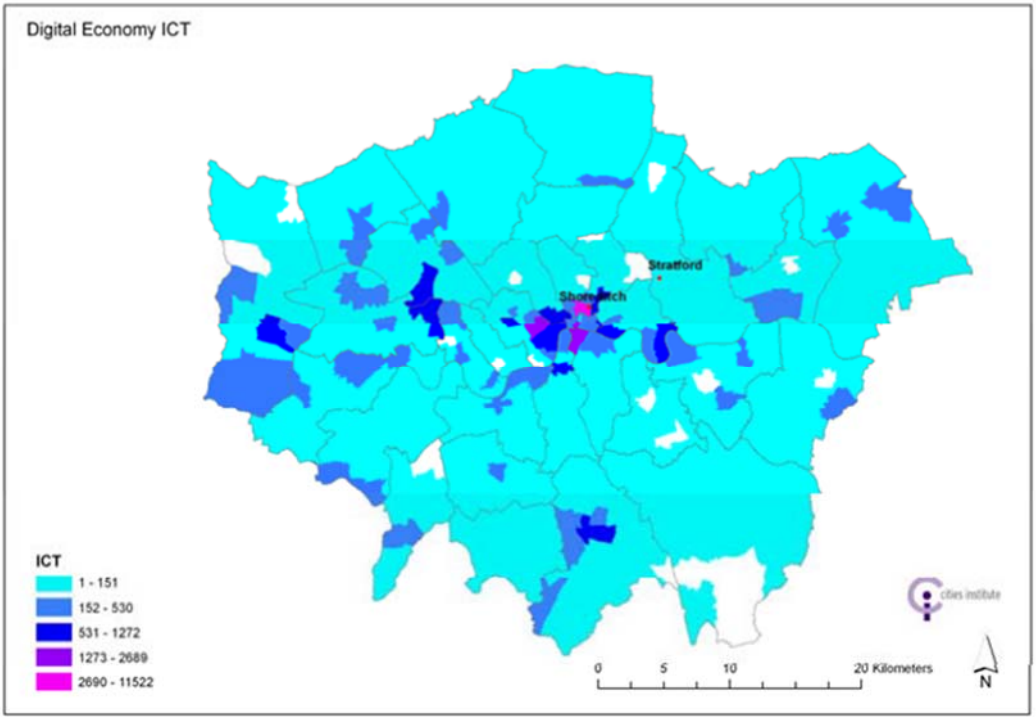
Within London, ICT employment is centrally concentrated while Content employment is primarily located in a west-central corridor (Fig.1 and Fig.2). However, there are pockets of extremely high ICT and Content employment in inner east and south central London.

Figure 1. Digital Economy Content Employment distribution



Data Source: BRES (Business Register and Employment Survey)

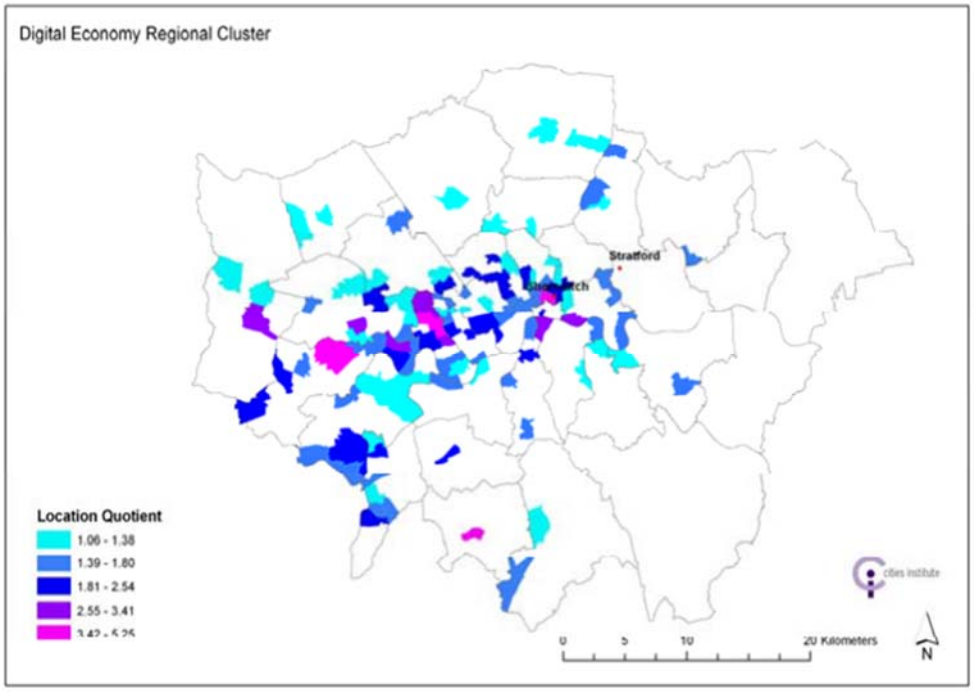
Figure 2. ICT Employment distribution



Concentration - Location Quotients

Cluster analysis using Location Quotients (LQs) identifies over-representation of Digital Economy firms in an almost continuous central corridor from west London to east London, with outlying scattered pockets of significance (Fig. 3).

Figure 3. Sector concentration in inner east London



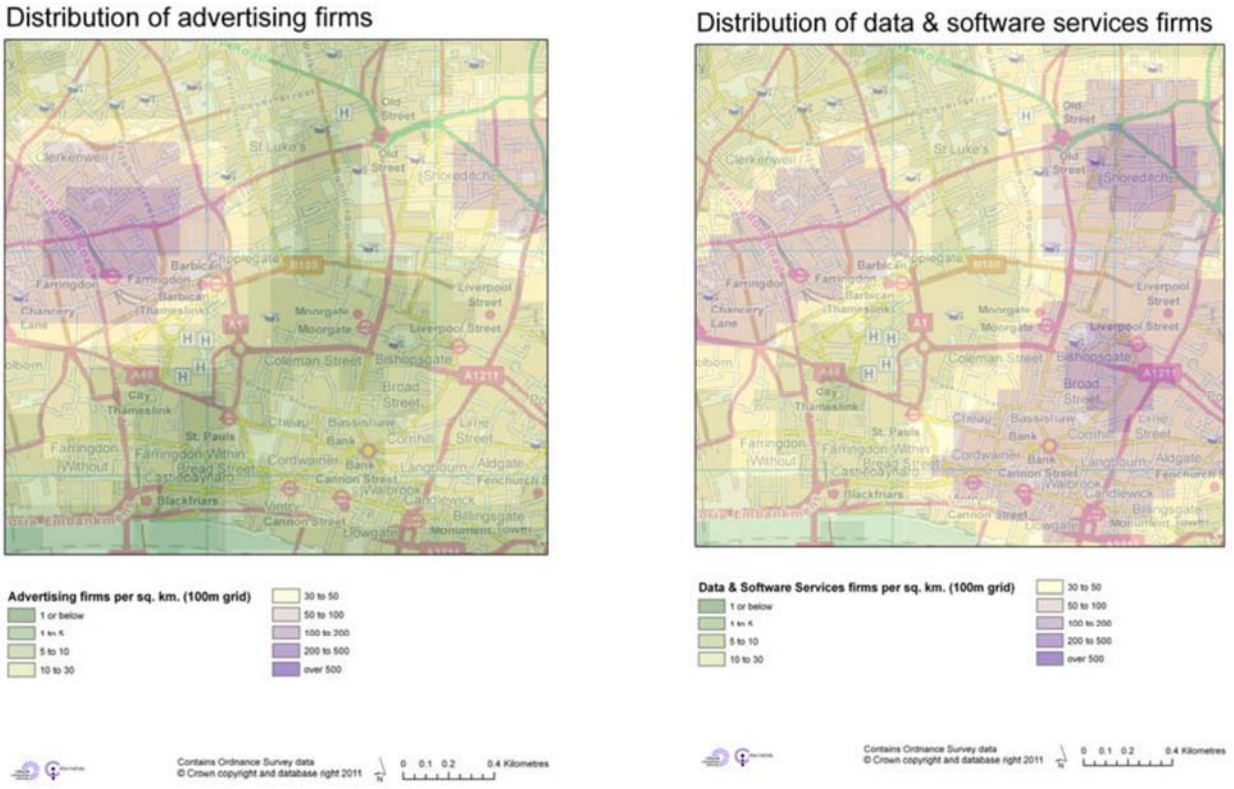
The LQ measures, for a given unit of geographical analysis, whether there is an agglomeration of creative firms which is larger than the national average. If the LQ is greater than one (>1), this means that the agglomeration is greater than the national or regional average, which indicates relative specialisation in that sector for that unit of geographical analysis. Over representation indicates that the level of Digital Economy employment is in a higher ratio to all employment locally than it is regionally (Table 1).

Table 1. Sector concentration in inner east London

Sector	Location Quotient
Digital Economy in Inner East London	1.46
ALL CONTENT INDUSTRIES	1.26
Printing, Pre-Press and Reproduction	1.90
Publishing	1.37
Specialist Design	1.36
Software and Data Services	1.12
Advertising & Market Research	1.24
PR and Communications	1.11
Music Production	0.42
TV, Radio, Film and Video Production	0.38

This eastern edge has its own specialisations and forms one of a number of London sub-clusters, each with their own established geographies and industry cultures – for example Music Production in west London; TV, Radio, Film and Video in west and central London; and Publishing in north and central London (Fig. 3). A satellite agglomeration of Advertising firms can be identified in inner east London – distinct from its main concentration in west-central London, and this overlaps with a larger cluster of Data and Software Services firms in inner east London (Fig. 4).

Figure 4. Local agglomeration of Advertising and Data & Software Services firms



This co-location may go some way to explain the specific emergence of 'creative digital' firms in inner east London – those combining digital design, animation, video with web design and software development. The co-presence of Data and Software Services including many freelance and small web 'design and build' firms (Hutton, 2004; Pratt, 2009) together with Print, Publishing and Advertising, facilitates cross-fertilization through sub-contracting. For example, specific demand for software development has emerged from Publishing companies specialising in e-publishing of in-house and specialist magazines for corporate and government clients. Other firms focus on developing educational and training materials suitable for delivery over multiple platforms. Both require development of bespoke software developments and applications.

There are high levels of demand for software services from within the Advertising, Market Research and PR & Communications industries. Changes in these industries have given rise to new forms of advertising, marketing and branding and have created opportunities for application development across platforms. However, as is argued below, the internal blending of digital and creative development *within firms* makes it increasingly difficult to distinguish software development firms from other Content companies. This local combination of high levels of demand, availability of experimental developers and early adopters, differentiates the inner east London cluster from existing established centres of Advertising (in west London), Publishing (Bloomsbury, Holborn in central,

and Wapping in east London) or Film, Media and Music (in Soho, central London). To be located in inner east London is to have a particular reputation as 'cutting edge' and forward looking (McKinsey, 2011, BOP, 2010). Convergence of Advertising, Marketing and Communications with Design and the development of digital formats including games and product or service-related 'Apps', is a primary driving force of the current cluster development – and the speed of its growth. Local software developers working in different fields - entertainment, education, transport, health, government and the other creative industries - all benefit from this demand and the core of technical and creative expertise it employs. And vice versa - those working for or within these Advertising, Marketing and Communications industries benefit from games developers, digital designers and software start ups. Particular spillovers - skills, knowledge and new markets - are therefore emerging from this particular convergence between Content industries.

The inner east London's sub-cluster is, not surprisingly, made up of micro and SME firms with 53% having less than 10 employees in our survey (below). This is the same for both ICT and Content industries. Less than 5% of enterprises employ more than 100 people. Looking at the value generated in this locality, ICT has higher levels of overall turnover (dominated by Wholesale and Telecommunications) than Content industries. The latter however employ more people. Publishing dominates Content turnover which is in excess of £18m. However, when combined, Advertising and Software have a £16m annual turnover (Table 2). The pace of change and innovation emerging from this sub-cluster is evidently from a mix of firms with relatively small turnovers.

Survey – 'Creative Digital' Firm

From a questionnaire survey of a sample of 261 firms identified from the Digital Shoreditch cluster – based on a B2B membership network of digital firms – 46% define themselves as Digital Design Consultancies or Agencies offering a 'creative digital' service. Individual firms in the sample tend to prioritise one particular activity - Marketing, Communications, PR or Branding, whilst some activities focus on particular types of clients – charities/not-for-profits, public sector, music, technology companies, fashion houses or financial services - but all offer a combination of creative digital services and products. Firms identifying themselves as Advertising Agencies operate in a similar way and if these are included, then 60% of the firms in the sample are hybrid 'creative digital' companies. The amalgamation of services within individual firm portfolios is both responding to the demand for, and increasing the convergence of, creative campaigns and digital formats and platforms. The 'Creative Digital' firm is therefore a blend, fusing technology/ICT and design in the context of Advertising, Communications and Marketing services, including Digital Branding; e-Marketing; Search and Content Management Applications and Games Infographics; Animation & Video; Web Design and Building; Internet Development and Hosting; Online advertising; Mobile apps; and Social networking sites, services and applications. Typically, these firms offer a number of products and services simultaneously to clients - a hybrid of creative strategy development, campaign implementation and technological development.

Whereas 19 firms offer IT Consultancy services, only 5 firms identified as independent Software Development houses. Traditional local specialities in Graphic Design and Photography, Film and Video production are also evident in the sample (Table 2).

Table 2. Firms in Digital Shoreditch sample

Main activity	No. of firms
Advertising	36
Digital Design Consultancy*	1
IT Consultancy	19
Graphic Design	15
Photography, Film, Video, Post	13
Design and Print	9
Software development	5
Animation	4
Recruitment	4
Data and Database Management	3
Digtial Publishing and e-Learning	3
Events and Promotions	3
Games	2
Training	2
Social networking	1
Other	22
Total	**261**

*Marketing, Communications, PR, Branding

Further evidence from this and subsequent surveys suggests that many of these 'creative digital' firms operate in more than one UK centre (Cities Institute, 2011; NESTA, 2016; Tech City UK, 2017). Many also manage portfolios of clients on an international stage. Global and international brands are frequently listed in client lists. Some are also a new breed of 'micro global' firm. These firms have offices in more than one city/country and clients spanning national boundaries. They use expertise from around the world and some sub-contract specialist skills in cheaper locations, such as Eastern Europe, where coding quality is high, but costs of hiring skilled professional staff are lower. This micro global firm structure may produce value through wealth creation, but not necessarily local jobs. London has long been recognised as a hub for brokering creative projects for international clients and for putting together financial packages to support campaigns (Pratt, 2006). However, this role in the international division of labour is changing - clients' increasingly expect digital innovation as well as strong creative input. The place of London in the overall Advertising division of labour may be increasingly dependent on the success of the inner east London cluster to maintain its reputation for innovation.

East London currently provides a fertile ground in which freelancers, micro and SME creative digital firms, as well as established 'off centre' agencies, flourish. Many benefit from (relatively) cheap premises with employees celebrating the area's 'buzz' (Storper and Venables, et al., 2004) and the range of independent cafes, restaurants and bars. This 'no brand' street culture is highly valued. Digital creative and technology companies are taking tenancies in existing managed workspace buildings, alongside other creative industries, enabling cross-fertilisation, innovation spillover and assembly of project teams and production chains. Some cluster spillovers are also orchestrated by social networking intermediaries offering support services, advice from industry gurus, hacking sessions and contact opportunities with early adopters (e.g. *Minibar*, *Tech Hub*). A few have combined social networking with the provision of tech friendly workspace, developing niches in the property sector (from relatively 'cheap and cheerful' *Tech Hub* to more comfortable and luxurious *The Trampery*). These join long established workspace providers active within this locality and commercial workspace developers. As this digital cluster gained wider attention, global media firms such as Google have opened workspace facilities offering SMEs hosting and access to 'expertise', notably Google Campus, Microsoft and Silicon Valley Investment Bank.

This provides these global corporations direct access to new talent, innovations and a degree of intelligence and 'surveillance', leading to acquisitions (talent, firms, innovations, licences etc) and collaborations (e.g. joint ventures).

Conclusion

This article has presented an analysis of a creative-digital cluster which emerged in east London in the aftermath of the 2008 financial crash and which has grown despite deepening recession (Foord, 2012). It has been suggested that this cluster did not arise from the location decisions of a few tech and media savvy individuals, however much they may have shaped the idea of a new cluster (McKinsey, 2010). Digital Shoreditch has come to represent a strong place brand. Yet it over-emphasises the presence and driving force of technology companies, understates the comparative advantage of a prehistory of creative enterprise in this area of east London (Simmie et al, 2008), e.g. arts and cultural production, crafts and skilled manufacture (Pratt, 2009; Evans, 2004), and sidesteps more complex restructuring of creative services and production (e.g. advertising, audio-visual, print & publishing, digital manufacture/prototyping), leading to convergence and blending of activity across co-located sectors.

Explanations lie in unpicking the relationship with the wider London digital economy as discussed above. The cluster, centred on the Digital Shoreditch industrial district, represents a contingent assemblage of actors and sectors: an experimental production space offering opportunity and favouring opportunism. London's Digital Economy is therefore largely shaped by the diversity of its Content industries which generates rich opportunities for cross-fertilisation of ideas and innovation and most importantly, assembles a critical mass of potential clients/customers and collaborators across the region. It has arisen at a time when technical innovation and recession are both focusing effort on maximising the effectiveness of B2B creative services, particularly those that can suggest an improved return from marketing and advertising for business and government clients.

Following Scott (2010), east London's Digital Cluster is therefore an expression of an emerging 'techno-creative habitus' evolved in order to both manage and take advantage of current market fluidity, technical and social uncertainty. By developing an extensive network (or 'ecosystem') of weak and 'noisy' ties, this cluster is reshaping an existing global hub. It is locally anchored by a semi-sticky but highly porous locale. As such it presents a challenge for both creative cluster analysis and policy formation. For example, cluster models in this sector stress the importance of university-industry collaboration and linkages, both in terms of high quality research/R&D (Laursen, Reichstein and Salter, 2011) and the advantages of proximity (Garcia et al, 2015). However, in this cluster there were no clear university collaborators or facilities. The closest was an incubator building owned by a local Community (Further Education) College which did offer affordable workspace and a neutral meeting place for SMEs/start-ups, but no technological or innovation expertise. As the digital network of firms and the cluster grew both in size and economic value, universities and local authorities in the wider area did start to engage and promote the cluster (e.g. events), with the local knowedge system (LKS) building over a three-year period, but this was local industry-led and mediated, rather than university R&D-based.

The importance of SME networking should not be under-estimated in this is sector (NESTA, 2016; Tech City UK, 2017), and the informal exchanges that this locale offered including bars/cafes, clubs, pop-up and shared/managed workspaces which facilitated rapid networking, knowledge exchange and business promotion opportunities (e.g. pitching ideas for investors/collaborators). Unlike tech clusters located in science or technology parks, the location in an historic industrial district with an embedded cultural/crafts industry and building stock, and a neighbouring financial services

district, has distinguished Digital Shoreditch from ICT clusters and Silicon Valley emulators (Ratti, 2015).

In conclusion, this cluster case does confirm that geography (and connectivity) is important, but that other proximities: institutional, social, cognitive are also vital to the growth and success of the cluster and the strength of inter-firm ties. This was reinforced in interviews with firms, for instance personal relationships and business partnerships which tended to arise from links made at their 'own' universities (rather than in the cluster region), and their cross-disciplinary nature, i.e. across traditional science/computing, arts and humanities divides.

Emulating digital clusters elsewhere, as Scott warned (above), is not advisable where this range of characteristics and relationships are not present and where these particular conditions have emerged organically over time, which can neither be replicated nor accelerated. As Palazuelos observes: 'although clusters are an appealing phenomenon and in some particular cases can deliver growth, modernisiation and even local development, clusters may not always be a realistic or appropriate ambition for policy-makers for all regions. Cluster-creation should only be adopted as a local economic development strategy if it has been determined to be suitable for the development of the area which could only be concluded after rigorous analysis of the peculiarities of the location' (2005, p.138).

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Appendix I. Standard Industry Classification (SIC) Codes for ICT and Content Industries

ICT sector	
SIC 2003 Code	**Description**
30.01	Manufacture of office machinery and computers
30.02	manufacture of computers and other information processing equipment
31.30	Insulated wire and cable
32.10	Electronic valves and tubes and other electronic components
32.20	Television, radio transmitters and apparatus for telephony and telegraphy
32.30	Television and radio receivers, sound or video recording or producing apparatus and associated goods
33.20	Instruments and appliances for measuring, checking, testing and navigating and other purposes
51.43	Wholesale of electrical household appliances and radio and television goods
51.84	Wholesale of computers, computer peripheral equipment and software
51.85	wholesale of other office machinery and equipment
51.86	Wholesale of other electronic parts and equipment
51.87	Wholesale of other machinery for use in industry, trade and navigation
64.20	Telecommunications
71.33	Renting of office machinery and equipment including computers
72.10	Computer Hardware consultancy
72.50	Maintenance and repair of office, accounting and computing machinery
72.60	Other computer related activities
Digital Content industries	
SIC 2003 Code	**Description**
22.11	Publishing of books
22.12	Publishing of newspapers
22.13	Publishing of journals and periodicals
22.14	Publishing of sound recordings
22.15	Other publishing
22.21	Printing of newspapers
22.22	Printing not elsewhere classified
22.24	Pre-press activities
22.25	Ancillary activities relating to printing
22.31	Reproduction of sound recording
22.32	Reproduction of video recording
22.33	Reproduction of computer media
72.21	Publishing of software
72.22	Other software consultancy and supply
72.30	Data processing
72.40	Database activities
74.40	Advertising