Nesta...

A MAP OF THE UK GAMES INDUSTRY

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Executive Summary

1. Approach

- The video games industry is recognised as a highly innovative part of the UK's creative economy, but hard data about its economic performance and geography are difficult to come by. In this respect, the sector is partly a victim of its relative youth and dynamism: it didn't get dedicated Standard Industrial Classification (SIC) codes until 2007, and many of its companies are hard to classify using standard codes.

- In this report, we use an experimental 'Big Data' approach to bypass some of these limitations. Specifically, we leverage the digital footprint of the sector in product directories and fan websites to create a new list of UK video games companies. We combine this with official data to measure how the sector clusters across the UK, and explore the drivers of this clustering.

2. The current shape of the UK video games industry

- This exercise results in a list of **1,902 video games companies.** iOS (including iPhone and iPad) turns out to be the most popular platform.

- Only around one-third of the companies we identify are captured by official games SIC codes. SIC codes are particulary bad at capturing companies in newer platforms like iOS.

- The video games sector has experienced an entrepreneurial boom in recent years: almost nine in ten of companies began operations in the 2000s or the 2010s. Between 2011 and 2013, the number of games companies grew at an annual rate of 22 per cent. This growth was driven by **iOS companies**: they **comprise three-quarters of the companies formed in the 2010s.**

- Despite the growth of multiplatform companies, the sector as a whole is increasingly divided into those that focus on mobile, and those specialising in traditional gaming platforms.

3. The geography of the UK video games industry

- Around one-half of UK video games companies are based in London and the South of England (though the sector is better represented in the North of England than the rest of the creative industries).

- The UK's games sector is more geographically concentrated than other creative industries, but the situation is changing over time as games companies begin to pop up more frequently across the UK.

- We have identified 18 areas with a critical mass of games activity in terms of company numbers, and 12 games hubs that have high levels of games concentration. These hubs are **Brighton, Cambridge, Cardiff, Dundee, Edinburgh, Guildford and Aldershot, Liverpool, London, Manchester, Oxford, Sheffield and Rotherham and Warwick and Stratford-upon-Avon.**

- These games hubs are varied in their industrial structure and platform specialisation – some like London, Brighton or Manchester are more focused on iOS while others, such as Guildford and Aldershot, or Warwick, have a stronger console presence.

- **London, Brighton, Edinburgh, Liverpool and Manchester have experienced faster rates of company formation in recent years, and this is driven by iOS developers.**

4. Drivers of UK games clustering

- The video games industry is strongly co-located with other creative industries such as Design, Advertising, Software and Film, Video and TV. This is especially the case with iOS developers.

- There is **evidence of a link between better broadband access in an area, as measured by indicators from Ofcom, and the extent to which games companies cluster there.**

- Data from UCAS, the web portal for undergraduates degrees, reveal that 115 (higher education) institutions in the UK offered 315 specialist video games degrees (in 2013/14). We detect evidence of a **positive link between the presence of games specialist courses and games industry clustering.**

5. What does our data tell us about the scale of the UK games industry?

- We have combined our company counts with official sources to produce some back-of-the-envelope calculations about the scale of the sector. According to these calculations, the sector could have a Gross Value Added of as high as £1.72 billion.

6. Next steps

- Our analysis shows the potential value of using 'Big Data' to study new sectors like video games. Going forward, we will work with Ukie in using this approach to build a web platform that will allow users to explore interactively and in real time the geography and evolution of the sector. This should contribute to investment, education and policy strategies that are more strongly grounded in evidence.

Background

Starting in 1980 with the launch of the Sinclair ZX80, the UK games industry has, in just over three decades, gone from bedroom coding to global leadership, combining arts and technology to deliver some of the most successful games in the history of the medium.

As often happens with new industries, policymakers took a while to recognise the video games sector as an economic force. Over the noughties, there were serious concerns about the UK's decline in the global development rankings, as a consequence of the generous subsidies for video games development available overseas (particularly in Canada), and severe skills shortages.

Policymakers have finally responded to the calls for reform of how computing is taught in English schools in reports like *Next Gen*, and introduced tax relief for the production of culturally British video games. Together with a renewed entrepreneurial boom enabled by mobile and online platforms, these policy changes mean that the outlook for the sector in the UK has improved greatly.

However, if there is one feature that defines the games industry, it is the speed with which it changes. In particular, it is nigh on impossible to predict today what new technologies, business models and competitors will emerge next to disrupt the sector – though it is certain that this will happen.

Timely data can help everyone with a stake in the sector – games companies, investors, educators and policymakers – identify such challenges faster, put in place strategies to deal with them, and evaluate if these strategies are working or not. Getting reliable and timely data about the games sector is far from easy though. Sitting at the intersection of new technology and creative content, formed of fast moving – often micro – businesses, the video games sector is a case study in the difficulty of tracking the evolution of innovative industries.

In this project, undertaken in partnership with games industry trade body Ukie, our aim is to turn some of the innovative features of the video games industry to our advantage, using the 'Big Data' footprint of their products in online directories and websites – often maintained by passionate fans – to produce new evidence about the sector. This should be valuable for:

- **Investors, commissioners, educators, support agencies and trade bodies** who want to identify hubs of games companies to work with.

- **Games companies and companies in other creative and digital industries** seeking out partners and collaborators.

- **Talent** looking for a job in the video games industry.

- **Policymakers** (both national and local) who need information about the scale, performance and location of the industry.

- **Researchers and analysts** who are studying the sector.

This report forms the first output of our research. After presenting our approach, the data sources and data collection method in Section 1, we present our findings. Specifically in Section 2, we focus on the shape of the UK's video games industry, in Section 3 we look at its geography, and in Section 4 at its drivers, before concluding in Section 5.

Going forward, our plan is to transform the system we have used to collect the data into a 'living platform' that can be used to track and map the evolution of the UK games industry in real time, enabling better decisions by all the agents in its ecosystem – in a way that contributes to continued fast growth in the sector.

1.   Approach

a.   Traditional industry analysis

Traditionally, industry analyses are based on data collected by the government from businesses that self–select into that industry by choosing the relevant Standard Industrial Classification (SIC) code when they register at Companies House.
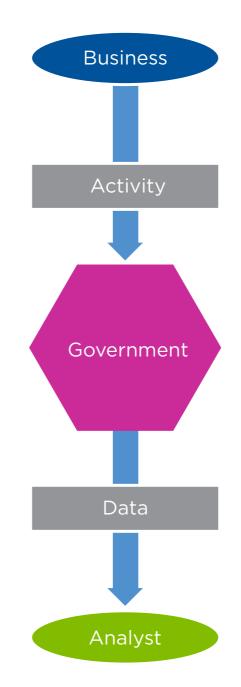
However, while ensuring consistency, this approach has some important limitations.

- **It is only as good as the SIC codes on which it is based.** If a sector is poorly captured by existing SIC codes then it will be hard to study using official data sources.
- **There are problems with misclassification:** companies have few incentives to select the right SIC code (though the Office for National Statistics (ONS) does some quality assurance of SIC codes in producing its industry statistics). Moreover, innovative companies that straddle sectors might struggle when choosing their SIC code.
- **It does not generate timely data**. Business survey data takes time to collect, so there are often significant lags of as much as one to two years.
- **It does not generate high–resolution data.** Understandably, official surveys are anonymised and cover general topics, but this limits their usefulness for analysts interested in micro–clustering of business or in firm performance over time. Some of these issues can be explored in facilities like the ONS's Secure Data Service, but access to these are restricted.

The case of the UK games industry

Emerging sectors are hard to analyse using a SIC approach – the UK video games industry is a good case in point. For example, even as late as 2007, games developers and publishers didn't have their own SIC codes (6201/1: Ready–made interactive leisure and entertainment software development, and 5821: Publishing of computer games).

As a response, most research on the industry has been based on lists of companies maintained by specialist research agencies, like Games Investor Consulting (GIC). GIC's database was used in reports such as *The Economic Contribution of the UK Games Industry* (Oxford Economics, 2008), and Nesta's own survey of games

employers for *Next Gen.* In its 2008 report, Oxford Economics estimated that the UK's development sector directly employed 10,000 people and generated value added of £386 million. Oxford Economics also used this data to study the geography of the industry, identifying clusters of gaming activity in Brighton, Guildford, the East Midlands, Yorkshire, Edinburgh and Dundee.

In January 2014, the DCMS's Creative Industries Economic Estimates used ONS sources (the Annual Population Survey and the Annual Business Survey) to estimate employment and GVA in the official games SIC codes (6201/1 (see above) and 5821: computer games publishing). According to this analysis, the sector employed around 15,000 people in 2012, and had a GVA of £540 million (controversially, these GVA numbers suggested that the sector had declined by over 40 per cent since 2011).

Another authoritative source on the state of the UK's development sector is the survey undertaken periodically by TIGA (The Independent Game developer Association, also in conjunction with GIC). According to the 2014 survey, reported in *Making Games in the UK Today*, the UK games industry employed 9,896 developers, and contributed £1 billion to GDP in 2013.
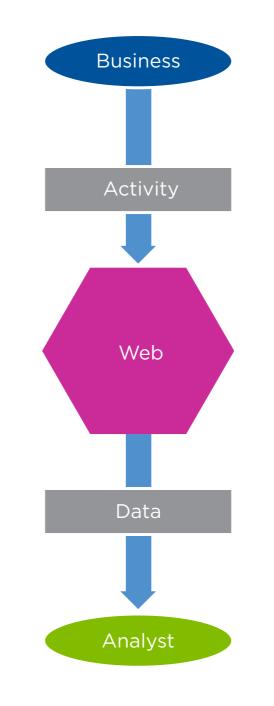
b. Our 'Big Data' approach

Improvements in the SIC classifications and bespoke surveys such as those mentioned above, contribute to our understanding of the UK's games industry. However, on their own they aren't enough. The SIC codes are set irregularly at the international level and are the subject of much negotiation. Surveys are expensive to administer, and often suffer from low response rates. Ensuring that their sampling frame captures new entrants isn't easy in a sector as entrepreneurial as video games.

We explore if we can overcome some of these issues by taking a 'Big Data' approach, harnessing the fact that the games business leaves a trace online – for example, when a product is sold on an e-commerce site or reviewed by a user. We draw on this 'found' data to identify and map UK games companies. Here are some advantages of this approach:

- **It's not reliant on SIC codes.** We identify games companies through the products they release, not the information they supply when they register at Companies House.
- **It is timely.** Companies can be identified as soon as their commercial activities are reported or discussed online. This opens up the possibility of refreshing the dataset at low cost, so the industry can be tracked in 'real time'.
- **It is based on publicly available information and therefore easier to scrutinise.** We are making available details of the methodology so that the results can be readily reproduced – an important requirement for users such as policymakers.
- **It is high-resolution.** We can examine company clustering at the postcode level, track company evolution over time, and explore important questions for the industry which are not covered in official surveys – for example, what platforms do different games companies target?

Our 'Big Data' approach has echoes with that followed in *Measuring the UK's Digital Economy with Big Data* (NIESR/Growth Intelligence, 2013) for the 'digital economy.' This research identified 'digital companies' using text in their websites and other sources of information such as patent filings and press releases, instead of the SIC codes. The analysis suggested that SIC-based measurements underestimate the size of the UK's digital economy substantially (perhaps by as much as 60 per cent in terms of company numbers, and by more than half in terms of employment).

Academic researchers are also using web data sources to measure the video games industry. In two papers published in the *Journal of Economic Geography*, Ron Boschma, Pierre–Alexandre Balland and Mathijs de Vaan use information about the global games industry derived from MobyGames (one of the data sources in our research) and conclude that:

- In the video games industry, the benefits to companies from clustering (knowledge spillovers and critical mass) outweigh the costs (more competition) (De Vaan et al., 2012).
- Over time, games companies tend to partner with others that specialise in the same genres as them (Balland et al., 2013).

Some limitations of our approach

- It requires dealing with messy data which hasn't been created for analytical purposes or quality assured by expert statisticians or industry experts.
- It might at the same time *underestimate* the scale of the sector if it fails to capture companies involved in the games industry but uncredited in online directories (e.g. a tools or localisation company) and *overestimate* it if it counts as games companies businesses that are only marginally involved with games development.

Although our methodology begins to address these issues, it should still be regarded as experimental.

Business

Activity

Web

Data

Analyst

c.   Data sources and questions

See **Appendix 1** for further details and **Appendix 2** for more information on sources

Video games web directories

Websites provide detailed product information including the identity of a game's other contributing companies

ONS data

IDBR is a register of businesses we use to generate company counts by SIC and geography. We use the BRES survey of UK businesses to measure employment levels

Secondary data

Broadband data from Ofcom, data about location of games courses from UCAS

Company name

How many games companies are there in the UK?

Product platform

In what platforms do these companies specialise?

Geographic distribution of games employment and local levels of economic activity

Clustering in other creative industries

Is the UK games industry more or less concentrated than other creative sectors? With what other creative sectors does it co-locate?

Companies House

SIC code

How well do 'games' SIC codes capture the sector?

Incorporation date

How is the sector evolving?

Games company address

Where are UK games companies located?

Games industry clustering metrics

Where does the UK games industry cluster? What is the industrial structure of UK games clusters?

What other local infrastructures and conditions are linked to games clustering?

Local broadband speed and access to talent

LEGEND

Source   Variable/measure   Question

d. Building our dataset

Data collection and processing

Company numbers

We select and scrape online data sources. We identify 226,302 unique games titles, their developers and publishers. We identify UK companies in Games SIC codes.

73148

We identify which of the companies in the company list are UK-based using Open Corporates (a web portal to query the business registries of different countries). We quality–assure the matching process using SIC codes and word similarity.

8880

We validate company identities through a web search, and use decision tree methods to identify non-validated companies that have a high probability of being games companies.

2225

We undertake final quality assurance and sense–checking of the data, removing inactive companies and extracting additional information from DueDil, a platform that provides comprehensive access to Companies House records.

1902

Master company dataset
including... Location, incorporation date and platform specialisation, financials (for larger companies)

+

Additional scraped data (UCAS)

Secondary data (ONS, Ofcom)

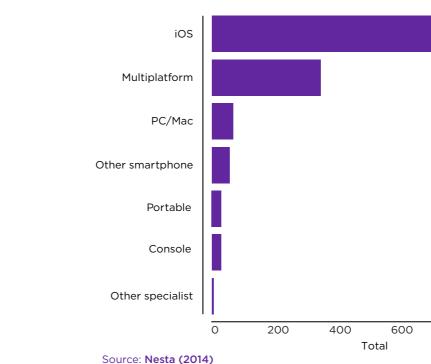**Geographical metadata** (ONS, Ordnance Survey)
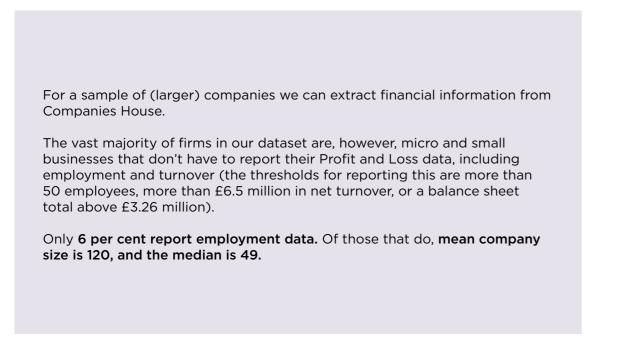
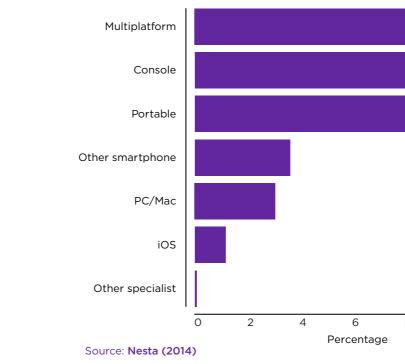# 2.   The shape of the UK games industry

a.   Descriptives

The final dataset that we use in our analysis contains **1,902 companies currently active in the UK. By comparison, official IDBR data based on official SIC codes suggests that, in 2013, there were 1,320 video games companies in Britain.**

Eighty-three per cent of the companies in our sample are identified using web sources, which means we have information about the platforms that these companies target. We use that information to study their specialisation patterns. We identify the other 17 per cent solely through their SIC code. In other words, they have a games SIC code but their products are not yet featured in the websites we use as data sources.

The majority specialise in iOS

Figure 2.1: **Distribution of companies by platform they specialise in**

Source: **Nesta (2014)**

iOS (including iPhone and iPad) is the most popular platform (64 per cent of the companies for which we have platform data only publish on iOS). Just under a quarter of companies diversify across multiple platforms (we examine this in Section 2.d below).

Ninety-five per cent of the companies in our sample are micro or small businesses

For a sample of (larger) companies we can extract financial information from Companies House.

The vast majority of firms in our dataset are, however, micro and small businesses that don't have to report their Profit and Loss data, including employment and turnover (the thresholds for reporting this are more than 50 employees, more than £6.5 million in net turnover, or a balance sheet total above £3.26 million).

Only **6 per cent report employment data.** Of those that do, **mean company size is 120, and the median is 49.**

Figure 2.2: **Reporting of employment by platform (per cent)**

Source: **Nesta (2014)**

Unsurprisingly, companies with the capacity to target multiple platforms, as well as consoles, are more likely to be above the reporting thresholds for Companies House.

Only 1 in 100 iOS specialists, and 3 in 100 PC/Mac specialists report employment data.

b.   SIC codes

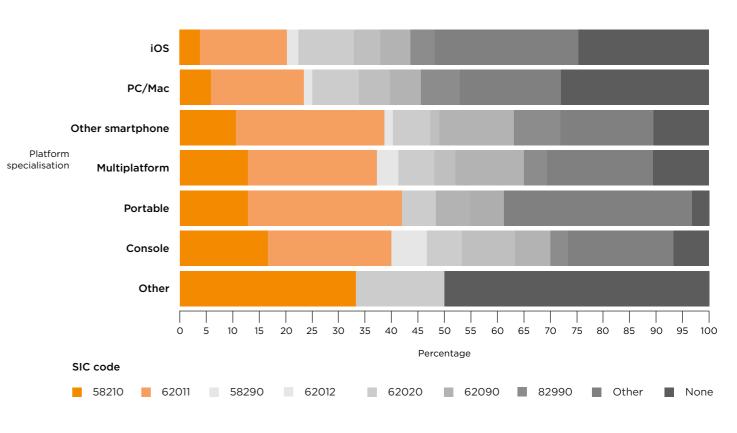### Official video games SIC codes fail to cover two-thirds of our dataset

Primary SIC Code		n	%
6201/1	Ready-made interactive leisure and entertainment software development	524	28%
6201/2	Business and domestic software development	154	8%
5821/0	Publishing of computer games	142	7%
6209/0	Other information technology and computer service activities	124	7%
6202/0	Computer consultancy activities	76	4%
8299/0	Other business support service activities n.e.c.	75	4%
5829/0	Other software publishing	42	2%
	Other	410	22%
	No SIC code available	355	19%

We have examined the primary SIC codes of all the companies in our sample. Official games SIC codes 6201/1 and 5821 cover just over one-third (35 per cent) of companies. Other digital codes capture around 18 per cent. Among the companies without games SIC codes we find established players like Rockstar North (developers of Grand Theft Auto), Rare Limited, Sega Europe and Media Molecule, and younger studios such as Fireproof Studios.

Our web-based approach also allows us to identify companies that haven't selected a SIC code yet because they are too young (90 per cent of the companies with no available SIC code were incorporated in the 2010s). All these companies would be missed using a SIC-based approach.

SIC codes are worse at capturing companies in newer platforms like iOS

Figure 2.3: **Distribution of SIC codes by platform**

SIC code

■ 58210   ■ 62011   □ 58290   □ 62012   ■ 62020   ■ 62090   ■ 82990   ■ Other   ■ None
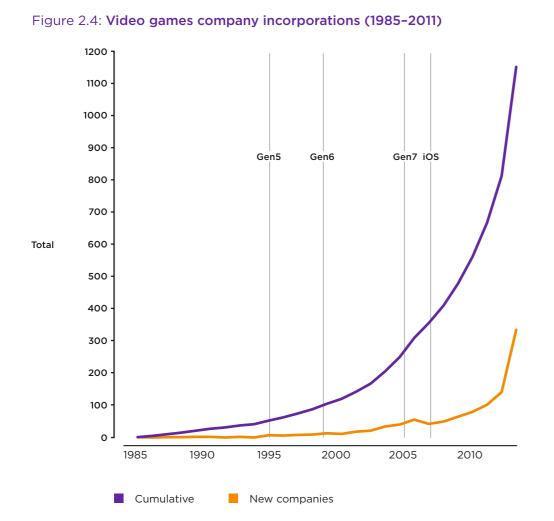
Source: **Nesta (2014)**

It is often said that SIC codes are poorly suited to capturing new industries, and our findings support this: as the figure above shows games studios targeting younger platforms such as iOS are half as likely to be captured by video games SIC codes as console-focused companies.
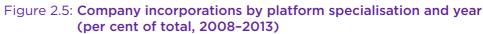
c.   Company formation

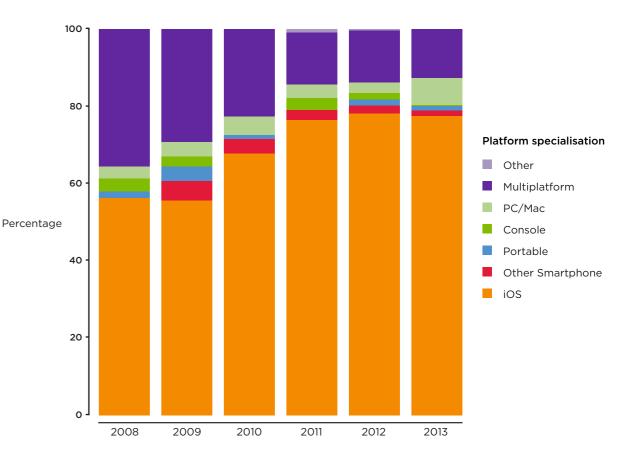### There has been an entrepreneurial explosion since the mid–2000s

Figure 2.4: **Video games company incorporations (1985–2011)**

Source: **Nesta (2014)**

Just over 90 per cent of the video games companies in our dataset started operating after 2000. The growth in the number of companies between 2011 and 2013 (around 22 per cent per year) was almost 15 times as fast as the UK economy overall (measured using IDBR data). This is in line with the growth projections for the wider App economy in VisionMobile (2014).

This explosion is being driven by iOS developers

Figure 2.5: **Company incorporations by platform specialisation and year (per cent of total, 2008–2013)**
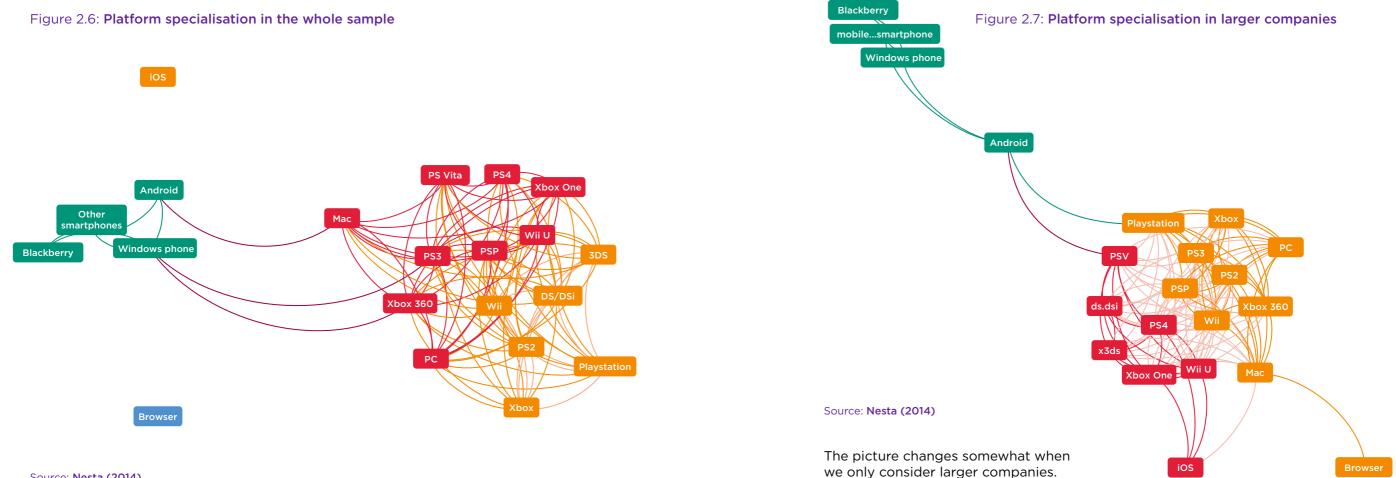

Source: **Nesta (2014)**

The overwhelming majority of new companies are iOS specialists, PC/Mac developers and multiplatform companies. Almost four times as many companies have been formed in the seven years since Apple's App Store launched as in the seven years before.

d.   Platform specialisation

W hat is the platform specialisation of the UK's video games industry? How companies specialise in different platforms, from consoles to mobile phones, tells us something about the transferability of technical, creative and business skills across platforms.

We calculate correlations between the platforms that companies target at the same time, and map the results in a network graph, for the whole sector, and then separately for larger companies (i.e. those for which we have employment data), in case our results are skewed by the presence of small single–platform companies. We then use community identification algorithms to identify 'platform families' (in different colours below) that the UK video games industry specialises in.[1]

There is specialisation, in that companies tend either to focus on 'traditional' gaming platforms or mobile platforms

Figure 2.6: **Platform specialisation in the whole sample**

When we look at the whole sector, we see a clear separation between dedicated games platforms (consoles, portables and also PCs and Macs) and mobile platforms. The overwhelming majority of iOS developers specialise in that platform over everything else.

Figure 2.7: **Platform specialisation in larger companies**

The picture changes somewhat when we only consider larger companies. Interestingly, larger companies tend to target iOS platforms *at the same time as* 'now gen' platforms such as PS4 or Xbox One. We still see a substantial separation between mobile and 'traditional' platforms.

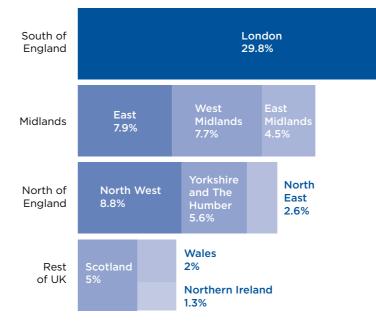# 3. The geography of the UK games industry

a. Regions and nations

Although the majority of video games companies concentrate in London and the South of England, the North of England has a stronger presence in video games than in the creative industries overall.

	Total	Percentage	Cumulative
London	566	29.8%	29.8%
South East	346	18.2%	47.9%
North West	167	8.8%	56.7%
East	151	7.9%	64.7%
West Midlands	146	7.7%	72.3%
South West	126	6.6%	79%
Yorkshire and The Humber	106	5.6%	84.5%
Scotland	96	5%	89.6%
East Midlands	86	4.5%	94.1%
North East	49	2.6%	96.7%
Wales	38	2%	98.7%
Northern Ireland	25	1.3%	100%

The South of England (including London) dominates our sample, concentrating almost 55 per cent of activity. However, this percentage is lower than for the creative industries overall (according to the DCMS classification and using IDBR data on business counts).
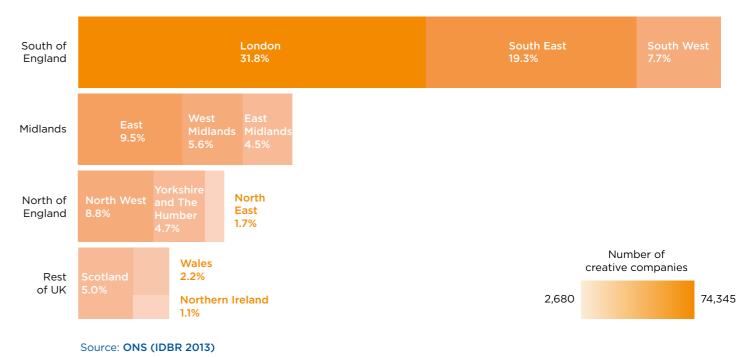
The North of England and the Midlands regions have a stronger presence in the video games industry compared to the creative industries overall.

Figure 3.1: **Distribution of video games companies by region/nation (percentage of total)**
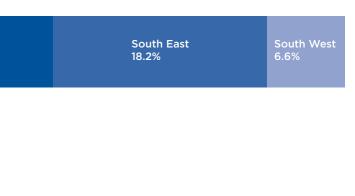

Number of games companies
25 — 566

Source: **Nesta (2014)**

Figure 3.2: **Distribution of creative industries companies by region/nation (percentage of total)**

Number of creative companies
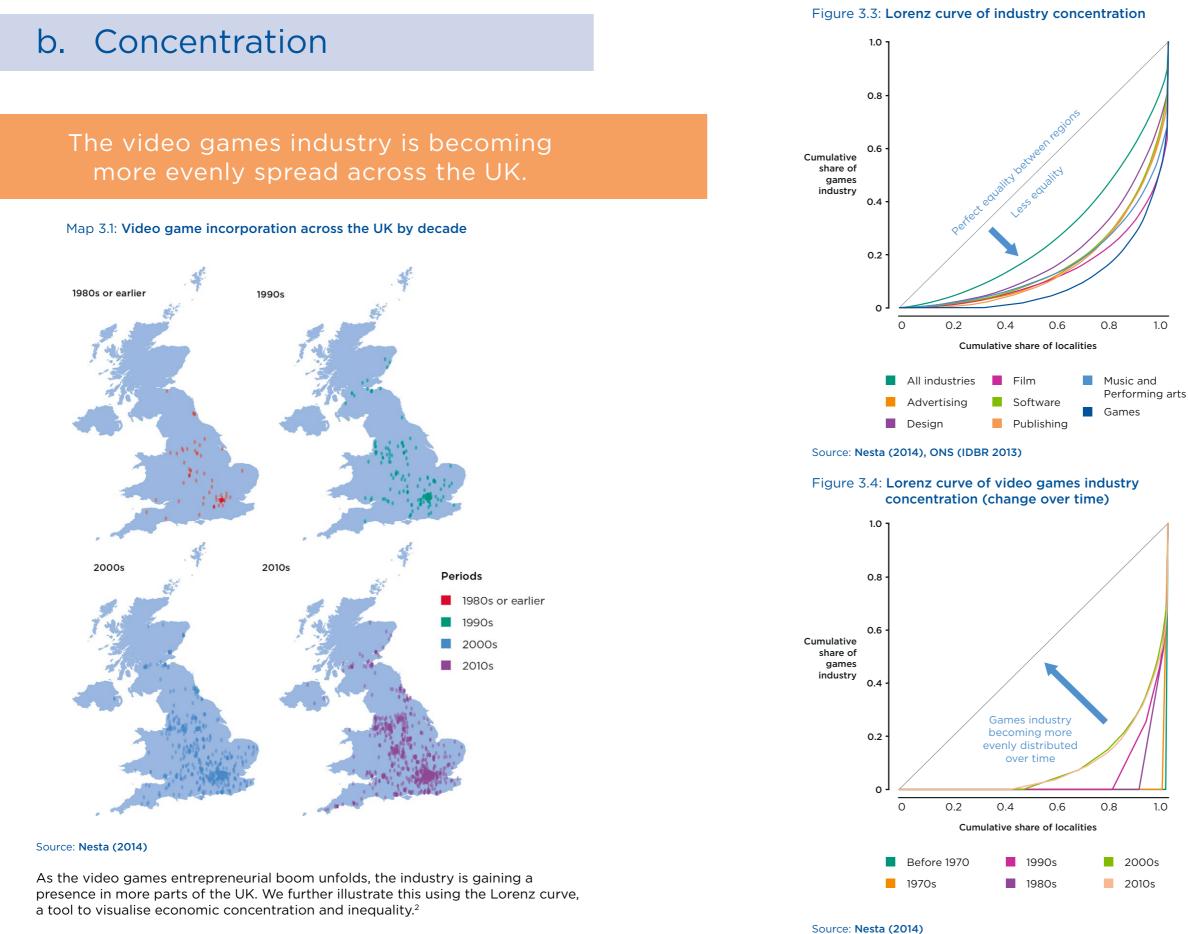2,680 — 74,345

Source: **ONS (IDBR 2013)**

b.   Concentration

The video games industry is becoming more evenly spread across the UK.

Map 3.1: **Video game incorporation across the UK by decade**

1980s or earlier   1990s

2000s   2010s

Periods

- ■ 1980s or earlier
- ■ 1990s
- ■ 2000s
- ■ 2010s

Source: **Nesta (2014)**

As the video games entrepreneurial boom unfolds, the industry is gaining a presence in more parts of the UK. We further illustrate this using the Lorenz curve, a tool to visualise economic concentration and inequality.[2]

Figure 3.3: **Lorenz curve of industry concentration**

Cumulative share of games industry

Perfect equality between regions

Less equality

Cumulative share of localities

- ■ All industries
- ■ Advertising
- ■ Design
- ■ Film
- ■ Software
- ■ Publishing
- ■ Music and Performing arts
- ■ Games

Source: **Nesta (2014), ONS (IDBR 2013)**

Figure 3.4: **Lorenz curve of video games industry concentration (change over time)**

Cumulative share of games industry

Games industry becoming more evenly distributed over time

Cumulative share of localities

- ■ Before 1970
- ■ 1970s
- ■ 1990s
- ■ 1980s
- ■ 2000s
- ■ 2010s

Source: **Nesta (2014)**

We compare the geographical distribution of the UK video games industry with some other creative sectors (measured using IDBR 2013 data). Although **the UK video games industry is more concentrated than other creative industries** (as well as the economy overall), this is changing as **video games companies open in other parts of the UK** (this is shown in Figure 3.4, which looks at numbers of companies formed in different decades).
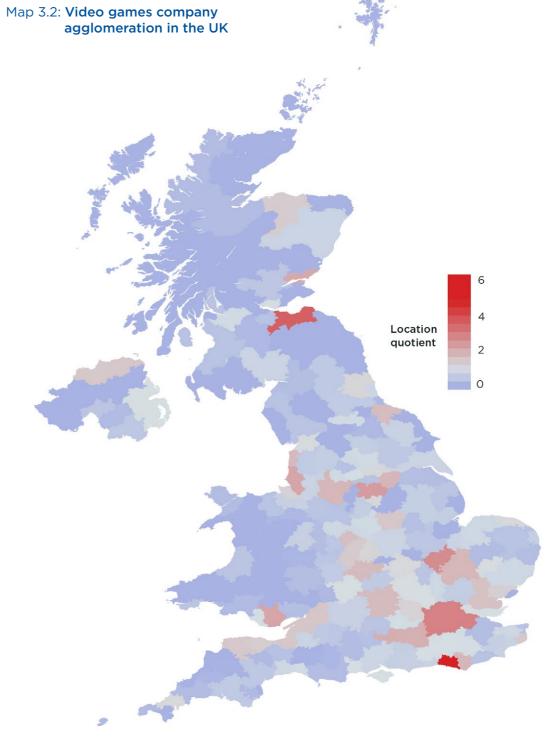
c.   Agglomeration

I NDUSTRIAL CLUSTERS are geographical concentrations of firms specialising in the same sector or related sectors along the value chain that collaborate and compete with one another, and have links with other local actors such as universities (Porter, 1990).

According to the economic geography literature, clusters innovate more and grow faster because firms can share infrastructures like broadband and talent pools, collaborate more easily and enjoy knowledge spillovers.

To identify the UK's video games clusters, we followed the same approach as in our *Creative Clusters and Innovation* report (Chapain et al., 2010). This involved:

- **Drilling down below the regional level:** Counting companies over large areas like regions and nations masks hotspots of games activity at the local level. To account for this, we analyse the geography of the video games industry at a finer level of resolution, the Travel to Work Area (TTWA). TTWAs are ONS–defined geographies that encompass local labour markets, measured using commuting data from the 2001 Census. In the discussion that follows we use the term 'area' to refer to TTWAs.

- **Measuring specialisation using location quotients (LQ):** To identify places with concentrations of video games companies, we calculate location quotients that normalise our measures of games activity using the relative size of the local economy. A location with a LQ of 1 has a video games presence which is typical of the UK as a whole. LQs larger than 1 indicate a stronger local sector presence than the national average, in other words, that a place is relatively specialised in the video games industry.

Map 3.2: **Video games company agglomeration in the UK**

Source: **Nesta (2014), ONS (IDBR 2013)**

The map above shows location quotients based on numbers of games companies by TTWA (normalised using 2013 business counts from IDBR). As we said before, there are hotspots of games activity right across the UK. We use this information in the next sub–section to identify the main areas where the sector clusters.

d. Video games clustering in the UK

We have used our data to select areas with a critical mass of video games activity.

The thresholds that we set are:

• Some specialisation in the sector (a video games company location quotient higher than zero).

• A higher than average absolute number of games companies higher than 20, the mean game company number for areas with at least some games industry presence.

This gives us a list of 18 areas. For each of these areas we analyse the games industry company counts (in our dataset) and employment estimates for the two official games SIC codes using data from an official employment survey (BRES) to classify them in the categories below.[3]

Clustering Type	Areas	Description
Balanced	London, Brighton, Guildford and Aldershot, Manchester, Dundee, Edinburgh.	Areas with a mix of large, established companies and small, younger companies.
Entrepreneurial	Liverpool, Sheffield and Rotherham and Cardiff.	Areas with largely micro or small video games companies.
Consolidated	Oxford, Warwick and Stratford–Upon–Avon and Cambridge	Areas with a relatively small number of companies employing large numbers of people in the games industry.
Potential	Wycombe and Slough, Birmingham, Nottingham, Newcastle and Durham, Bristol, Luton and Watford.	Areas with a critical mass of video games companies but low levels of specialisation in the sector compared with other areas.

These areas comprise 62 per cent of the companies in our dataset.

e.   Games hubs

W e find differences in the platform focus and industrial structure of our video games hubs.

Map 3.3: Video games hubs in the UK

Cluster type

- Balanced
- Consolidated
- Entrepreneurial
- Potential

We have analysed in further detail **12 areas that we define as 'video games hubs'** – those places with high levels of company and/or employment specialisation (that is, balanced, consolidated and entrepreneurial areas in the previous table).

Dundee

Edinburgh

Newcastle and Durham

Liverpool

Manchester

Sheffield and Rotherham

Warwick and Stratford upon–Avon

Nottingham

Birmingham

Cambridge

Luton and Watford

Wycombe and Slough

Cardiff

Guildford and Aldershot

London

Brighton

Bristol

Oxford

Source: **Nesta (2014), ONS (IDBR 2013)**

Figure 3.5: Platform specialisation by hub (percentage of companies specialising in a platform)

Percentage

Platform focus

- iOS specialist
- Other smartphone
- PC/Mac specialist
- Multiplatform
- Console specialist
- Portable specialist
- Other specialist

Source: **Nesta (2014)**

While Brighton, London, Manchester and Cardiff specialise more in iOS, Guildford, Oxford and Warwick have a relatively stronger console presence.

Figure 3.6: Mean worker estimate per firm by hub

Warwick, Cambridge, Guildford, Edinburgh, Manchester, Oxford, London, Dundee, Brighton, Sheffield, Cardiff, Liverpool

iOS focused

Source: **Nesta (2014), ONS (BRES 2012)**

iOS specialist hubs tend to have smaller companies. Edinburgh is the exception, although this is probably driven by its one very large video games company (Rockstar North).[4]

f.   Hubs – over time

iOS specialist hubs – especially London –
have boomed in the late 2000s/early 2010s.

Figure 3.7: **Company incorporation by hub, 1990–2011**

Video games hubs

- Brighton
- Cambridge
- Cardiff
- Dundee
- Edinburgh
- Guildford and Aldershot
- Liverpool
- London
- Manchester
- Oxford
- Sheffield and Rotherham
- Warwick and Stratford–upon–Avon

Source: **Nesta (2014)**

London's games economy started its boom in the late 2000s, after the launch of Apple's AppStore, and the Tech City initiative to support East London's digital cluster. Other clusters with an iOS specialism and diverse creative ecosystems such as Brighton and Manchester (see Chapain et al., 2010) followed suit in the 2010s.

Map 3.4: **London company formation and counts (by borough)**

1980s or earlier   1990s

2000s   2010s

Companies started   **Incorporation Decade**
4 ▭ 52   ◻ 1980s or earlier ◻ 1990s ◻ 2000s ◻ 2010s

Source: **Nesta (2014)**

The map above shows video games company formation in London over time, by postcode (red dots) and borough (green gradients). The 2000s and 2010s boom is again evident. Although Tech City boroughs like Hackney experience a boost (it ranks 6th in terms of video game company creation after 2008, whereas it was 11th beforehand), the fastest rates of company formation are in fact in Islington, Westminster and Camden.

4. Drivers of video games clustering

a. Co-location

In this section, we look at the relationship between the tendency of video games companies to cluster, and important local resources and capabilities.

We begin by looking at the sector's **complementarities with other creative industries.**

The idea here is that video games companies benefit from proximity to other sectors. In addition to trading with them (e.g. when a broadcaster commissions a game) and recruiting talent from them (e.g. when a graphic designer joins a games studio), co-location also opens the possibility of knowledge spillovers, where new ideas 'jump' between video games and other industries serendipitously (Chapain et al., 2010).

We look for evidence of such complementarities between video games and other creative industries by estimating correlation coefficients between their cluster patterns (location quotients). These are bounded between 1 and –1 and are an indicator of co-location. This provides indicative evidence of synergies that make industries more competitive when they are clustered together.

In addition to calculating these correlations using aggregate measures of video games clustering, we also compute them for measures of iOS specialist consoles clustering separately. That way, we aim to establish what the connections are between different parts of the video games industry and other creative industries.

The correlation matrix overleaf displays the results of our analysis (blue circles indicate positive co-location and orange circles indicate negative co-location).

Figure 4.1: **Creative industries and video games co-location**

Source: **Nesta (2014), ONS (IDBR 2013)**

Our correlation analysis shows, first, that video games companies locate together with Film, Video and TV, Advertising, Music and Performing Arts, Design and Software companies; and second that this result appears to be driven by iOS companies.

In particular, when we look at console companies separately, we find little evidence of co-location between them and other creative industries (and iOS developers, for that matter).

Conceivably this result might be driven by differences in business models (iOS games in contrast to console games, are often commissioned by advertisers and TV broadcasters), and by stronger labour and knowledge flows between iOS companies and other creative industries – something which merits further exploration.
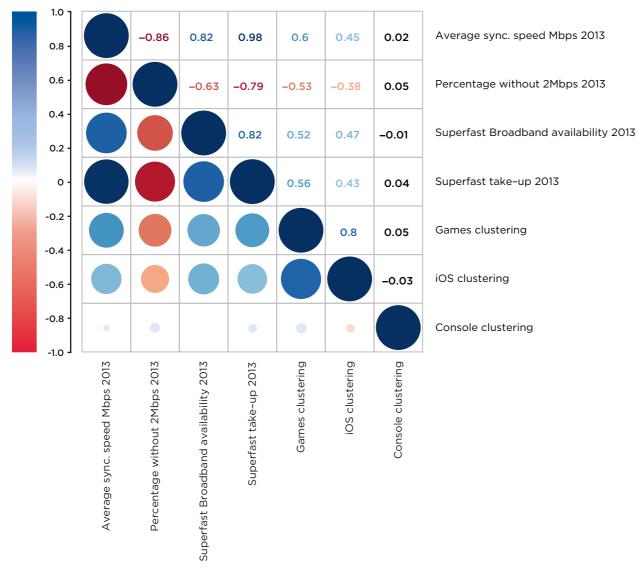
b. Broadband

The web is an important vehicle for video games distribution, collaboration and inspiration. This means that the conditions of the **broadband infrastructure could drive – or hinder – video games clustering.**

We explore this using broadband use data collected by Ofcom, the broadcasting and telecommunications regulator, to see how it correlates with the presence of video games clusters at the local authority level (on a logarithmic scale to reduce

the effect of outliers).[5] For this purpose we focus our analysis on the subset of 45 local authority districts with at least *some* video games presence (measured by whether they have at least five games companies in our dataset).

Together with the fact that the location quotients are normalised by overall levels of local industrial activity, this should reduce the likelihood that our findings are explained by urbanisation – the fact that larger areas tend to have both more games companies and faster broadband.

Figure 4.2: **Broadband access and video games clustering**

The measures of broadband access that we consider are:

- **Average sync. speed Mbps 2013:** The average maximum speeds of existing broadband connections.
- **Percentage without 2Mbps 2013:** The percentage of homes with broadband currently not achieving 2Mbit/s speeds.
- **Superfast Broadband availability 2013:** The percentage of addresses which are within the coverage area of superfast broadband networks.
- **Superfast take–up 2013:** Percentage of the total broadband connections which are superfast.

The results are consistent with the idea **that a stronger broadband infrastructure supports higher levels of video game clustering:** that is, clustering is positively correlated with average broadband speeds, superfast availability and take–up, and negatively correlated with the percentage of homes without basic connectivity. Our data further suggest that this result is driven by iOS companies – perhaps because they are more reliant on consumer broadband for their operations than larger console companies that have the resources to buy business broadband (something that is worth exploring further).

We cannot rule out that strong broadband infrastructure and video games presence are both explained by a third local factor, though we are exploring this possibility using longitudinal data.

Source: **Nesta (2014), Ofcom (2013)**

c. Education

One of the UK's great assets is its creative workforce, and the video games sector recruits heavily from universities.
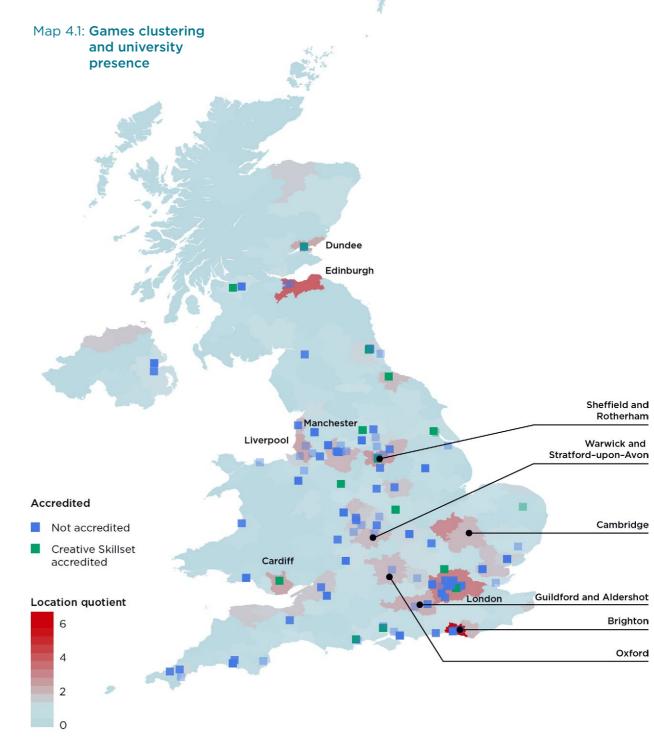
Around three-quarters of the games workforce have at least undergraduate qualifications, and one-quarter are postgraduates (Bakhshi, Hargreaves and Mateos-Garcia, 2013). An implication of this is that video games clusters could benefit from proximity to universities supplying the right talent. We use data from UCAS to explore if there is a relationship between games clustering and the presence of games courses in the vicinity.

Specifically, we use a selection of games-related keywords to identify 115 UK institutions offering 315 specialist undergraduate games courses in the UCAS web portal, and map them at the TTWA level, for which we have produced games clustering data. We also match this dataset with information about video games courses that have received Creative Skillset's accreditation (showing that they teach games industry-relevant skills). The map overleaf displays these data, together with levels of video games company agglomeration at the TTWA level.

In this analysis, we remove London from the sample in order to prevent the large number of games specialist courses and game companies in the capital from skewing our results. Even after doing this, we uncover evidence of a link between games clustering and specialist games talent supply.

- There is a positive correlation (coefficient of 0.37) between number of games specialist courses being offered in a TTWA and the extent of video games company agglomeration.

- There is a statistically significant difference between the mean number of courses in TTWAs that we identify as a games hub (as defined in Section 3) and those that aren't. In particular, the average games hub has four times as many games specialist courses in its vicinity.

- Over one in four games hubs have an institution that offers Creative Skillset accredited games in its vicinity (compared with less than 3 per cent of non-games hubs).

As in the case of broadband, this analysis doesn't tell us anything definitive about the direction of causality between games clustering and density of games specialist courses (does clustering create demand for courses, or does the supply of talent from games courses drive clustering?), but the results are nonetheless striking.

Map 4.1: **Games clustering and university presence**

Accredited

- ■ Not accredited
- ■ Creative Skillset accredited

Location quotient

6

4

2

0

Source: **Nesta (2014), ONS (IDBR 2013), UCAS (2014), Creative Skillset (2014)**

5. Conclusions and next steps

A new approach

We take a novel 'Big Data' approach to overcome the limitations of relying on the Standard Industrial Classification (SIC) to measure the UK's video games industry, and which exploits the digital footprint of the sector in product directories and fan websites. This method produces a data set of 1,902 UK video games companies. We combine this information with official data to identify how the sector clusters, and explore its drivers.

SIC issues

Our analysis provides evidence of the extent to which the SIC codes fail to capture the UK video games industry: we find that around one-third of the video games companies in our dataset are covered by the official games SIC codes 5821 and 6201/1. We show that SIC codes are particularily bad at capturing companies working in new mobile platforms.

An entrepreneurial, mobile-driven boom

Our dataset supports the idea that the UK's video games industry is enjoying an entrepreneurial boom, driven by companies working on newer, mobile platforms, and in particular iOS devices. Partly as a consequence, the sector is gaining a presence across more parts of the UK. Or in other words, digital distribution and new platforms aren't just bringing video games to new audiences, and democratising game playing – they appear to be democratising video games production too. Although production is still concentrated on London and the South of England, the North of England and the Midlands play a stronger role in the video games sector than in the creative industries overall.

Video games hubs

We have identified 18 areas in the UK with a critical mass of video games production, and out of these 18, 12 video games hubs with particularly high levels of video games company and/or employment clustering. These hubs span the UK, and go from established meccas of video games production like Cambridge, Brighton, Dundee, Guildford and Warwick and Stratford-Upon-Avon (Leamington Spa), to more up-and-coming locations like Manchester, Liverpool, Sheffield or Cardiff.

The games hubs are varied in their industrial structure, platform specialisation and recent trajectory. This means that some of the drivers and barriers to their growth might be distinct – fragmentation and access to finance might be a bigger issue in clusters dominated by iOS micro-businesses, for example, while access to office space and talent with specialist technical skills could matter more for clusters with large companies doing cutting-edge work in console or PC games. Policymakers should pay attention to these place-specific issues when they consider ways to support the sector.

Creative connectivity

Our analysis reveals significant levels of co-location between the video games industry and other creative sectors such as Design, Software, Advertising and Film, Video and TV, making it clear that the sector has become an integral part of the UK's wider creative economy. The creative co-location is most prevalent among iOS developers, probably because they trade, swap talent and exchange ideas more intensely with other creative industries than companies on other platforms.

Policymakers and other support bodies should look for ways to break down sectoral silos and strengthen the potential for innovative crossover between the UK video games industry and other parts of its creative (and wider) economy.

Infrastructure matters

We have looked closely at the link between video games clustering and two especially important components of the local infrastructure – namely, broadband and the talent pool. Although our analysis is exploratory, and can tell us little about causality, the findings that emerge are consistent with the view that better broadband and supply of talent from specialist games courses are associated with higher levels of clustering. These findings need deeper investigation, and we hope that the dataset we have generated in this project will allow just that.

Our data suggests the video games sector is larger than previously thought

It is possible to combine our data with GVA data for the two official games SIC codes published by DCMS (2014), and business count data from IDBR to make some back-of-the-envelope calculations about the size of the UK games industry today. According to this, the GVA of the industry could be as much as £1.7 billion.[6]

Next steps: a live platform to track the evolution of the UK video games industry in real time?

Going forward, we want to evolve the data collection methodology we have developed in this study into an interactive platform that will allow the games industry and its other stakeholders – investors, educators, talent, policymakers and commissioners – to understand its geography at the highest levels of resolution, and to track its performance in real time. That way, analysis of the sector can move away from static snapshots to a 'live' picture that users can customise to their needs – a defining feature of the 'Big Data' era that we will harness in the next stage of this project.

Appendix 1: Our data pipeline

Cluster Type	Action	Goals	Sources and Tools
DATA SELECTION	We select our data sources: web directories with information about video games titles, developers and publishers, and other websites covering the video games industry.	To capture efficiently historical and recent games production activity in console and mobile platforms, as well as support activities (motion capture, localisation etc.).	MobyGames, GameSpot, Pocketgamer, Tothegame, Develop 100, GameDevMap, MadeInCreativeUK.
DATA COLLECTION AND PROCESSING	We design and implement web–scrapers to extract product and company data from selected sources (resulting in a list of 69,343 companies), and design a database schema to store the data. We also identify 3,805 companies with games SIC codes in Companies House, without a publicly scrapable web presence. Altogether, we identified 73,148 company names. We match our list with Companies House data via Open Corporates Reconciliation API to identify UK–based companies. The matching is enhanced by data on company SIC, period of activity, and word similarity (Levensteihn score). We identify 8,880 confident UK matches.	To generate a list of UK–based video games companies on the basis of their production activities or their use of video games SIC codes when registering with Companies House (e.g. to capture newly–established companies that haven't released any video games yet).	Open Corporates Reconciliation API (matching), Companies House Free Data (SIC matching), DueDil. Node.js (scraping), MongoDB (storage).
DATA VALIDATION	We conduct a web search to validate company identity, by looking for web evidence linking company registration details to games production activity. We collect additional data about involvement with games for those companies that are validated. 2,110 companies are validated (1,679 correct matches). We use validation outcomes as a training set to predict what companies with low presence online are 'probably' video games companies (resulting in a list of 2,225 companies).	To minimise false positives in the dataset (matches caused by generic company names), reduce false negatives (situations where the matching process has failed for companies with generic names e.g. Rare), to exclude non–games companies that have released games (e.g. promotional games in global brands). To leverage Ukie domain knowledge to generate a high quality dataset.	SPSS (Decision Tree CHAID analysis).
DATA ANALYSIS	Final QA and sense–checking gives us 1,902 companies. We merge the company dataset with secondary data and metadata for mapping and analysis of clustering drivers.	To answer our research questions with the data.	Secondary data from BRES, IDBR, UCAS, Kickstarter, Ofcom, ONS. R (data cleaning, merging, analysis), Gephi (network graphs), Tableau (some of the visualisations).

Appendix 2: Data sources

Source	Description
MobyGames	User-maintained video games catalogue launched in 1999. MobyGames contains information on 90,000 titles in 150 platforms. This information includes developers and publishers involved, release date/platform(s)/genre(s) etc. MobyGames is particularly strong in its historical data, spanning 1971 to the present. It also offers aggregated journalist review data and user scores. www.mobygames.com
Gamespot	Video games review site launched in 1996. It contains a list of video games and companies, with a special focus on 'next gen' and 'last gen' consoles. www.gamespot.com
PocketGamer	Gaming database in operation since 2005. It offers product reviews and company lists, focusing on portable platforms, including handheld consoles, mobile, smartphone, and tablets. www.pocketgamer.co.uk
Tothegame	Gaming database launched in 2001. Contains detailed factsheets on gaming titles, focusing on 'next gen', 'last gen' and portable consoles. www.tothegame.com
Develop 100	Trade magazine Develop is the only European-based website and magazine totally focused on the games development sector. Develop publishes a series of Develop 100 reports detailing top games companies, including their location and, products and/or services based on their commercial and critical success, reputation, and potential. www.develop-online.net
GameDevMap	A living web map of game development organisations based on user submissions. It can be queried by location and type of company (developer/publisher/platform focus). www.gamedevmap.com
MadeInCreativeUK	A website and brand promoting the UK creative industries. Companies that register to use this brand – including games studios, publishers and technology suppliers - are featured on the website. madeincreativeuk.com

Source	Description
Companies House	The UK's registrar of companies. Companies House provides detailed information on company location, industry of activity (using SIC codes), and financials (including balance sheet data and, for larger companies, Profit and Loss information). We accessed Companies House through their free downloadable data file, Open Corporates (a portal to query international business registries) and DueDil (a user-friendly, automatable website for querying UK open business data). www.companieshouse.gov.uk
UCAS	The University Central Council on Admissions website provides information about higher education courses in the UK. It can be queried via keywords to identify courses in specific subjects and the institutions offering them. www.ucas.com
Ofcom Broadband data	Ofcom has been publishing data on residential, fixed broadband access at the local authority level since 2011. This is based on data supplied by telecommunications providers and monitoring of the routers in a panel of volunteers. maps.ofcom.org.uk/broadband
IDBR	The Inter-departmental Business Register is a list of UK businesses compiled using administrative data from a variety of sources including HMRC and Companies House. We accessed it through ONS' Nomis official labour market statistics portal. www.ons.gov.uk/ons/about-ons/products-and-services/idbr/index.html
BRES	The Business Register and Employment Survey is a survey that collects detailed information from VAT and PAYE registered UK businesses at the establishment level. Its sample consists of 80,000 companies and 500,000 local units. We also accessed it through Nomis. www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/business-register-and-employment-survey--bres-/index.html

Endnotes

1. Community detection algorithms use information about the proximity between nodes in a network (in our case, the nodes are platforms, and their proximity is determined by the number of instances when developers target them simultaneously) to sort them into groups. In our analysis, we employ the Louvain community detection method, which selects communities in a way that optimises the modularity of the network (that is, the extent to which it can be decomposed into groups of nodes which are densely connected internally, but sparsely connected with other groups). See Blondel et al., (2008).

2. The Lorenz curve represents the share of games industry captured by a share of locations. In a perfectly equitable distribution each location would have the same share of companies and the line would be a diagonal. In a perfectly inequitable distribution, one location would have all the companies, and the curve would overlap with the south–east corner of the figure. In our Lorenz curves, areas are defined at the TTWA level (see 3.c for a definition).

3. We do this using the location quotients for games companies (based on our company counts) and games employment in 18 areas (using BRES data and games SIC codes). Areas whose location quotients are above the median within the group in both company numbers and employment are classified as 'balanced'. Areas whose location quotients are above the median in number of companies but not in employment are defined as 'entrepreneurial.' Areas whose location quotients are above the median in employment but not on the number of companies are classified as 'consolidated'. Areas below the median for the group in number of companies and employment are classified as 'potential.'

4. Our measures of the industrial structure of each cluster combine our video games company counts with (area, rather than firm–level) BRES data on levels of employment. We do know however, from Companies House records that Rockstar North employed 318 workers in 2013, which made it one of the largest video games employers in the UK.

5. The matching of Ofcom data and our data is not seamless, due to differences in spelling and inconsistent aggregation of categories in their data (for example, although Ofcom publishes data at the Local Authority level, it includes London as a single area). We address this challenge by using a fuzzy matching approach where we match areas not on their exact name, but on its similarity. In any instances where the matching processes generates no matches, or more than one candidate, we remove the area from the dataset (this means dropping London, for example). We end up with a list of 174 matches out of 200 areas included in Ofcom's list.

6. Our approach is to calculate GVA per company for the two games SIC codes using DCMS (2014) and IDBR data averaged between 2011 and 2012, and scale this by the number of companies in our sample active in 2014. This assumes that the GVA per business in games SIC codes is the same as those in the rest of our dataset.

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