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A DYNAMIC MAPPING OF THE UK'S CREATIVE INDUSTRIES

Hasan Bakhshi, Alan Freeman and Peter Higgs

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EXECUTIVE SUMMARY

This paper argues that, despite its strengths, the UK Department of Culture, Media and Sport (DCMS) classification of the creative industries contains inconsistencies which need to be addressed to make it fully fit for purpose. It presents an improved methodology which retains the strengths of the DCMS's approach while addressing its deficiencies. We focus on *creative intensity*: the proportion of total employment within an industry that is engaged in creative occupations.

Our analysis brings to light inconsistencies that undermine the strengths of the DCMS definition as a *de facto* world standard, and will detract from the understanding which it has brought to the study of the creative economy, above all under conditions of structural economic change, such as digitisation.

Using the list of occupations which DCMS treats as 'creative', the intensity of the industries it defines as creative falls within a narrow range – with only minor exceptions – that is on average over 25 times greater than in the rest of the economy. This is a defining characteristic of such industries. However, DCMS's choice of industries excludes important codes with high creative intensity that account for large amounts of employment.

In addition, DCMS's choice of occupations is itself open to question, because the criteria by which they are classified as 'creative' are not clear. We propose a rigorous method for determining which occupations are creative, scoring all occupations against a 'grid' of five theoretically grounded criteria. The grid score of those occupations that DCMS considers as creative also lies in a range significantly above the grid scores of other, non-creative occupations. However, as with its choice of industries, DCMS's choice of occupations excludes codes that account for significant employment and which, on the strength of a rigorous classification, should be included. It also includes a small minority of codes which should be excluded.

We then propose a fully consistent classification by using these occupations to identify, on grounds of creative intensity, those industries that appear inappropriately included and excluded in the DCMS industrial classification (our 'baseline'). We conduct a sensitivity analysis to show that this classification lays the basis for a robust and consistent selection of industry codes. This accords with the reality, which should be squarely faced, that uncertainty is a defining feature of emergent areas subject to persistent structural change like the creative industries, and should be dealt with in a systematic way.

Our baseline classification suggests that the DCMS inappropriately excludes a large (and growing) software-related segment of the creative industries. We argue that significant numbers of new digital creative businesses in fact reside within this segment, reflecting an increasingly tight interconnection between content production and its digital interface. Our baseline estimates suggest that in its 2011 Statistical Release, the DCMS understated the size of creative employment in the UK by 997,500 of which 460,000 falls within the creative industries and 537,500 outside the creative industries.

Our estimates, like the DCMS's latest published estimates, are computed using the ONS's SOC2000 classification of occupations. In 2013, the DCMS will adopt the Office for National Statistics' new SOC2010 classification which, in general, permits an improved

discrimination between which occupations are creative and which are not. We estimate that the transition to SOC2010 will produce lower estimates of employment in the creative economy by about 15 per cent.

Our baseline estimates show that creative economy employment is now a highly significant and growing component of the workforce as a whole, accounting for 8.7 per cent of it by 2010 as compared with 8.4 per cent in 2004. Our estimates also confirm a feature of DCMS's estimates which has been documented in previous Nesta research: the majority of creative workers are employed outside the creative industries in the wider creative economy; this part of the creative workforce has grown particularly strongly, rising by 10.6 per cent between 2004 and 2010.

Our work shows that the creative industries do not rely, either wholly or mainly, on traditional content or ICT activities alone. Rather, a new economic phenomenon has emerged characterised by a parallel application, within single industries, of ICT and other creative skills together. This strongly suggests that any attempt to separate ICT from other creative work or to reduce the creative industries either to an offshoot of content production, or for that matter a branch of the software industry, will not succeed. Thus our sensitivity analysis includes, among other possible variants, the impact of removing the main software occupation codes from the list considered to be creative occupations. Even after this is done, ICT industries employing large numbers of people emerge as intensive users of the remaining creative occupations. On this alternative scenario, the software-related industries still contribute 213,000 jobs to the creative industries. The non–software creative industries are also very important employers of ICT labour.

We describe our approach as a 'dynamic' mapping because a systematic method for identifying the 'most creative' industries produces a classification that does not over-react to small fluctuations in the underlying data, but can respond to structural economic changes. Intensity data can be used to compare like with like over time. We thus derive a reasonably robust estimate of growth of creative economy employment which, between 2004 and 2010, rose by 6.8 per cent - more than five times the growth rate of the non-creative workforce, measured on a comparable basis over the same period. In 2010, almost 2.5 million were employed in the UK's creative economy, of which 1.3 million worked in the creative industries.

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The statistics in this report are adapted from data from the Office for National Statistics licensed under the Open Government Licence v.1.0.

1. INTRODUCTION

Considering it was introduced 14 years ago, the DCMS's (1998) classification of the creative industries has arguably stood the test of time well. It has become a *de facto* world standard. Creative industries estimates have become a regular feature of policy life and are widely used and cited. The DCMS classification, in one form or another, has prevailed as the preferred definition of the creative industries. This success strongly suggests that there is a real economic entity which the classification captures, at least in part. It describes features of the modern creative economy which are to be found in diverse countries throughout the world, which are becoming more marked with the passage of time, and which correspond, in some important respects at least, to the experience of the creative industries themselves.

This success masks a major shortcoming of DCMS's classification, however: it is *inconsistent*. Although it does reflect an underlying economic reality, it does not fully capture that reality; it excludes industries with the same features as the great majority of those it includes, and includes others that do not share these general features, without a clear rationale for doing so. In a fully consistent definition, by contrast, all industries in the definition would share key common features, and no industry would be excluded, if it also shared these common features.

A second problem is that the economic reality has itself changed, and the definition has not been updated in line with these changes, notably digitisation and the fact that increasing numbers of industries are embracing creativity as a way of gaining competitive advantage. A key feature of DCMS's original definition (which informs its industry classification) is its flexibility:

> *those industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property.*

This definition can accommodate change in principle. But this advantage has not been exploited, and the actual industries and occupations considered to be creative are still rooted in the conditions of the late 1990s.

The central obstacle to correcting these inconsistencies is that no explicit method underpins the DCMS's classification system. This lack of method only expresses a deeper problem, which is that the concept of 'creativity' itself was never defined. The often-cited definition that we have just given is a policy guideline, not an analytic definition. It offers a generalised rationale, but no explicit criteria for making informed judgements on what should be counted as 'creative', and what should not. As such, it is not transparent; decisions on which Standard Occupational Classification (SOC) or Standard Industrial Classification (SIC) codes to include are not structured to permit informed discussion by a community of practice including policymakers, practitioners and researchers. This contrasts with the way that, for example, definitions of R&D and innovation have been developed in such publications as the OECD's *Frascati* and *Oslo* manuals, or cultural activity in UNESCO's (2009) cultural statistics framework.[1]

This reflects a broader problem which is not of the DCMS's making: creativity is generally speaking a poorly defined concept, and there is no agreed objective basis to judge what

is, or is not, creative. Writers casually impose their own definitions. Three defining works in the field – Florida (2002), Caves (2002) and Cox (2005) – offer definitions which overlap and, to a degree, mutually re-enforce each other, but certainly do not coincide. This is not surprising, since each writer has one particular focus – for example, Florida on the workforce and its relation to urban space, Caves on the contractual structure of creative business, and Cox on the relation of design to business innovation. However, though each is interesting and valid in its own sphere, none addresses the wider question: 'what do we mean by the word "creativity"?' nor provides a definition of the creative industries rooted in a systematic answer to that question.

Lacking a consistent, objective or transparent framework for selecting particular SIC and SOC codes as creative and others not, we should not be surprised that the DCMS has struggled to keep its classifications up to date in the face of structural changes such as digitisation, and has retained internal inconsistencies, addressed in this paper, which obstruct the production of reliable and trustworthy evidence.

The purpose of this paper is to address the shortcomings of the DCMS classification based on a rigorous, analytic method which understands the creative industries as an integrated economic whole. We are guided by three principles. First, the method should be *robust*; the estimates to which it gives rise should not change by large amounts in response to small changes in the underlying data or its classification. Second, it should be *responsive*: capable of step by step adjustment to deal with structural, longer–term changes in the economy. Third, it should be *transparent*: other analysts and researchers, with access to the same data, should be able to reproduce its results. Such rigour is required not for arcane reasons, but because a definition that matches economic reality will ensure that the wider unity of practice, amongst those who use and produce creative industries statistics, is regulated by a unity of understanding.

2. ORIGIN OF THE 'CREATIVE INTENSITY' METHOD

The method we use in this paper focuses on a measure which Freeman (2004: 7) termed *creative intensity*, defined as the proportion of workers in any given creative *industry* that are engaged in a creative *occupation*. This approach draws on a key feature of the DCMS classification: it includes a definition of both industries and occupations. This distinguishes it from most other industrial classifications, including the SIC system itself, which define only industries.[2]

The approach itself is rooted in the early work of the European Leadership Group on Culture (known as LEG), which informed the approach of the original DCMS (1998, 2001) mapping documents. As Deroin (2011) explains, the development of European Working Groups on cultural statistics began in November 1995, when the European Council of Culture Ministers adopted the first resolution on the promotion of statistics concerning culture and economic growth. This resolution invited the European Commission "to ensure that better use is made of existing statistical resources and that work on compiling comparable cultural statistics within the European Union proceeds smoothly."

> *In response to this request, the Commission encouraged the creation of the first European pilot working group on cultural statistics, known under the acronym "LEG Culture" (Leadership Group on Culture). From 1997 to 2004, the LEG and its following operational European working groups drew up the first European framework for cultural statistics and developed specific methodologies such as the method for estimation of cultural employment. (Deroin 2011:1).*

This led in 2001 to a tool, developed by the European Task Force on cultural employment, to produce a 'culture matrix' which brings together cultural professions and cultural activities. As Deroin (2011:15) explains:

> *This method for assessing cultural employment uses the results of the European Labour Force Survey (LFS), which has the advantage of being based on a sample of households in all the EU Member States (as well as in the candidate countries and the EFTA), and of being structured around 2 reference classifications: the NACE which classifies the employer's main activity, and the ISCO which classifies professions... The method consists in estimating all cultural employment in the economy, that is, employment in all cultural activities along with cultural jobs in non-cultural activities. The estimate can be performed by using two classifications (NACE and ISCO) used in the LFS. Once the most refined posts are filled in, it is simple to make an estimate of cultural jobs:*
>
> *Cultural employment =*
>
> *cultural occupations (A)*
>
> *+ non-cultural occupations in cultural activities (C)*
>
> *+ cultural occupations in non-cultural activities (B)*

The DCMS (1998) classification reproduced the core idea that creative and cultural activity is best captured by describing, and measuring, both the industries whose outputs may be considered creative, and the occupations whose activities may be considered creative. But DCMS did not draw any special connection between the two. Rather, it regarded the creative occupations as an additional component of creative employment as a whole, simply 'adding' creatively-occupied workers outside the creative industries to those inside, and even assigning them to 'industries' they did not work in. It paid little attention to the specialised use which the creative industries made of their creative talent; it did not until 2011 publish statistics recording the number of creative workers that work *within* the creative industries and has not really paid any systematic attention to this aspect of its own statistics.

Three groups of researchers have drawn attention to the distinctive role of the creative workforce inside the creative industries themselves. Peter Higgs and Stuart Cunningham, working at the Centre of Excellence for Creative Industries (CCI) at Queensland University of Technology, devised an approach they termed the 'Trident' method (Higgs et al., 2005). Using a terminology we employ throughout, they called creative occupations inside the creative industries 'specialist' jobs and those outside the creative industries 'embedded' jobs: they coined the term 'support' jobs, now adopted by DCMS, to describe the additional jobs within the creative industries which were not themselves creative occupations. Working independently, Freeman (2004:7) began producing measures of 'creative intensity' and showed that this was systematically higher in the creative industries than elsewhere, was increasing over time, and was particularly high in London and the South–East of England. Nesta encouraged the development of these ideas in the UK, leading to a number of publications on the creative industries that focussed on the role of the embedded workforce (Higgs et al., 2008), Bakhshi et al., 2008).[3] Freeman (2008b:15) concluded that:

> *If we think of this labour as a resource, and the sector's outputs as a product, then it begins to make sense to conceive of the industry as a specialised branch of the division of labour which uses this resource to produce specialist products.*

We can illustrate this by asking the simple question: where are creatively occupied workers actually employed? Table 2.1 provides a basic breakdown for the industries and occupations defined by DCMS as creative. In this Table, the components of creative employment are highlighted. The 476,800 jobs in the first row and column are the specialist jobs and the 600,900 in the first column and second row are the embedded jobs. The remaining 420,500 in the second column and first row are the support workers.

The results are qualitatively very significant. 53 per cent of those employed within the industries which DCMS defines as creative are engaged in occupations which DCMS defines as creative. This is over 25 times higher than in those industries that DCMS does not define as creative. It is also consistent across nearly all the DCMS industries. As Table 2.2 shows, only three of the eleven DCMS sectors defined by industrial codes have intensity lower than 35 per cent. Moreover the low intensity recorded for the sectors 8 and 12 (Software/ Electronic Publishing and Digital and Entertainment Media) is entirely a consequence of the reclassifications introduced with DCMS's 2011 Statistical Release. If these reclassifications had not been made, the intensity in these two sectors combined would have been 58 per cent.

TABLE 2.1: EMPLOYMENT IN THE CREATIVE INDUSTRIES

	Occupation			
Industry	**Creative Occupations**	**Other Occupations**	**Total in this industry**	**Intensity (Creatively Occupied/Total Employment in the Industry)**
Creative Industries	**476,800**	**420,500**	897,300	53%
Other Industries	**600,900**	27,622,800	28,223,700	2%
Total in this occupation	1,077,700	28,043,300	29,121,000	4%

Source: Creative Industries Economic Estimates Full Statistical Release, 8 December 2011, page 28

TABLE 2.2: INTENSITIES IN THE DCMS SECTORS, 2011 ESTIMATES

		Creative	Other Occupations	Total Occupations	Intensity
1.	Advertising	45,900	69,400	115,300	40%
2.	Architecture	67,300	36,200	103,500	65%
3.	Art & Antiques	500	8,300	8,800	6%
5.	Design	56,400	42,100	98,500	57%
6.	Designer Fashion	3,700	2,900	6,600	56%
7.	Film, Video & Photography	28,700	29,500	58,200	49%
9&10.	Music & Visual and Performing Arts	138,400	52,800	191,300	72%
11.	Publishing	71,300	111,500	182,700	39%
8&12.	Software/Electronic Publishing	900	22,300	23,200	4%
8&12.	Digital & Entertainment Media	2,000	11,200	13,200	15%
13.	TV & Radio	61,700	34,200	96,000	64%
	Total	476,800	420,500	897,300	53%

Table 2.3 provides a more detailed view, looking at the individual SIC codes which are used in DCMS's classification in the above sectors. Intensity within five-digit SIC codes cannot be determined with any more accuracy than for four-digit codes, since the Labour Force Survey (LFS) section of the Annual Population Survey (APS) – the basis of DCMS's estimates – only provides data classified at the four-digit SIC level. From now on we therefore refer to the four-digit codes, within which the firms classified by DCMS as creative are to be found, unless the contrary is stated.

Only one of the four-digit industries identified by DCMS as containing creative industries has an intensity lower than the national average for the economy as a whole. More than half these codes – accounting for 75 per cent of those working within these industries – have intensities greater than 30 per cent.

TABLE 2.3: CREATIVE INTENSITIES IN CODES DEFINED BY DCMS AS CREATIVE

Industry		Intensity
9003	Artistic creation	90%
5912	Motion picture, video and television programme post-production activities	89%
9001	Performing arts	81%
6010	Radio broadcasting	73%
7420	Photographic activities	73%
5911	Motion picture, video and television programme production activities	68%
7111	Architectural activities	65%
6020	Television programming and broadcasting activities	56%
5814	Publishing of journals and periodicals	55%
7410	Specialised design activities	55%
9002	Support activities to performing arts	52%
7312	Media representation	47%
5920	Sound recording and music publishing activities	40%
5813	Publishing of newspapers	39%
7311	Advertising agencies	39%
1820	Reproduction of recorded media	36%
5811	Book publishing	34%
5819	Other publishing activities	28%
9004	Operation of arts facilities	23%
1813	Pre-press and media	20%
5913	Motion picture, video and television programme distribution activities	19%
5914	Motion picture projection activities	13%
6201	Computer programming activities	11%
1411-1520	Clothing and accessories	7%
4779	Retail sale of secondhand goods in stores	6%
4778	Other retail sale of new goods in specialised stores	5%
5829	Other software publishing	3%

This is not a general feature of the relation between industries and occupations.

Table 2.4 shows the intensities of the main occupational groups within the main industrial Sections, as defined by the Office for National Statistics (ONS). These Sections define the 'standard' groupings which the ONS, applying international standards, considers to be industries properly defined. Very few of the occupational intensities match even the average seen in the creative industries. The highest is Teaching and Research Professionals, perhaps the most specialised occupation that is explicitly defined, and accounts for 45 per cent of the workforce in the Education sector – significantly lower than many intensities found in the creative industries. Science and Technology Professionals, an occupation which might be expected to show high degrees of industrial specialisation, given their similarity to the creative industries in other respects, do not form a particularly high proportion of the workforce of any industrial Section.

Moreover in many cases where intensities even approach those found in the creative industries, we find that the occupations concerned are intensively employed across a range of industries, unlike the creative occupations which tend to be heavily concentrated in the creative industries and dispersed in the others – a point we will shortly investigate in more depth. So, for example, 'Corporate Managers' make up 28 per cent of employment in Financial and Insurance Activities. But they are clearly a general resource used in a wide range of industries, showing intensities of 19 per cent in Manufacturing and 17 per cent in 'Electricity, Gas etc.' We should expect that any large occupational group will be intense across a range of industries. The peculiarity of the creative industries is that the high intensities apply only to a quite specific group of industries, that employ these types of workers in much higher proportions than do almost all other industries.

It is possible that these low intensities reflect an inappropriate selection of occupations – so that, if occupations were judiciously chosen, as with the creative occupations, they would account for a higher proportion of employment in certain industries that are in some sense their 'natural home'. Thus 'Skilled Construction and Building Workers' account for 39 per cent of employment in Construction (a not unsurprising statistic), which is itself low when compared with the intensities typical of the creative industries, but we might suppose that this proportion would increase if we added other occupations that were also intense within construction. But there are no obvious such groups – the next highest intensities are Corporate Managers, and 'Skilled Metal and Electrical Trades' both of which are of the dispersed, general type discussed above.

TABLE 2.4: OCCUPATIONAL INTENSITIES IN THE STANDARD GROUPS

	Agriculture, Forestry and Fishing	Mining and Quarrying	Manufacturing	Electricity, Gas, Steam and Air Conditioning Supply	Water Supply	Construction	Wholesale and Retail Trade	Transportation and Storage	Accommodation and Food Services	Information and Communication	Financial and Insurance Activities	Real Estate Activities	Professional, Scientific and Technical Activities	Administrative and Support Service Activities	Public Administration and Defence	Education	Human Health and Social Work	Arts, entertainment and Recreation	Other Service Activities
Corporate Managers	3	15	19	17	13	15	15	10	3	25	28	12	18	12	13	3	8	6	7
Managers and Proprietors in Agriculture and Services	10	2	1	1	4	1	4	1	16	3	1	19	2	5	1	1	1	9	6
Science and Technology Professionals	1	11	9	14	6	5	1	1	0	26	5	0	10	1	3	1	1	1	2
Health Professionals	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	8	0	0
Teaching and Research Professionals	0	0	0	0	1	0	0	0	0	0	0	0	1	1	2	45	1	1	1
Business and Public Service Professionals	0	3	1	3	2	2	0	1	0	3	6	4	20	1	7	1	4	3	10
Science and Technology Associate Professionals	0	6	4	5	4	2	0	1	0	4	2	1	4	1	2	2	1	1	2
Health and Social Welfare Associate Professionals	0	0	0	0	0	0	1	0	0	0	0	7	0	0	4	1	24	0	3
Protective Service Occupations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Culture, Media and Sports Occupations	0	0	1	0	0	0	0	0	0	15	0	0	8	1	1	2	0	28	2
Business and Public Service Associate Professionals	1	5	4	6	5	2	4	5	1	5	24	15	11	7	10	3	3	4	3
Administrative Occupations	3	6	6	9	8	5	6	9	2	5	23	15	10	9	25	4	6	10	7
Secretarial and Related Occupations	2	1	1	1	1	2	1	1	2	1	2	5	5	2	3	3	5	3	3
Skilled Agricultural Trades	45	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	5	0

Skilled Metal and Electrical Trades	2	13	14	12	4	10	5	3	0	4	0	1	1	2	1	0	0	1	5
Skilled Construction and Building Trades	0	1	3	7	1	39	0	0	0	0	0	2	1	0	0	0	0	0	1
Textiles, Printing and Other skilled Trades	1	0	5	1	0	1	2	0	13	1	0	0	0	0	0	1	1	1	2
Caring Personal Service Occupations	1	0	0	0	0	0	0	0	0	0	0	2	1	1	2	20	33	2	4
Leisure and Other Personal Service Occupations	0	0	0	0	0	0	0	4	2	0	0	2	0	5	0	2	1	7	31
Sales Occupations	0	1	1	4	1	0	36	1	4	2	3	7	1	2	0	0	0	2	1
Customer Service Occupations	0	0	1	10	2	0	2	2	1	2	5	2	1	5	1	0	0	2	1
Process, Plant and Machine Operatives	2	21	18	5	9	5	2	1	1	0	0	0	1	1	0	0	0	1	1
Transport and Mobile Machine Drivers and Operatives	3	11	3	2	16	3	4	40	1	0	0	0	0	3	1	1	0	0	1
Elementary Trades, Plant & Storage Related Occupations	25	1	8	1	5	7	5	8	1	1	0	1	0	4	1	0	0	2	1
Elementary Administration and Service Occupations	1	2	1	1	17	1	7	12	48	2	1	3	1	30	3	8	4	10	5

Note: Highlighted cells show intensity greater than 10 per cent

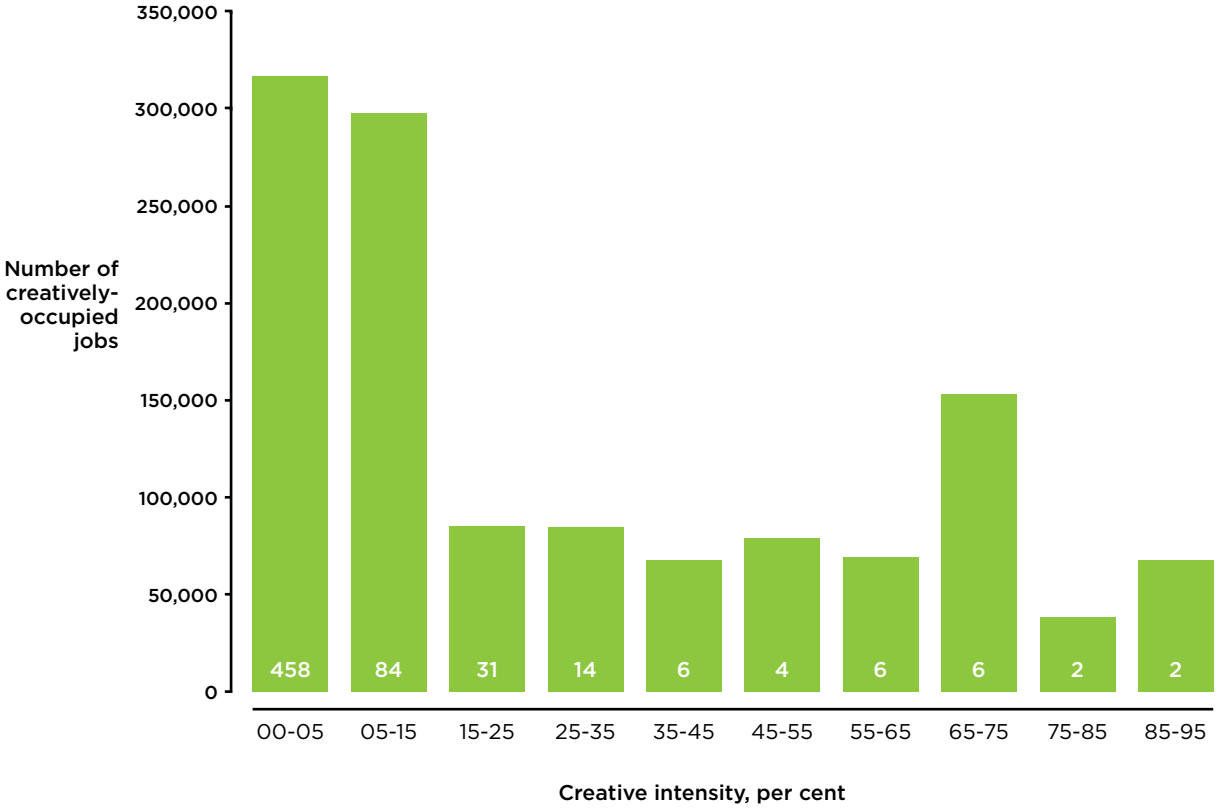
The special role of the creative workforce within the creative industries has led all three groups of researchers that we previously identified to agree that a defining feature of the creative industries is its workforce, and in particular the special use that they make of particular types of workers. The working assumption that informs this paper is that the creative industries are a specialist branch of the division of labour that has discovered how to harness the capabilities of this workforce to produce outputs which, it turns out, constitute a growing share of the value added in most advanced economies.

The justification for this assumption goes beyond the evidence of the intensity figures alone. A range of research suggests that the 'pragmatic validity' of the creative industries arises because they perform a definite and growing *economic function* which arises from fundamental changes in society, the most central being digitisation, the rise of the content industries, and the steadily growing share of discretionary spending in total economic demand. This idea is developed at greater length, and justified, below in Section 4, where we deal with the definition of creative occupations.

3. PROBLEMS AND INCONSISTENCIES IN THE DCMS CLASSIFICATIONS

Chart 3.1 summarises the way this guides our approach, presenting creatively–occupied jobs as a frequency distribution. The vertical axis shows the creatively-occupied jobs within industries having the intensities shown on the horizontal axis.

CHART 3.1: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY CREATIVE INTENSITY



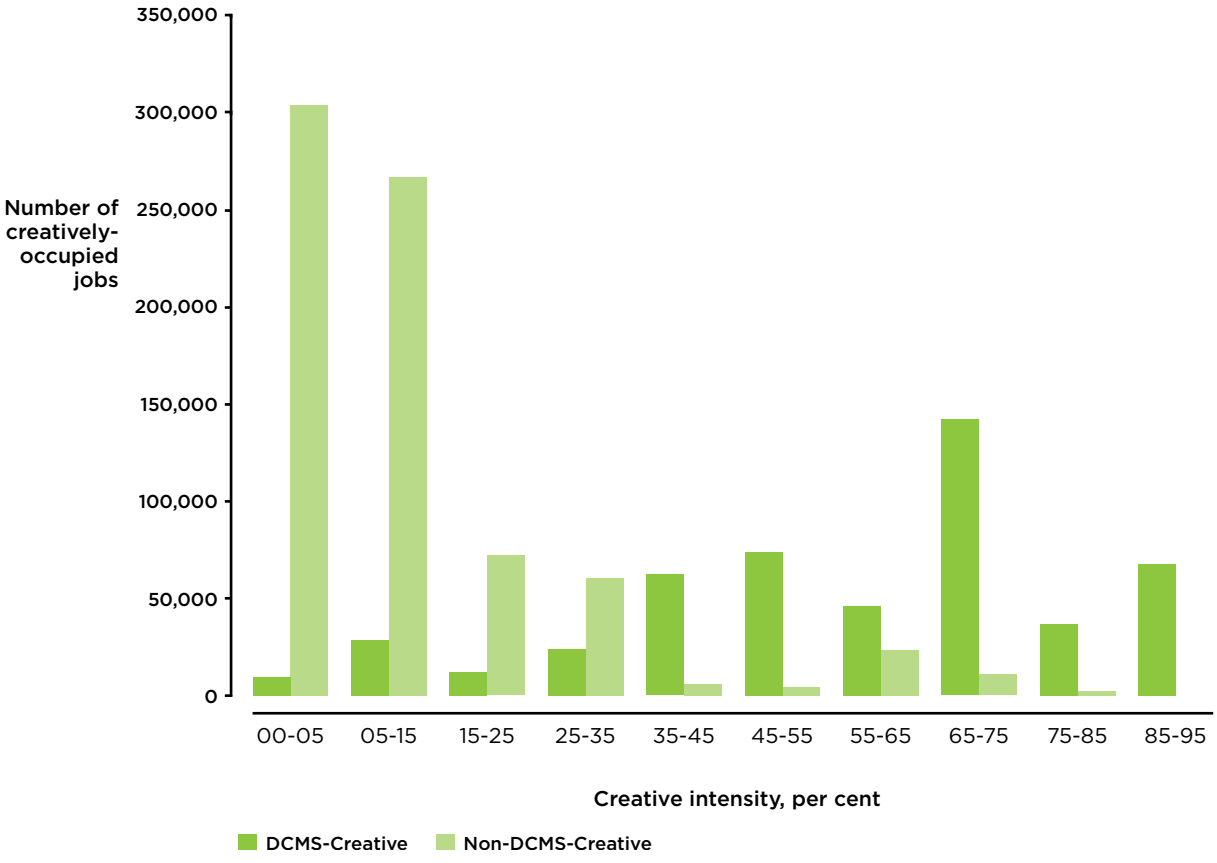
The chart shows how creatively-occupied jobs are distributed between industries. The horizontal axis shows ten bands of increasing intensity, the smallest covering zero to 5 per cent and the largest covering 85 to 95 per cent. Each column shows the creative employment accounted for by the industries whose intensity falls within that band: thus the 22,800 creatively-occupied jobs within code 6201 (Computer Consultancy) in which intensity is 11 per cent, will be counted within the bar over the band '05-15 per cent'. The numbers inside the bars show the number of industries that fall within this frequency range.

This is a bimodal distribution with two peaks around which intensity is clustered – one which appears to lie between 0 and 15 per cent, and the other between 65 and 75 per cent.

We can study this in more detail by asking how much employment, in each frequency band, is accounted for by SIC codes that are included, at least in part, in the DCMS classification, and SIC codes that are not. This is shown in Chart 3.2.

This clearly confirms that a group of industries are distinguished by a markedly higher tendency to employ creative workers. But it also points to misallocations in the DCMS statistics: a definite group of industries which DCMS does not treat as creative exhibit high intensities, showing as a 'blip' in the distribution of the non-creative industries peaking at 55-65 per cent. In addition, a significant number of industries that DCMS classifies as creative exhibit intensities well below the average for the creative industries.

CHART 3.2: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY CREATIVE INTENSITY, PARTITIONED INTO DCMS-CREATIVE AND NON-DCMS-CREATIVE

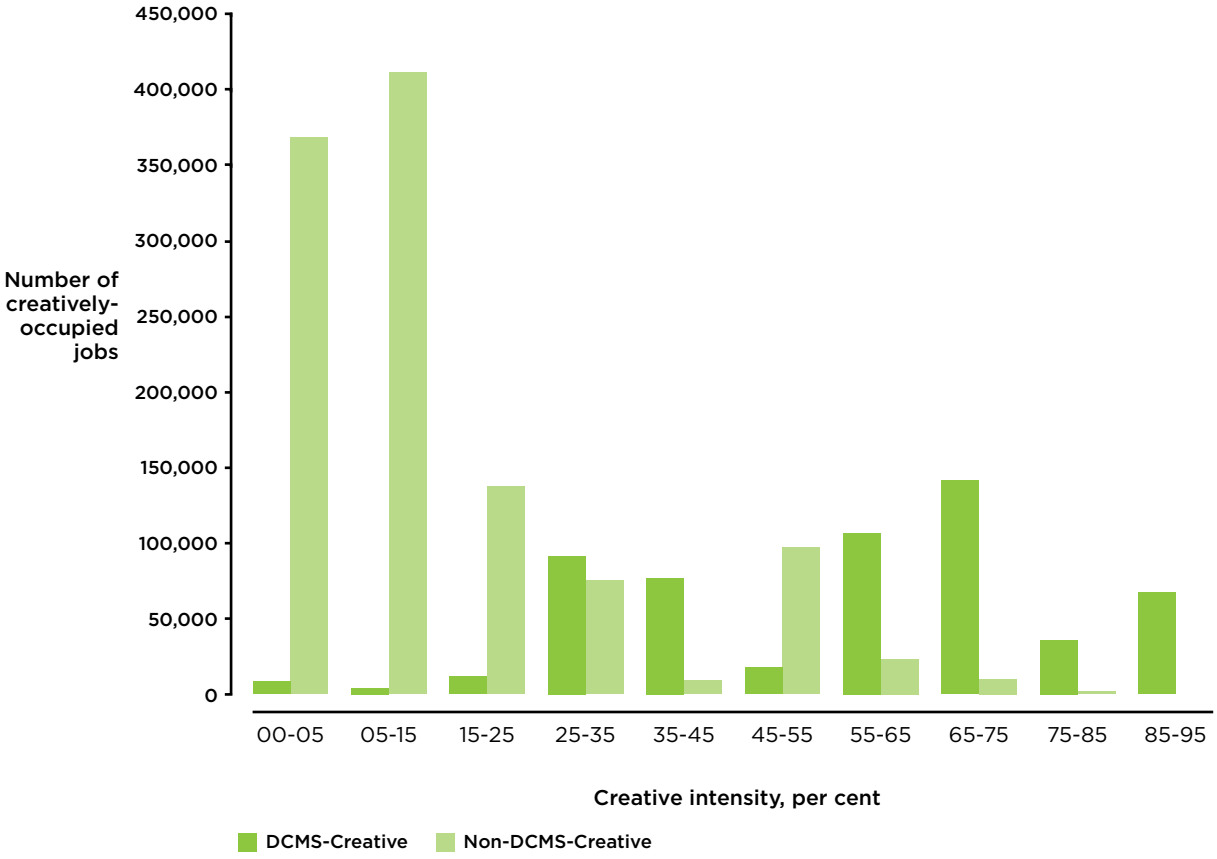


The inconsistency becomes clearer, as do the possible means to correct it, if we restore to the occupations considered creative the two software occupation codes which DCMS dropped in 2011 but included in its 2010 estimates, these being IT Strategy and Planning Professionals (2131) and Information and Communication Technology managers (1136). We can then recalculate the intensities that result, giving Chart 3.3. On the one hand, significantly fewer DCMS-creative industries exhibit the low intensities shown in Chart 3.2; particularly those lower than 25 per cent. But in addition, a much larger group of non–DCMS–creative industries now exhibit intensities above the average for the creative industries, showing up as a new and larger blip between 45 per cent and 55 per cent, dwarfing the blip between 55 per cent and 65 per cent which still remains. The first 'blip' includes the software-related industrial code 6202 with a creative intensity of 47 per cent,

employing 201,800 workers of whom 94,000 are creatively-occupied. Industrial code 6209 with an intensity of 29 per cent contributes a further 35,000 jobs of which 10,000 are creatively occupied. Finally, although the code 6201 with intensity of 34 per cent is presented in Chart 3.3 as creative in its entirety (employing 207,000 of whom 70,000 are creative), DCMS in fact only counts a small proportion of the employment from this software-related code.

This suggests that a combination of creative skills across a spectrum of activities contributes to the 'creative industries' as a coherent grouping of sub-sectors. The growing use of ICT in virtually all spheres of creative work suggests that creative talent has great economic impact when working in tandem with ICT.

CHART 3.3: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY CREATIVE INTENSITY, PARTITIONED INTO DCMS–CREATIVE AND NON-DCMS–CREATIVE, WHEN TWO EXCLUDED SOFTWARE OCCUPATIONS ARE RESTORED



This is confirmed if we add to the list of creative occupations a further software related occupation code which DCMS has never treated as creative, namely Software Professionals (2132). This gives rise to Chart 3.4 in which the distinctiveness of the two distributions involved is particularly clear.

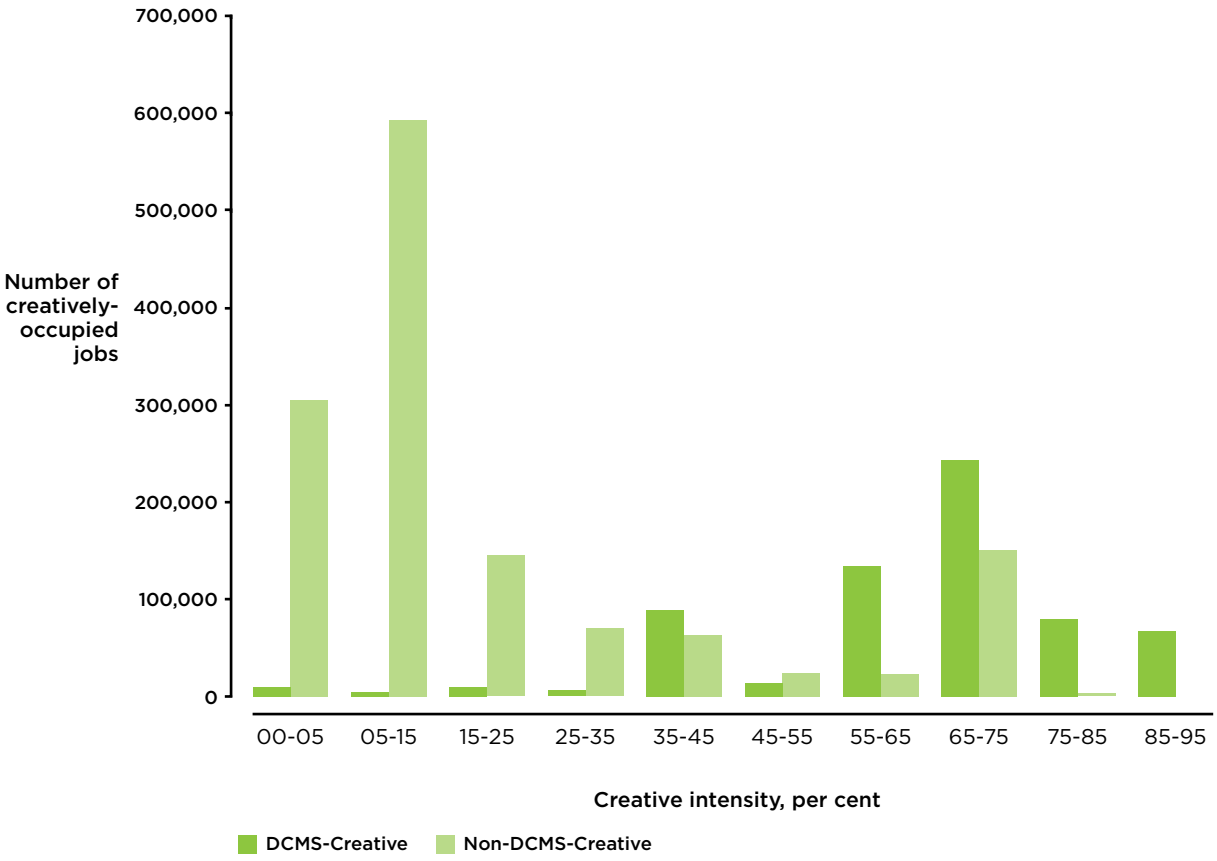
Employment in the non-DCMS-creative industries lies on a distribution skewed towards zero, with two-thirds of all creatively-occupied jobs located in industries whose intensity is less than 15 per cent. Employment in the DCMS-creative industries lies on a very different

distribution with 60 per cent of all creatively-occupied jobs located in industries whose intensity is greater than 55 per cent.

This distribution provides further confirmation that that the DCMS selection of industries involves misallocations; a large amount of creative employment, in industries that DCMS does not treat as creative, resides in industries with an intensity (defined, as stated above, on the basis of intensities that include all ICT occupations) in excess of 65 per cent.

A fact deserving especial attention is that the inclusion of ICT occupations significantly modifies the distribution of intensity, and that their complete exclusion leads to the much less coherent distribution of intensities seen in the DCMS classification in Chart 3.2. This points to a distinctive feature of the creative industries, which is their tendency to use labour from software occupations – and more broadly from ICT occupations – in combination with other forms of creative labour. This requires attention precisely because of the structural changes to the creative industries brought about by digitisation, and more generally the impact of ICT, a point made by Nicholas Garnham (2005).

CHART 3.4: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY CREATIVE INTENSITY, PARTITIONED INTO DCMS–CREATIVE AND NON-DCMS–CREATIVE, WHEN SOFTWARE PROFESSIONALS (2132) ARE INCLUDED



A comprehensive study of the role played by ICT, and software in particular, in the transformation of the creative industries deserves to be the subject of further research. It is complicated by the fact that the ICT–based industries are highly developed in other

fields too – for example, in commerce and financial service industries, in the automation of manufacture, in science-based industries, engineering and so on. Thus, the mere employment of ICT talent is not always in itself an indicator of creativity. However, ICT labour appears to play a special role within the creative industries, when it is deployed in combination with other types of creative labour. Table 3.1 therefore shows the intensity of employment, within those industries that are already identified as intensive users of other types of creative labour, of the three ICT-related occupations we have discussed above. These are, to recall, IT Strategy and Planning Professionals (2131), Information and Communication Technology Managers (1136), and Software Professionals (2132).

The Table looks at intensity using non-ICT creative occupations only (that is, those occupations used by DCMS in its 2011 update), dividing all industries as before into two groups: those that DCMS defines as creative and those that it does not. It then asks how much of the additional employment that these industries provide consists of workers in ICT occupations.

As Table 3.1 shows, within those industries that employ non-ICT creative labour more intensively than 10 per cent, 86 per cent of all ICT labour is employed in the DCMS-creative industries.

This confirms the economic rationality of the original DCMS classification, in both of which software occupations figure among the mix that is treated as creative, leading to a more consistent relation between industries and occupations than in the 2011 statistical release and confirming the hypothesis that an essential characteristic of the creative industries is the way that ICT creative occupations work with non-ICT creative occupations within them.

TABLE 3.1 EMPLOYMENT OF ICT OCCUPATIONS IN INDUSTRIES THAT USE NON-SOFTWARE LABOUR INTENSIVELY

Range of intensity for non-software occupations	Additional ICT employment within this intensity range			Proportion of ICT labour		
	Total ICT employment	Of which in creative industries	Of which in non-creative industries	Working in creative Industries	Working in non creative Industries	ICT intensity in non-creative industries
00–05	539,900	12,900	527,000	2%	9.3%	2.4%
05–10	80,000	900	79,100	1%	0.5%	3.3%
10–20	138,500	118,600	19,900	86%	49.6%	1.4%
20–30	4,600	4,000	600	87%	5.4%	0.2%
30–40	9,700	7,900	1,800	82%	4.3%	1.5%
40–50	3,000	2,900	<200*	>95%*	8.4%	<0.5%*
50–60	6,400	6,300	<200*	>95%*	3.2%	<0.5%*
60–70	1,900	1,900	–	100%	1.2%	0.0%
70–80	2,100	2,100	–	100%	3.6%	0.0%
80–90	–	–	–	n/a	0.0%	0.0%
All>10	166,000	143,500	22,500	86%	13.5%	1.2%
All>20	27,500	24,900	2,600	91%	3.0%	0.6%

*Exact figure suppressed due to disclosure control restrictions

This analysis thus confirms empirically that the creative industries – as originally conceived of by DCMS – are economically distinct, and are distinguished by a markedly higher tendency to employ creative workers, and that within this there is a strong tendency to employ workers in ICT occupations in tandem with other creative occupations. This leads us to conclude that intensity, including intensity of use of at least some ICT occupations, is a significant discriminator of industry creativity. If we are looking at an industry and attempting to judge whether or not it may be creative, the first port of call is to ask how far it lies within the upper distribution shown in Charts such as 3.2, 3.3 and 3.4. We now proceed to develop the above empirical insights into a rigorous definition.

4. A FIRST STEP TO A SOLUTION: DEFINING CREATIVE OCCUPATIONS

The first problem is that the creative occupations which underlie the DCMS classification are not themselves defined rigorously. In constructing Table 2.3, we employ the official DCMS definition of creative occupations. But the industrial codes could be appearing in that Table simply because the underlying occupations are wrongly defined as creative, and others could be absent for the converse reason. Hence the need to look at occupations more closely.

In this Section we attempt to define more rigorously what makes creative occupations 'creative'. In addressing this question, we return to the idea that the creative worker is a decisive resource for the creative business. What is the economic role of the creative worker? We can think of any productive activity as a sequence which passes from inputs, transforms them in some process more or less specific to the industry, and produces outputs as a result. This suggests that the way to conceptualise what a creative worker does is to ask 'what does she or he contribute to the *process* that produces the outputs from the inputs?'

To contextualise this, we return to the economic model of the creative industries which informs this paper and was briefly introduced earlier.

Digitisation, and more generally ICT, provides the capacity to transcend the traditional barriers of service production. These technologies facilitate the reproduction of a growing range of services at any *distance* by means of transmission technology, at any *time* by means of recording technology, and in any *quantity* by means of copying and reproduction technology. These lay the technological basis to deliver products and services which were at one point confined to direct person-to-person contacts, to a far wider audience than previously.

This has been accompanied by a parallel growth in creative 'content' and service industries that produce what is delivered through the new technologies. The relationship appears complex if the economic mechanism is not understood.[4] Paradoxically, for example, it has also led to increased popularity of live performance, attendance at exhibitions, and so on. Page (2007), for example, has consistently tracked, using royalty data, how consumer spending on live music performance has increased.

At the same time, there has been a continued rise in spending on such products as fashion, in which questions of taste and subjective perception of experience predominate over pure quantity.[5] It is logical to view this as an outcome of the broader rise of discretionary spending. In 1994, for the first time, UK families spent more on leisure products and services than on food. By 2004 they were spending twice as much. Similarly, businesses are investing more on creative services, such as design, advertising and software, than other more 'tangible' expenditures.[6]

These trends can be understood as a substitution effect: as digitisation has cheapened creative products, consumers and businesses have increased how much they spend on them. But, arguably, they also suggest that consumers and businesses increasingly *discriminate* in their purchases, placing the highest premium on the most authentic and direct experiences.[7]

The creative industries have responded to all of these new opportunities by developing, to a high degree, the capacity to differentiate their products; to cater precisely for the discretionary requirements of more segmented groups of clients or customers. This also brings into play non-IP methods for realising the value-added supplied by the creative process such as first-mover advantage – most obvious in the fashion industry but increasingly common elsewhere – in which the seller, rather than placing a high emphasis on management of copyright or patents, creates and maintains a client base on the basis of brand, distinctiveness and 'novelty'.

This requires a new form of production in which the key requirement is no longer the production of large volumes at low prices, but a continuous succession of small runs of products each varying from its predecessors – and the competition – in respects which may be small, but are sufficiently adapted to customer needs, and sufficiently highly-prized aesthetically otherwise, to attract the loyalty of a discriminating clientele.

In order to achieve this, the creative industries have become primary users of a specialist workforce that knows how to satisfy the needs of a discriminating customer base. Our interpretation of the different characteristics of this workforce are discussed later when we undertake a more rigorous definition of it, but together they focus on the capacity to meet what we term – in line with common parlance in linguistics and computing – requirements expressed *semantically* rather than in terms of *process*. That is, the creative worker has a concept of what 'kind' of effect is desired, but is not told how to produce that effect in the same way that, say, an assembly line worker or even skilled technician is instructed. The creativity, in our view, consists in devising an original way of meeting a differentiated need or requirement that is not expressed in precise terms.

This confers a unique and important quality on the creative worker within the creative process, namely that it is difficult to *mechanise* the creative process and hence to substitute machines or devices for the humans, reversing a trend that has dominated much of history. Implementing a creative decision is not really a creative role, we would argue, but making one is. Technology has largely done away with the need for the highly–skilled roles of typesetters and photo touch–up artists. The former is now subsumed into the page management applications and style guides applied by art directors and graphic designers. The traditional photo touch–up artist's palette of complex specialist physical techniques such as dodge and burn are now plugins to applications such as Adobe Photoshop used, again, by graphic artists.

In hindsight, while these crafts were important to the creative output of advertising, they arguably were not themselves creative occupations. The continual process of democratisation of technology lowers the cost and the technical skill needed to do previously highly complex, but essentially non-creative, tasks. Editing a film is a creative task – but operating a 6 plate 35mm Steenbeck editing table under the direction of the editor is not. The onset of digitisation has allowed the film director to make, and implement, creative decisions directly, using programmes such as Avid or Final Cut Pro on her or his laptop, or in a non–linear editing suite, steadily eliminating dependence on purely

repetitive craft skills. Creatives adopt, adapt and absorb new technologies in pursuit of creative excellence. They are seldom made redundant by it.

These workers are also engaged in specific and new types of *process*, described by such writers as Caves (2002) and Chesborough (2003) which suggest additional indicators of creativity in the economy. These include pre-market or 'gatekeeper' selection mechanisms (for example galleries, agents, distributors or publishers), project-based or 'open' collaborations (Caves describes this as the 'motley crew' principle), contracts that manage uncertainty rather than risk (which Caves terms the 'nobody knows' principle) and so on. A final important characteristic is the strong tendency towards geographical clustering at a microspatial level, leading to such phenomena as West London's film, broadcasting and advertising clusters, or the Shoreditch Triangle.

These considerations inform an economic model of the creative industries; they may be thought of as an industry, in the normal economic sense of the word, which has a characteristic input, a characteristic output and a characteristic process of production, through which the inputs are deployed to produce the outputs. The defining feature of the creative industries does not lie, according to this approach, solely in producing cultural outputs or in innovation or originality – these are the province of other industries also. It lies in their use of the workforce within a specific process to produce the outputs in which these industries specialise. Their most unusual feature is that their distinctive input is a type of labour – creative talent. They are thus different, for example, from traditional manufacturing industries which are defined either by physical, non-human or mechanical inputs or outputs, or by mechanical processes: agriculture creates products from the land, whilst manufacturing creates products that require machinery, and so on. They are defined in summary by:

1. A common type of input or resource (the creative workforce).
2. Common features of the output (emphasis on content, product differentiation, shorter, often smaller, production runs, preponderance of cultural or culture-related outputs, sale to discretionary markets, exploitation of both traditional IP and first-mover advantage).
3. Common processes of production (pre-market selection, uncertainty-management contracts, just-in-time short-run production methods, 'open innovation' with an emphasis on collaborative contracts, geographical clustering at the micro level, and so on).

The workforce constitutes the link between all the above three aspects. Creative talent is to the creative industries what the land is to agriculture or the machine to manufacturing: its defining indicator. It is a specialist resource that is used precisely because it knows how to implement the processes and produce the results.

All these features have been recognised to a greater or lesser degree in previous research which tends however to concentrate on one aspect of this economic model at the expense of the overall picture. Thus as we have noted, Richard Florida focuses on the workforce and clustering, Richard Caves on the nature of the creative contract, whilst yet others focus centrally on the output of the creative industries. Yet none (Caves comes closest) really consider the industries as a whole, taking into account the resources and inputs that they deploy, the process in which they use them, and the outputs that result, and understanding the relationship between these dimensions of production.

This is particularly evident in the otherwise excellent work that UNESCO (2009) has done on defining the nature of cultural activities, which is centrally concerned either with the end result of cultural activity – for example, cultural consumption and participation – or in the interface between one producer and another, as in the analysis of the cultural value chain. Yet other approaches, such as the definition offered by WIPO (2004, 2012) which confines itself to intellectual property outputs, exclude other forms of capitalising on differentiated output such as first-mover advantage, discussed above. This leads to one-sided appreciations of what the creative industries actually do, to which, in our view, the key is our understanding of the resource which makes them what they are: their creative workforce.

This now allows us to give rigorous meaning to the idea of 'creative occupation'. We define this as:

> *a role within the creative process that brings cognitive skills to bear to bring about differentiation to yield either novel, or significantly enhanced products whose final form is not fully specified in advance*

These creative skills involve a combination of original thought – all creative skills involving problem solving to a greater or lesser degree – with processes defined by collaborative relationships to deliver or realise the output. We operationalise this definition by breaking it down into a set of five criteria:

1. **Novel process –** Does the role most commonly solve a problem or achieve a goal, even one that has been established by others, in novel ways? Even if a well-defined process exists which can realise a solution, is creativity exhibited at many stages of that process?

2. **Mechanisation resistant –** The very fact that the defining feature of the creative industries is their use of a specialised labour force shows that the creative labour force clearly contributes something for which there is no mechanical substitute.

3. **Non-repetitiveness or non-uniform function –** Does the transformation which the occupation effects likely vary each time it is created because of the interplay of factors, skills, creative impulse and learning?

4. **Creative contribution to the value chain –** Is the outcome of the occupation novel or creative irrespective of the context in which it is produced; one such context being the industry (and its standard classification) of the organisational unit that hosts or employs the role? For example, a musician working on a cruise ship (a transport industry) is still creative while a printer working within a bank is probably operating printing technology and hence would be considered mechanistic and not creative.

5. **Interpretation, not mere transformation –** does the role do more than merely 'shift' the service or artefacts form or place or time? For instance, a draughtsperson/CAD technician takes an architect's series of 2D drawings and renders them into a 3D model of the building. While great skill and a degree of creative judgement are involved, arguably the bulk of the novel output is generated by the architect and not by the draughtsperson.

Of course, each of these five criteria are problematic when considered in isolation, and they do not offer hard and fast rules for determining whether an occupation is or is not 'creative'. There are also connections between them: it is unlikely that the activities of someone who is constantly called on to devise new processes, to carry out new transformations and to construct creative interpretations of their raw material can easily be mechanised. But occupations which score positively on all or most of the indicators, we believe, are very likely to function as an economic resource that the creative industries require.

5. STEP TWO: RATING THE STANDARD OCCUPATIONS USING THE 'CREATIVE GRID'

We applied the criteria established above to the Standard Occupational Classifications. All occupations were examined and the value '1' assigned where the occupation complies with the criterion, and '0' where it does not. The values were then totalled to provide an overall grid score. We set a threshold of four to qualify an occupation as creative.

In this paper, we apply the ratings to the SOC2000 occupations so that we can compare the results with the creative occupations in the latest published DCMS Creative Industries Economic Estimates which also use SOC2000, and because data based on the SOC2010 classification is only available for the LFS from 2011 onwards (both our results and those that DCMS has published so far, only go up to 2010). Unlike the SIC codes in the DCMS definition, the SOC codes have changed relatively infrequently (only once during the life of the estimates, in 2000 as the name suggests). This means that, although the industrial classifications have breaks and discontinuities which make it difficult to deduce long-term time trends, estimates of the total creatively occupied workforce provide a more or less continuous time series since the year 2000. Whilst this does not solve the principal problem of determining in which industries this workforce is actually deployed to produce creative products, it is a useful anchor; for this reason we suggest that changes in the occupation codes included in the classification should be changed relatively infrequently and the transition to SOC2010 should be undertaken with an eye to continuity. In this analysis, SOC2000 applies throughout, except in our final Section 12 in which we assess the likely impact of the transition to SOC2010 on our estimates.

Table 5.1 shows the occupations which on this basis we select as creative, defined as scoring 4 or 5 out of the possible total of 5. Table 5.2, for comparison, lists codes which DCMS treats as 'creative' but which we score less than 4 and which are therefore not included in our final list.

Applying the Creative Grid produces a significantly higher total of creatively-occupied jobs than the DCMS's selection. The differences are summarised in Table 5.3, which lists codes identified as creative according to the Creative Grid but not recognised as creative by the DCMS, and Table 5.4, which lists codes that DCMS counts as creative but which are not grid-scored as creative.

TABLE 5.1: OCCUPATIONS WITH A SCORE OF 4 OR 5, WHICH ARE INCLUDED IN THE GRID CLASSIFICATION OF CREATIVE OCCUPATIONS

SOC code	Occupation	Grid Score	Process novelty	Resistant to Mechanisation	Non-repeating output	Creative Function in process	Interpretation not transformation	DCMS Creative
1132	Marketing and sales directors	5	1	1	1	1	1	
1134	Advertising and Public Relations managers	5	1	1	1	1	1	Yes
2131	IT Strategy and Planning professionals	5	1	1	1	1	1	Yes
2132	Software professionals	5	1	1	1	1	1	
2431	Architects	5	1	1	1	1	1	Yes
2432	Town Planners	5	1	1	1	1	1	Yes
2451	Librarians	5	1	1	1	1	1	
2452	Archivists and curators	4	1	1	1	1	0	
3121	Architectural technologists and Town Planning technicians	4	1	1	1	1		Yes
3411	Artists	5	1	1	1	1	1	Yes
3412	Authors, Writers	5	1	1	1	1	1	Yes
3413	Actors, Entertainers	5	1	1	1	1	1	Yes
3414	Dancers and Choreographers	5	1	1	1	1	1	Yes
3415	Musicians	5	1	1	1	1	1	Yes
3416	Arts officers, producers and directors	5	1	1	1	1	1	Yes
3417	Photographers, audio-visual and broadcasting equipment operators	5	1	1	1	1	1	Yes
3421	Graphic Designers	5	1	1	1	1	1	Yes
3422	Product, Clothing and related designers	5	1	1	1	1	1	Yes
3431	Journalists, Newspaper and Periodical editors	5	1	1	1	1	1	Yes
3432	Broadcasting associate professionals	5	1	1	1	1	1	Yes
3433	Public Relations officers	4	1	1	1	1		Yes
3434	Photographers and Audio-Visual equipment operators	5	1	1	1	1	1	Yes

3543	Marketing associate professionals	4	1	1	1	1		Yes
5491	Glass and ceramics makers, decorators and finishers	5	1	1	1	1	1	Yes
5495	Goldsmiths, Silversmiths, Precious Stone workers	5	1	1	1	1	1	Yes

TABLE 5.2: OCCUPATIONS WITH A SCORE OF 1-3, WHICH ARE EXCLUDED FROM THE GRID DEFINITION OF CREATIVE OCCUPATIONS

SOC code	Occupation	Grid Score	Process novelty	Resistant to Mechanisation	Non-repeating output	Creative Function in process	Interpretation not transformation	DCMS Creative
5244	TV, Video and Audio engineers	3	1		1	1		Yes
5422	Printers	3	1	1	1			Yes
5424	Screen printers	3	1	1	1			Yes
5493	Pattern makers (moulds)	3	1	1	1			Yes
5411	Weavers and Knitters	2			1	1		Yes
5496	Floral arrangers, Florists	2			1	1		Yes
8112	Glass and Ceramics process operatives	2			1	1		Yes
5421	Originators, Compositors and Print preparers	1			1			Yes
5423	Bookbinders and Print finishers	1			1			Yes
5499	Hand Craft occupations not elsewhere classified	1			1			Yes
9121	Labourers in Building and Woodworking Trades	1			1			Yes

TABLE 5.3: EMPLOYMENT IN OCCUPATIONS GRID-SCORED AS CREATIVE WHICH ARE NOT INCLUDED IN THE DCMS DEFINITION

Code	Description	Employment
1132	Marketing and sales directors	549,400
2132	Software professionals	327,500
2451	Librarians	28,200
2452	Archivists and curators	11,700
TOTAL		916,800

TABLE 5.4: EMPLOYMENT IN OCCUPATIONS INCLUDED IN THE DCMS DEFINITION WHICH ARE NOT GRID-SCORED AS CREATIVE

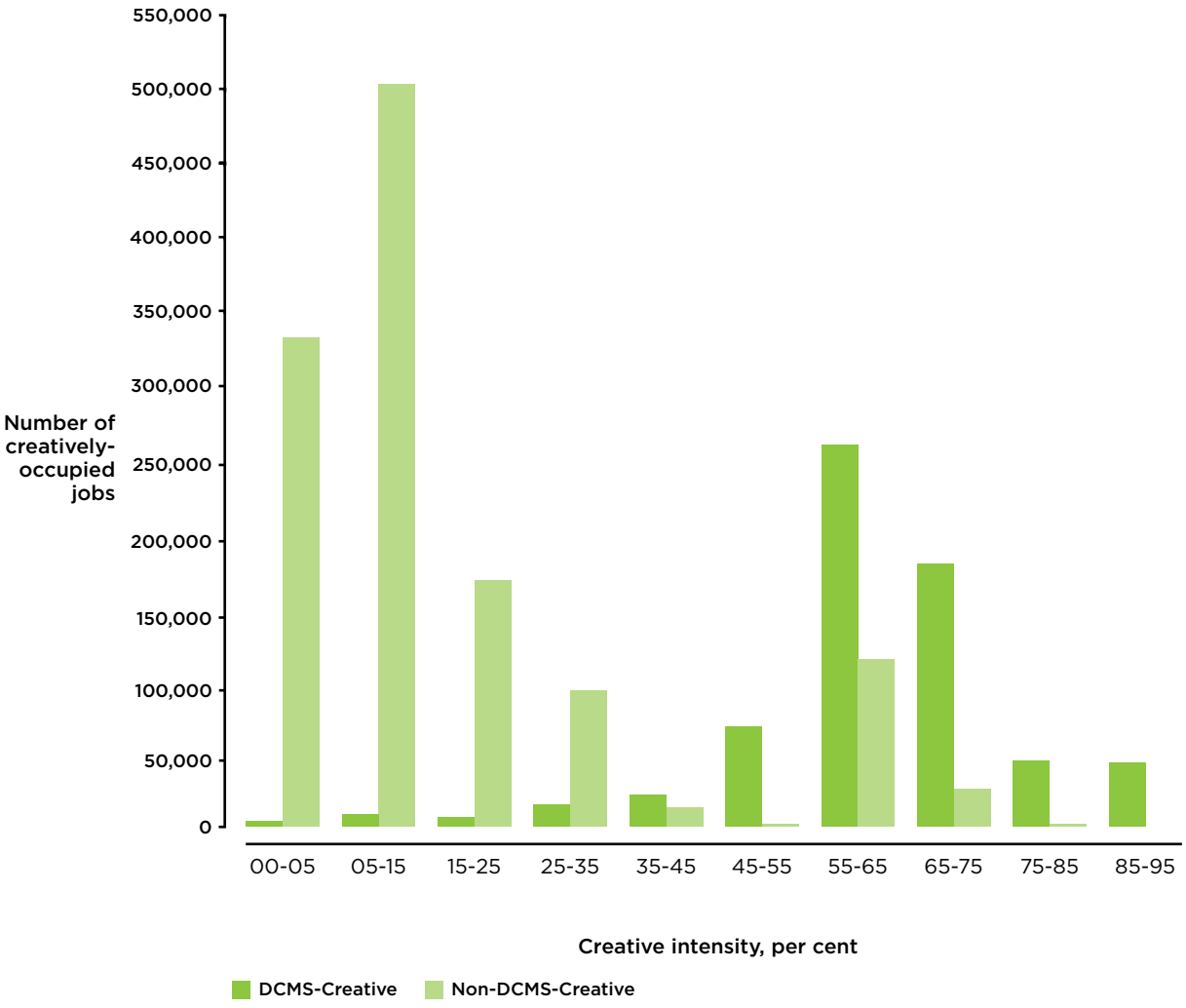
Code	Description	Employment
1136	Information and Communication Technology managers	309,900
2126	Design and Development engineers	63,300
5244	TV, Video and Audio engineers	11,400
5411	Weavers and Knitters	2,900
5421	Originators, Compositors and Print preparers	3,500
5422	Printers	33,000
5423	Bookbinders and Print finishers	19,000
5424	Screen printers	1,800
5492	Furniture makers, other craft woodworkers	49,000
5493	Pattern makers (moulds)	1,600
5494	Musical Instrument makers and tuners	2,000
5496	Floral arrangers, Florists	11,900
5499	Hand Craft occupations not elsewhere classified	15,000
8112	Glass and Ceramics process operatives	7,600
9121	Labourers in Building and Woodworking Trades	165,400
Total		698,000

It can been seen from Tables 5.3 and 5.4 that the grid-scoring increases the estimate of creatively-occupied jobs by 218,800 (916,800-698,000), after rounding, when compared with the last-published DCMS occupation codes (DCMS 2010:23).

6. STEP THREE: DERIVING RIGOROUS INTENSITY MEASURES

We can now apply these grid-generated occupations to generate a new list of creative intensities for the different industries. We will refer to this as grid intensity where the need for clarity arises. Using the new occupational definitions (which therefore now deviate from DCMS to the extent shown in Tables 5.3 and 5.4) we can partition all SIC codes into two groups on the basis of DCMS's choice of industries.

CHART 6.1: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY GRID INTENSITY, PARTITIONED INTO DCMS-CREATIVE AND NON-DCMS-CREATIVE



This gives a new table of intensities, reproduced in detail in Annex B and illustrated in Chart 6.1. This is the first step in identifying a 'baseline' set of 'creative industries'. We now analyse grid-intensities within the DCMS-creative industries; we identify the anomolies, and we then correct them, arriving at a new set of industries defined by their creative intensity.

For clarity we refer to the original set of DCMS–creative industries as the 'seed' and the final set as the 'baseline'.[8] In Section 8, we test the sensitivity of this method to a different choice of seed and to a different choice of grid occupations.

Chart 6.1 shows that creatively–occupied jobs within this seed list of industries falls on a nearly unimodal distribution, with a mean of 51 per cent, a standard deviation of 19 per cent and a median of 58 per cent. The distribution of creatively–occupied jobs within the non–DCMS–creative industries has a mean of 5 per cent, a median of 10 per cent and a standard deviation of 22 per cent. These distribution parameters are so far apart that it is highly improbable that the two sets of data come from the same population. The interpretation is clear: there are two distinct groups of industries involved and, equally clearly, some industries that 'belong' to one group have been misallocated to another.

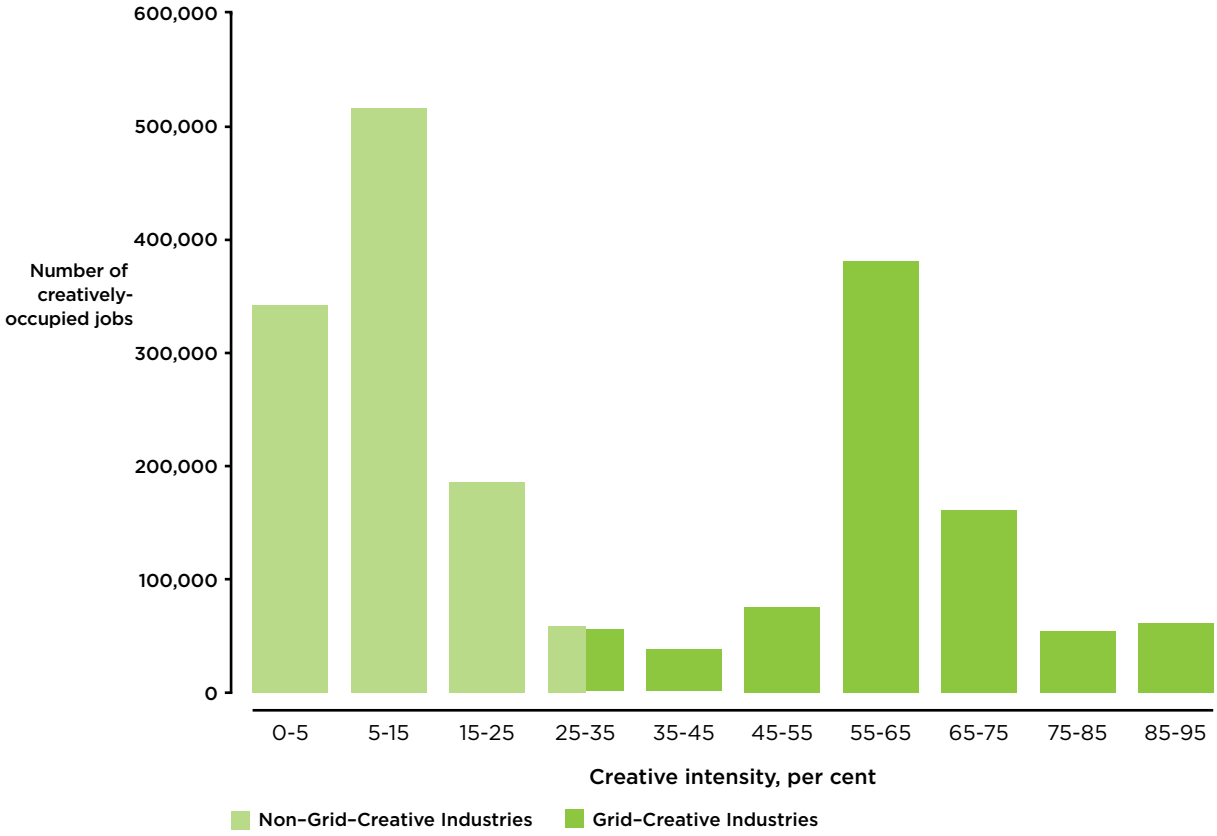
What should the threshold intensity for a creative industry be? The data do not easily support imposing a simplifying assumption, for example that they are drawn from normally distributed populations. But it is obvious, pragmatically, that two distributions are involved and there is an allocation problem to be settled. We therefore adopt a 'heuristic' device: a decision-making procedure rooted in the basics of probability theory which can be used with a range of prior partitions of the data into groups that are assumed to be 'creative' or not creative, and which eliminates or significantly reduces the inconsistencies in the prior 'seed' partition by eliminating improbable classifications. This leads to a new partition of the data which better discriminates between creative and non-creative industries.

An intuitive decision principle is to seek an equal likelihood of a type I error (wrongly defining a creative industry as 'non-creative') and a type II error (wrongly defining a 'non–creative' industry as creative). On this basis we set the threshold so that it lies an equal number of standard deviations from the mean of the distributions. This threshold, it turns out, falls at 30 per cent on the basis of the DCMS's 2011 creative industry classification,[9] which is roughly one standard deviation away from the mean of each group of codes. Any SIC from the 'non–creative' group which is over this limit is provisionally reclassified as creative, and any SIC from the creative group which is below it is reclassified as not. This initial reclassification is finally refined in the next Section by removing a small number of codes for which the statistical evidence is insufficiently reliable.

Of course this is not the only possible heuristic: we could for example place a greater weight on the existing DCMS classification by having a lower threshold for exclusion and a higher threshold for inclusion. In this way we might choose to bias in favour of inclusion, or to bias in favour of exclusion. Another possibility is to set two different thresholds; one which is used to move codes initially assumed to be creative out of that classification if their intensity is too low, whilst the other is used to move codes initially assumed not to be creative out of that classification if their intensity is too high. Our choice, which uses a single equi-probable threshold, has the 'Bayesian' advantage that it imposes the least assumptions on the data, and this is why we have adopted it. A fruitful topic for research would be to identify robust and consistent heuristics for partitioning data, like the data for the creative industries, which have distributions of the type seen in Chart 6.1.

Further options are to analyse the use of ICT labour in greater detail, and finally to take into consideration other aspects of why an industry may be deemed creative (such as the nature of its outputs or its production processes), as suggested by our economic model. These are topics for further research. Our studies so far show, however, that intensity is an exceptionally good indicator of all other aspects of an industry's creativity, and certainly, strong doubt must be cast on any choice of creative industries for which intensity is low, or the exclusion of any industry for which intensity is high.

CHART 6.2: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY GRID-INTENSITY, PARTITIONED INTO CREATIVE AND NON-CREATIVE



The impact of the resulting list of codes is shown in Chart 6.2. It gives a new assignment of codes to creative industries, with a mean of 57 per cent and standard deviation of 15 per cent, and non-creative industries with a mean of 4 per cent and a standard deviation of 9 per cent.

7. STEP FOUR: A STATISTICALLY RESILIENT BASELINE

In this Section, we refine the baseline to remove statistically volatile or unreliable codes, and derive the baseline estimate for creative employment arising from this analysis. The final resulting selection of industries is shown in Tables 7.1 and 7.2 and the baseline employment estimate in Table 7.3.

Statistical reliability must be taken into account. If the baseline depends on data which cannot be relied on, then the results may fluctuate erratically, and for reasons not connected to the underlying nature of the industry. To avoid this, in this Section we distinguish between industries whose intensity clearly does place them inside, or outside, the creative industries, and those for which the data is less statistically reliable.

As a rule of thumb, the ONS's Labour Force Survey team advises that individual employment totals lower than 800 should not be relied on statistically. More technically, confidence intervals can usually be obtained for estimates based on APS data. Some thought is needed when applying this information. We do not imply, if we exclude a code from the baseline on the grounds of statistical reliability, that we are certain it does not belong there. We are simply saying that the data does not tell us enough to put it there with confidence.

This procedure may be thought of as 'conservative' in that it is cautious about reclassifying industries as creative which have not hitherto been thought of as creative, but which seem so from the intensity analysis.

The headline estimates of the size of the creative industries and creative economy are not highly sensitive to this procedure. The affected codes, by their very nature, account for only a small proportion of total creative industry employment. Conclusions drawn from trends, the weight of the industries in the economy, or the economy-wide composition of the creative workforce, can therefore be relied on, in the sense that they will be unaffected by these exclusions. Nevertheless, care is needed for any further conclusion which other researchers might draw, if that involves small samples containing these undecided codes. In this paper, we avoid drawing any such conclusions.

A similar consideration leads us to compare the selection of codes for 2010 with a selection for 2009, to see how much variation occurs between the two years. This also constitutes an initial test of robustness: we cannot be confident in conclusions that are highly sensitive to the year from which the data is drawn, unless we can devise a smoothing or aggregation procedure such as averaging over a number of years. This is the procedure we have adopted for 2004–2008, where the baseline classification is constructed from a four–year average of creative intensities since data are available on a comparable basis for all of these years.

For the years 2009–2010 – the only years for which SIC2007 data are available – we also tried to find out which SIC codes were *volatile* when calculated on the basis of a single year's data, that is, those codes whose intensity changed a lot between the two years.

A useful objective, in further improvements to the DCMS estimates, would be to attach confidence intervals to the numbers in the published estimates.

For practical purposes we treat as volatile any SIC code that moves from creative to non-creative or vice versa, and which changes by more than one-fifth relative to its lowest value, between years. Table 7.1, the baseline, excludes reclassified codes which are either based on small samples, or are volatile, or both. Table 7.2, as noted, presents codes which have been excluded from the baseline on the above bases, but which, on grounds of creative intensity alone, might reasonably be included within it.

Table 7.3, finally, presents our baseline estimates of creative employment for 2010. These combine the occupation codes arising from the Creative Grid with the industrial codes selected in this Section.

TABLE 7.1: THE BASELINE: CODES DEFINITELY RECOGNISED AS GRID–INTENSIVELY CREATIVE AFTER REMOVING STATISTICALLY UNRELIABLE RECLASSIFICATIONS

NOTE: Totals in this table are given in thousands to ensure compliance with LFS disclosure requirements.

Code	Description	2009 Total (000)	2009 Creative (000)	2010 Total (000)	2010 Creative (000)	2009 Intensity	2010 Intensity	2009 Grid-creative	2010 Grid-creative	DCMS–creative	Small sample	Volatile	Comment
3212	Manufacture of jewellery and related articles	6	3	6	4	46%	59%	Y	Y				
5811	Book publishing	40	17	37	17	42%	46%	Y	Y	Y			
5813	Publishing of newspapers	512	22	51	19	44%	38%	Y	Y	Y			
5814	Publishing of journals and periodicals	45	29	45	28	63%	62%	Y	Y	Y			
5829	Other software publishing	22	13	22	13	58%	60%	Y	Y	Y			
5911	Motion picture, video and television programme production activities	46	31	56	38	69%	68%	Y	Y	Y			

5912	Motion picture, video and television programme post-production activities	7	5	4	3	71%	83%	Y	Y	Y			
6010	Radio broadcasting	14	10	16	13	69%	79%	Y	Y	Y			
6020	Television programming and broadcasting activities	43	22	39	22	51%	58%	Y	Y	Y			
6201	Computer programming activities	195	110	207	120	56%	58%	Y	Y				
6202	Computer consultancy activities	233	125	202	112	54%	55%	Y	Y				
6209	Other information technology and computer service activities	34	14	35	12	40%	36%	Y	Y				
7021	Public relations and communication activities	30	21	27	18	72%	67%	Y	Y				
7111	Architectural activities	93	60	96	63	64%	65%	Y	Y	Y			
7311	Advertising agencies	85	49	87	45	58%	52%	Y	Y	Y			
7312	Media representation	31	18	24	14	56%	57%	Y	Y	Y			
7320	Market research and public opinion polling	39	12	42	15	30%	35%		Y				
7410	Specialised design activities	101	66	105	61	65%	58%	Y	Y	Y			
7420	Photographic activities	44	31	41	30	71%	75%	Y	Y	Y			
7430	Translation and interpretation activities	17	11	14	10	66%	74%	Y	Y				
9001	Performing arts	39	29	45	36	74%	80%	Y	Y	Y			
9002	Support activities to performing arts	10	6	11	6	58%	54%	Y	Y	Y			
9003	Artistic creation	71	67	71	63	95%	89%	Y	Y	Y			

2341	Manufacture of ceramic household and ornamental articles	6	2	7	4	42%	57%	Y	Y			Y	Volatile, not part of the DCMS definition; but high intensity in both years. Included.
5821	Publishing of computer games	3	1	2	1	53%	38%	Y	Y	Y	Y	Y	Volatile and a small sample, but part of the DCMS definition. Included.
5819	Other publishing activities	32	13	37	12	41%	32%	Y	Y	Y		Y	Volatile, but large sample and part of the DCMS definition. Included.
5913	Motion picture, video and television programme distribution activities	4	1	9	3	28%	35%		Y	Y		Y	Volatile, not a large sample, but part of the DCMS definition, close to the 2009 threshold and above the 2010 threshold. Included.
5920	Sound recording and music publishing activities	15	10	10	5	68%	51%	Y	Y	Y		Y	Volatile, but large sample and part of the DCMS definition. Included.
1820	Reproduction of recorded media	8	3	6	4	40%	64%	Y	Y	Y		Y	Volatile, not large sample, but part of the DCMS definition. Included.

TABLE 7.2: CODES THAT ARE SUGGESTED BY THE CREATIVE INTENSITY ANALYSIS, BUT EXCLUDED ON GROUNDS OF INSUFFICIENT STATISTICAL RELIABILITY

Code	Description	2009 Total	2009 Creative	2010 Total	2010 Creative	2009 Intensity	2010 Intensity	2009 Grid-creative	2010 Grid-creative	DCMS creative	Small sample	Volatile	Comment
2640	Manufacture of consumer electronics	7	2	5	2	37%	31%	Y	Y				Borderline case, not large sample and near the threshold. Not part of the DCMS definition. Excluded, but a plausible candidate for inclusion.
6120	Wireless telecom-munications activities	83	18	83	26	22%	31%		Y			Y	Large sample, but volatile, near the threshold, not part of the DCMS definition. Excluded, but a plausible candidate for inclusion.
2342	Manufacture ceramic sanitary fixtures	4	1	2	1	28%	47%		Y			Y	Volatile, and not part of the DCMS definition. Excluded.

BASELINE EMPLOYMENT ESTIMATES

Table 7.3 presents our baseline estimates of creative employment, derived as noted by combining the grid-selected occupations with the industries identified as creative according to their intensities, as modified by the restrictions of statistical reliability imposed in this Section.

In line with the 'Creative Trident' methodology introduced by Higgs et al. (2005, 2008), we use the term 'specialist' to refer to workers who are creatively occupied and work within the creative industries; 'support' workers refers to workers who are not creatively occupied, but work within the creative industries; and 'embedded' workers are creatively occupied outside the creative industries.

TABLE 7.3: BASELINE EMPLOYMENT ESTIMATES

Specialist	Support	Embedded	Total
794,000	563,300	1,138,400	**2,495,700**

8. TESTING THE GRID: REVERSE INTENSITY AND THE SPECIALISATION OF EMPLOYMENT IN THE CREATIVE INDUSTRIES

In the next Section we will test the sensitivity of the employment estimates to our assumptions. Before doing so, we conduct a brief further reality check on our economic model using what we term 'reverse intensity' (Freeman (2007) terms this 'occupational intensity'). We define reverse intensity as the proportion of the total employment of a given occupation that is found within a given industry. In contrast, 'normal' intensity is the proportion of total employment of a given industry that is accounted for by a given occupation.

Occupations with high reverse intensities tend to be specialised so that architects, for example, have a high reverse intensity within the architecture sector where most of them work, and correspondingly low reverse intensities elsewhere. If our model is correct, then not only should the creative industries be intensive employers of creative occupations, but in addition these creative occupations should be found in greater concentrations within these industries. To take a concrete example, it is not only the case that the architecture sector uses many architects, but also that many architects work in the architecture sector. These two statements may sound as if they are two ways of saying the same thing, but they are not. It could be, for example (though this is not the case), that only 5 per cent of architects work within the architecture industry, whilst 85 per cent of the workforce of those industries is made up of architects.

We test the claim that the creative occupations are a specialist resource, which the creative industries make especial use of, by calculating the reverse intensities of the occupations that we treat as creative in our baseline. The results are shown in Table 8.1

TABLE 8.1: REVERSE INTENSITY: PROPORTION OF EACH GRID-DEFINED CREATIVE OCCUPATION WHICH WORKS WITHIN THE BASELINE INDUSTRIES

Code	Description	Rev. Intensity
3432	Broadcasting associate professionals	89%
3411	Artists	82%
3431	Journalists, Newspaper and Periodical editors	78%
2431	Architects	75%
3412	Authors, Writers	74%
3434	Photographers and Audio-Visual equipment operators	71%
3421	Graphic Designers	70%
3421	Arts officers, producers and directors	64%

3415	Musicians	59%
3121	Architectural technologists and Town Planning technicians	56%
3422	Product, Clothing and related designers	56%
2131	IT Strategy and Planning professionals	53%
2432	Town Planners	51%
1134	Advertising and Public Relations managers	50%
5495	Goldsmiths, Silversmiths, Precious Stone workers	49%
3413	Actors, Entertainers	46%
2132	Software professionals	43%
3433	Public Relations officers	36%
5491	Glass and Ceramics makers, decorators and finishers	32%
3543	Marketing associate professionals	18%
1132	Marketing and sales directors	13%
2452	Archivists and curators	5%
2451	Librarians	1%
3414	Dancers and Choreographers	0%
Total	All creative occupations and industries	41%

The result is a strong confirmation of the general thesis that these occupations act as a specialist resource for the creative industries. The average across creative occupations, at 41 per cent, confirms that a high proportion of creatives work in the creative industries. These findings present some puzzles for further study too; for example, why is it that only 46 per cent of actors work within the creative industries in our baseline? It also indicates that there are important occupations, such as Librarians and Archivists, which the Creative Grid identifies as creative but which very largely work in industries not marked by high creative intensities.

The concentration of creative occupations within the baseline creative industries contrasts markedly with the pattern for non-creative occupations, but there is evidence that a small number of other professions may further be playing an unrecognised role within the creative industries. Table 8.2 lists those occupations which are not creative according to our grid definition, but whose reverse intensity in the baseline creative industries is nonetheless significantly higher than the average.

The average reverse intensity of the non-grid-creative occupations, at 2 per cent, is less than one-twentieth of the corresponding intensity for the baseline creative industries. This further confirms a principal thesis of our economic model: that the specialist creative workforce plays a pivotal role in the UK's creative industries, as does the fact that only one of these occupations has a reverse intensity higher than the average for the grid-creative occupations. However, the relatively high occupational intensity of other ICT-related occupations such as 1136, 5245, 3132 and 3131 offers further reinforcement to our finding that the creative industries realise a special fusion of content provision and ICT technologies.

TABLE 8.2: PROPORTION OF EACH GRID-DEFINED NON-CREATIVE OCCUPATION THAT WORKS WITHIN THE BASELINE INDUSTRIES

Code	Occupation	Intensity
4137	Market research interviewers	56%
5421	Originators, Compositors and Print preparers	37%
1136	Information and Communication Technology managers	29%
5245	IT engineers	21%
3132	IT user support technicians	19%
3131	IT operations technicians	16%
5323	Painters and decorators	15%
5422	Printers	14%
1239	Managers and proprietors in other services n.e.c.	14%
3122	Draughtspersons	14%
8136	Clothing cutters	13%
8112	Glass and Ceramics process operatives	13%
5244	TV, Video and Audio engineers	13%
5499	Hand Craft occupations not elsewhere classified	12%
1112	Directors and chief executives of major organisations	12%
7113	Telephone salespersons	12%
5424	Screen printers	11%
4136	Database assistants/clerks	11%
3536	Importers and exporters	10%
5423	Bookbinders and Print finishers	10%
All	All non-creative occupations in baseline industries	2%

9. SENSITIVITY ANALYSIS

To what extent is our selection dependent on prior assumptions about which industries, and which occupations, are creative? There are four factors to consider: first, is the threshold creative intensity determined above a consequence of our 'initial seed' selection of industries? If we had started for example from a different set of industries than the DCMS-creative industries, what partition would we have arrived at? We show that the answer is that we would arrive at a different partition, but the variation in employment is not great. The threshold creative intensity calculation performs, in effect, a 'reality check' on any classification of industries into creative and non-creative, highlighting the inconsistencies and pointing to a superior classification in which these inconsistencies are almost completely eliminated.

The second factor to consider is the impact of the threshold creativity intensity itself. If we had set a higher threshold than in our baseline, obviously fewer industries would be included, and a lower threshold would include more. How big is this effect? We examine the employment estimates arising from a wide range of thresholds in the region of the one selected, and show that for thresholds between 20 and 90 per cent, estimates of creative economy employment using the intensity method are resilient to small changes in the threshold, conforming to the goal of robustness.

The third factor to consider is the effect of a different choice of occupations on the selection of industries as creative. Clearly this will make a difference: if for example the only occupations included were teachers, we would end up with a partition into 'education-intensive' and 'non-education-intensive' industries.[10]

Here, we consider two major variants or 'scenarios'. In scenario 1 we remove the two ICT–related occupations which were scored as creative using the Grid. These are 2131 (IT Strategy and Planning Professionals) and 2132 (Software Planning Professionals). In scenario 2 we remove a couple of large occupations which are 'non-intensively distributed' among industries, by which we mean that they are not particularly concentrated in any UK industry, compared to specialist occupations such as architects, who are concentrated in Section M of the SIC2007 classification (Professional, Scientific And Technical Activities). The codes removed in this second scenario are 1132, Marketing and Sales Directors and 3543, Marketing Associate Professionals. The rationale for these exclusions is that these professions, although creative, appear to be a more general resource that is used throughout industry rather than a specialist resource used mainly by the creative industries. They may also of course serve as a specialist resource in these industries in that their role within it may actually be different from what it is in, say, utilities. Either way, it is useful to see if their inclusion plays a significant role in determining which industries are creative: on the null hypothesis that they are equally distributed throughout all industries, their exclusion should have no effect. The results in both cases confirm that the intensity method remains applicable when a different set of occupations are chosen, but confirm that the Creative Grid provides a more coherent selection of industries and hence a more consistent estimate of creative economy employment and its components.

The fourth and final factor to consider is whether the source of the employment data itself affects the results. It is well-known that there can be significant differences in employment data from business and household surveys.[11] A final statistical test on the robustness of the LFS-based intensity data compares it with results from the Annual Survey of Hours and Earnings (ASHE), a business survey that also reports on occupations. The ASHE has the further advantage of a larger sample size than the LFS, but the disadvantage that it does not cover self-employed workers (an important segment of the creative economy workforce).

EFFECT OF A DIFFERENT 'SEED' SELECTION OF CREATIVE INDUSTRIES

The procedure described in Section 6 is, in effect, a pattern recognition algorithm. Similar procedures are used in developing computer programmes which recognise letters in text images, words on the telephone, or consumer preferences in web searches. A sought-after feature of such procedures is that they should arrive at a single, unique separation of any distribution: for example, in sorting a population of As and Bs, it is desirable that one should not find that under some circumstances a letter is recognised as an A and under other circumstances as a B – unless these circumstances contain genuine context information which should legitimately influence the decision. In effect, this is the same as requiring two things: that there is a single point in the decision space at which the separation should be made, rather than a multiple of such points, and that the procedure will find that point.

We therefore want to know the extent to which the threshold creative intensity that we have selected is affected by the 'prior' – the selection of industries considered creative when we calculate the threshold. Ideally, we would like it to be unaffected, in which case the intensity information alone would be sufficient to determine where to place any given industry. This would amount to finding that the characteristics of the intensity distribution alone, regardless of any context, suffice to determine a partition of industries into 'creative' and 'non-creative'. To the extent that the allocation of industries is sensitive to the initial assumptions, other contextual information is clearly important.

In the case of the data under study, it turns out that our procedure is highly robust with respect to variations in the seed.

We illustrate this by moving a large and creatively intense industry out of the seed group: 6201 (Computer programming activities). Since this SIC code is also contested, this enables us to check whether its inclusion leads to any anomalies in the set of industries which emerge as creative from our procedure.

We then test the effect of re-including the previously omitted code 4778.

We use the terms 'Initial 1', 'Initial 2' and 'Initial 3' to distinguish the three cases and 'outcome 1', 'outcome 2' and 'outcome 3' to refer to the results after applying the creative intensity method. Initial 1 refers to the whole group of SIC codes which are initially classified as creative. Initial 2 refers to the same group with the exception of code 6201; Initial 3 refers to the initial group with the re-inclusion of 4778.

The first point to note appears in the final two rows which record the variation in total creative economy employment between the various seed groups and the corresponding variations in creative economy employment between the corresponding outcomes. It can

be seen that the variation is significantly reduced by the intensity method – falling from 630,000 among the different 'seed' groups to 110,000 among the outcomes. The variation in the outcomes is thus considerably smaller than that in the initial, prior seed groups. This corresponds to the goal of robustness specified at the beginning of the report – that responses to changes in the initial assumptions should be small or reduced. The resulting variation is only 4 per cent of the Initial 1 estimate of creative employment.

Second, no variation arises from the exclusion of SIC code 6201, confirming that whether we begin by including the contested software industry or not, we end up with a similar result. Third, it can be seen that the effect of excluding SIC code 4778 from the seed group has not been large, its principal consequence being to raise the threshold intensity from 26 per cent to 30 per cent, excluding a small number of SIC codes who do not employ many people. Its exclusion thus allows us to produce a more robust baseline without large effects on the final estimate of creative employment.

TABLE 9.1: EFFECT OF A DIFFERENT INITIAL SEED GROUP OF INDUSTRIES (EMPLOYMENT IN THOUSANDS)

	Specialist	Support	Embedded	Total	Threshold	Standard deviations between the threshold and the initial mean
Initial 1 (DCMS creative industries used as seed)	643	618	1,287	2,548	30%	1.15
Initial 2 (Software excluded from seed)	524	531	1,054	2,109	29%	0.95
Initial 3 (4778 included in seed)	647	722	1,370	2,739	26%	0.99
Outcome 1	839	652	1,090	2,582		
Outcome 2	839	652	1,090	2,582		
Outcome 3	881	763	1,048	2,693		
Maximum variation in the seed group	124	192	315	630		
Maximum variation in the outcome	42	111	42	111		

EFFECT OF DIFFERENT THRESHOLD CREATIVE INTENSITIES

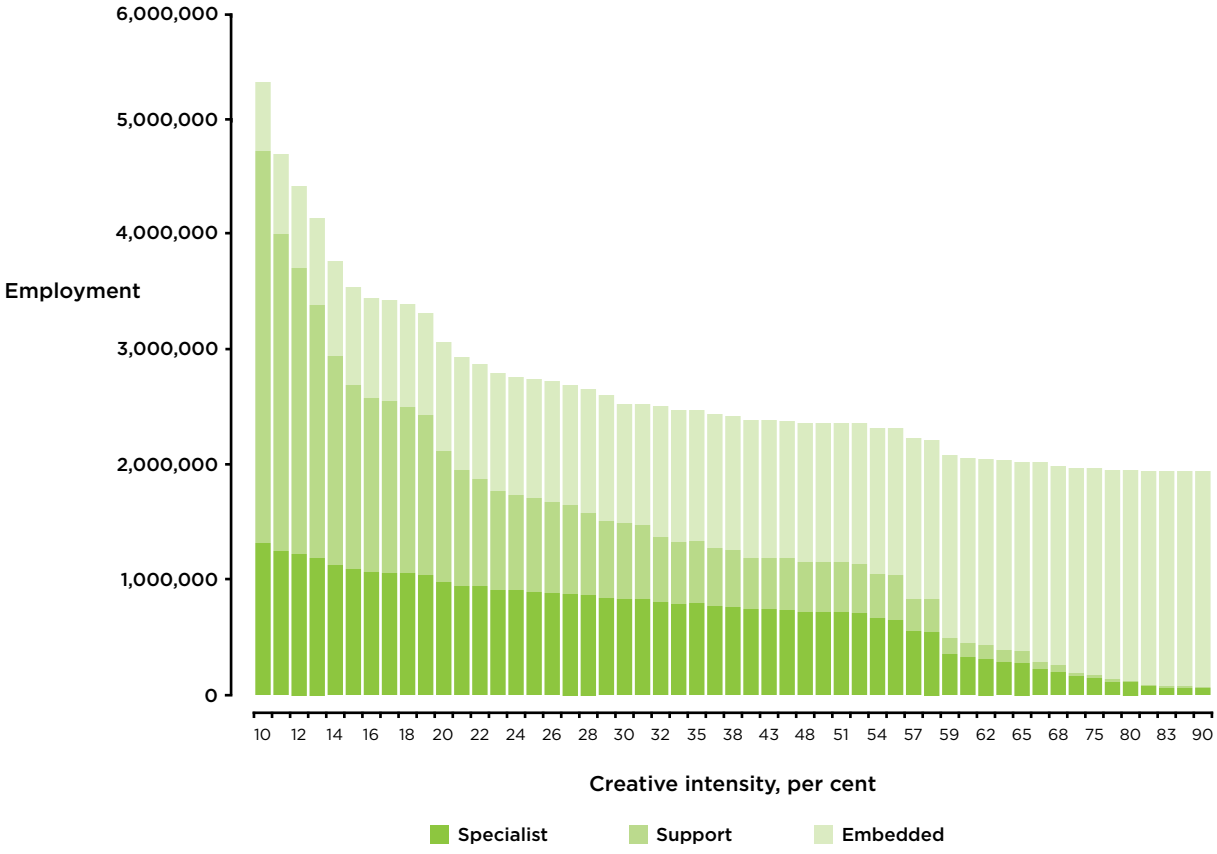
Chart 9.1 shows the effect of varying the threshold creative intensity on estimates of creative economy employment. Embedded and support workers are shown stacked above specialist workers. All figures are of course sensitive to the threshold creative intensity. With a threshold of 0 per cent, all sectors in the economy would be treated as creative

and the specialist component would just be the creatively occupied part of the economy. As the threshold rises, fewer industries are considered creative and so both support and specialist employment begin to fall and embedded employment increases; when the threshold reaches 90 per cent, no industries at all are considered creative.

However, the estimates are least sensitive to the threshold in an interval between about 20 per cent and 55 per cent. Below this level, the estimate of support employment begins to rise sharply, and with it total creative employment within the creative industries, as the threshold falls. Above this interval, these estimates begin to fall sharply as the threshold rises, and embedded employment correspondingly grows.

It is because these employment curves are reasonably flat in this interval and therefore relatively insensitive to changes in the threshold that a selection procedure based on creative intensity is robust with respect to changes in initial assumptions over time.

CHART 9.1: IMPACT OF THE INTENSITY THRESHOLD ON CREATIVE ECONOMY EMPLOYMENT



EFFECT OF VARIATIONS IN THE CREATIVE GRID OCCUPATIONS

SCENARIO 1: INTENSITIES BASED ON DCMS 2011 OCCUPATIONS

We now look at the consequence of varying the list of occupations that are used to calculate intensities. First, how do the results change if we exclude the software occupations? As Chart 3.3 showed, under these circumstances the distribution of

employment by frequency is less clearly bimodal because of the way that ICT and content occupations combine within a genuinely creative industry. How does this affect the determination of the threshold intensity and the consequent selection of industry codes?

Charts 9.2A and 9.2B show the results whose overall effect is summarised in Table 9.2. As before, we can partition the intensities for the DCMS-defined creative industries from the non–DCMS–creative industries, confirming that the method is still applicable. However, the threshold now falls to a much lower 18 per cent and employment in both the creative industries and the wider economy is reduced (that is, the effect on creative employment from excluding the software occupations more than offsets the boost to creative employment from including as 'creative' industries with creative intensities in excess of 18 per cent but which did not make the cut as creative in the baseline).

The most striking effect is that a large group of industries that are not obviously creative at all, when judged by their industry characteristics, now become creatively intensive above the threshold. This confirms that the creative industries bring together a particular combination of content and ICT skills; their integrity as an emerging economic entity relies on this combination, and if we attempt to define or measure these industries by omitting either component, the results make a lot less sense.

Just as significant is the considerable effect on the industries selected, shown in Annex C. Code 6202 (computer consultancy) drops from an intensity of 47 per cent to an intensity of 6 per cent, indicating that it is a major employer of software professionals but not of other creative professionals.[12] This is markedly different from 6201 (Computer Programming activities), however, for which the intensity is 17 per cent, just below the threshold of 18 per cent and over four times the average for the non-creative industries.

In summary these findings suggest that, first, SIC code 6201 does identify an industry which, as a whole, is a significant employer of creatives other than software professionals, sharing the characteristics of other creative industries. Second, however, it confirms that software and other creative occupations do work in tandem in the emerging creative economy. The fact that there are a number of industries, which do not share other characteristics of the creative industries, but are nevertheless intensive users of non–software creative occupations, deserves further study. But it strongly confirms that the distinctive characteristic of the creative industries as first identified by the DCMS mapping, and by the economic model which we have proposed to update it, is the use of a combination of creative talent across a spectrum of activities, which work together to produce the creative results that define these industries.

TABLE 9.2: EFFECT ON THE COMPONENTS OF EMPLOYMENT, SCENARIO 1

	Specialist	Support	Embedded	Total
Change in employment arising from scenario 1	-227,800	30,700	-248,700	-445,700
Memo: baseline	794,000	563,300	1,138,400	2,495,700

CHART 9.2A: SCENARIO 1: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY INTENSITY, AFTER TWO SOFTWARE OCCUPATIONS HAVE BEEN REMOVED FROM THE LIST OF GRID OCCUPATIONS

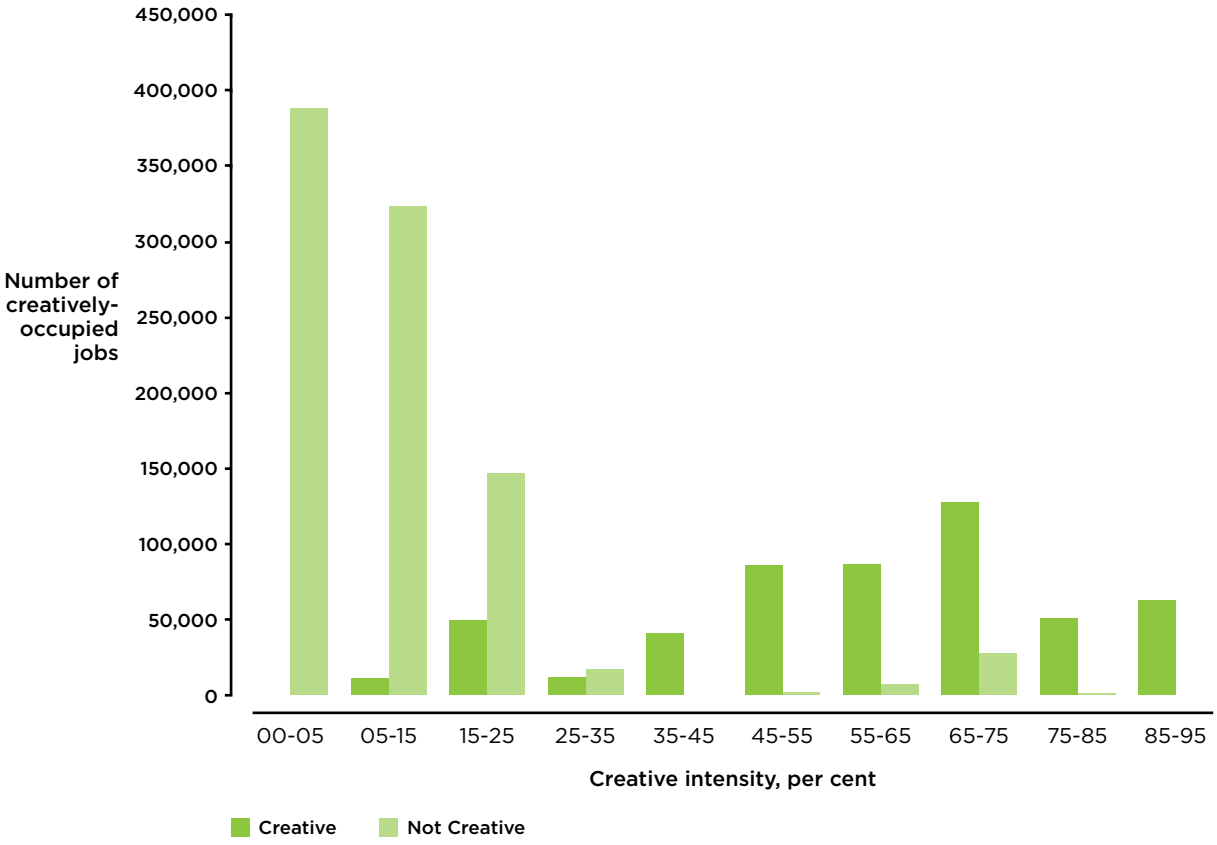
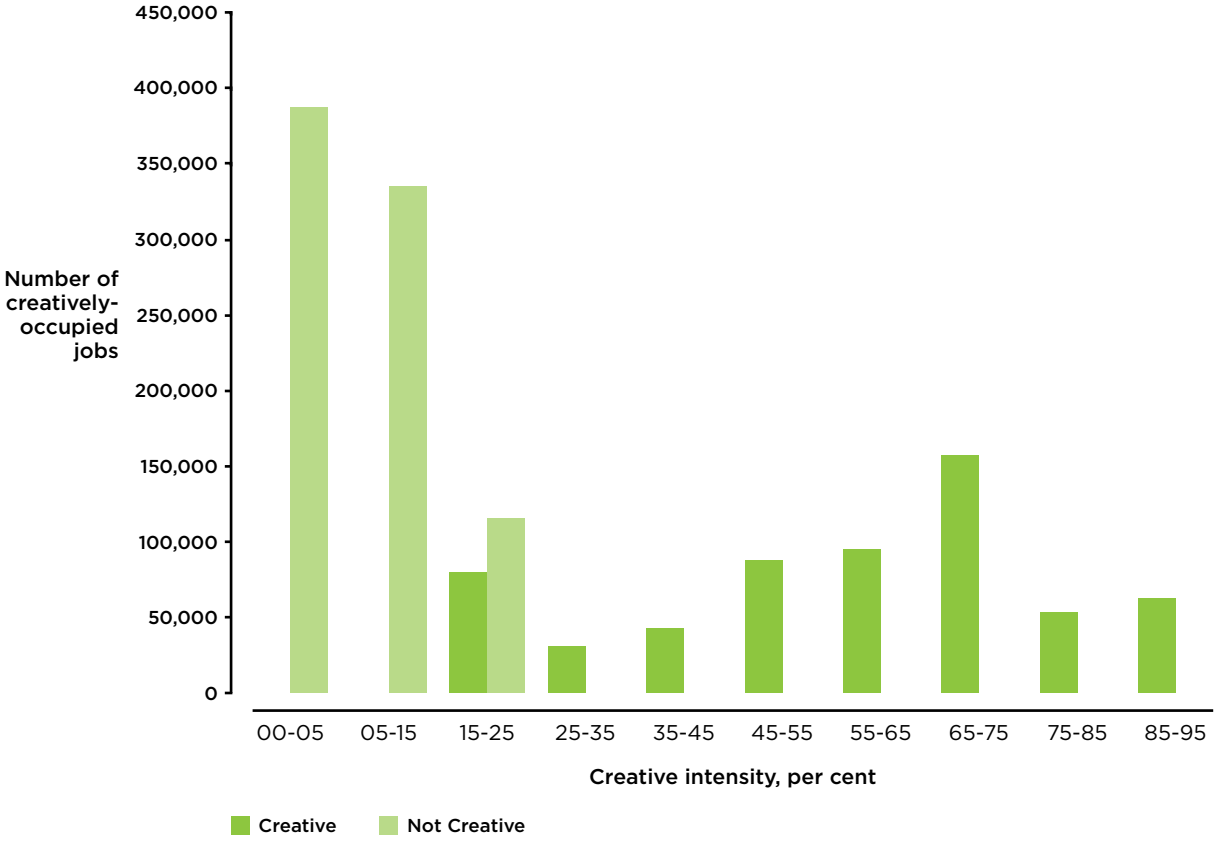


CHART 9.2B: SCENARIO 1: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY INTENSITY, AFTER TWO SOFTWARE OCCUPATIONS HAVE BEEN REMOVED FROM THE LIST OF GRID OCCUPATIONS, AFTER PARTITIONING



SCENARIO 2: REMOVAL OF GENERALIST CREATIVE OCCUPATIONS

In this scenario, we test the effect of removing those creative occupations whose reverse intensity is lowest within the economy as a whole. The rationale for this test is that occupations with lower reverse intensities may be considered more 'general' occupations. If they constitute a large proportion of total employment in the workforce as a whole, they will of course tend to show up with high industrial ('normal') intensities since they are a large proportion of everything. However, these occupations arguably do not play the same economic role as creative talent with specialisms particular to the industry – for example musicians in the Music industry. The codes removed are 1132 (Marketing and Sales Directors) and 3543 (Marketing Associate Professionals). Table 9.4 below explains the choice of these two generalist occupations. It shows the maximum reverse intensity of the occupations which are creative according to the Creative Grid, within the main industry Sections defined by the ONS (that is, those appearing in the columns of Table 2.4). Charts 9.3A and 9.3B, Table 9.3, and Annex D, present the results.

As before, the modified list of occupations yields a bimodal distribution, and our method partitions this using a lower threshold (of 24 per cent) which is not however as low as the threshold arising when the software occupation codes are removed. The result is reduced creative employment, shown in Table 9.3. But as can be seen from the reclassified codes in Annex D, no codes are reclassified as creative; only ten DCMS-creative codes (of which only one is in the baseline) are reclassified as not creative: two of these, including 6201 as before, being near the new threshold. An implication is that whilst these more general occupation codes are indeed creative as their Creative Grid scores confirm, they are less 'defining' of the creative industries than the more specialist codes. This finding merits further study. As before, the net effect of removing the occupation codes is a fall in creative economy employment, even though support employment increases marginally, since more industries are treated as creative given the lower threshold.

TABLE 9.3: EFFECT ON THE COMPONENTS OF EMPLOYMENT, SCENARIO 2

	Specialist	Support	Embedded	Total
Change in employment arising from scenario 2	-271,200	9,000	-409,500	-671,700
Memo: baseline	794,000	563,300	1,138,400	2,495,700

CHART 9.3A: SCENARIO 2: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY INTENSITY, WHEN THE TWO MOST GENERAL OCCUPATIONS HAVE BEEN DROPPED

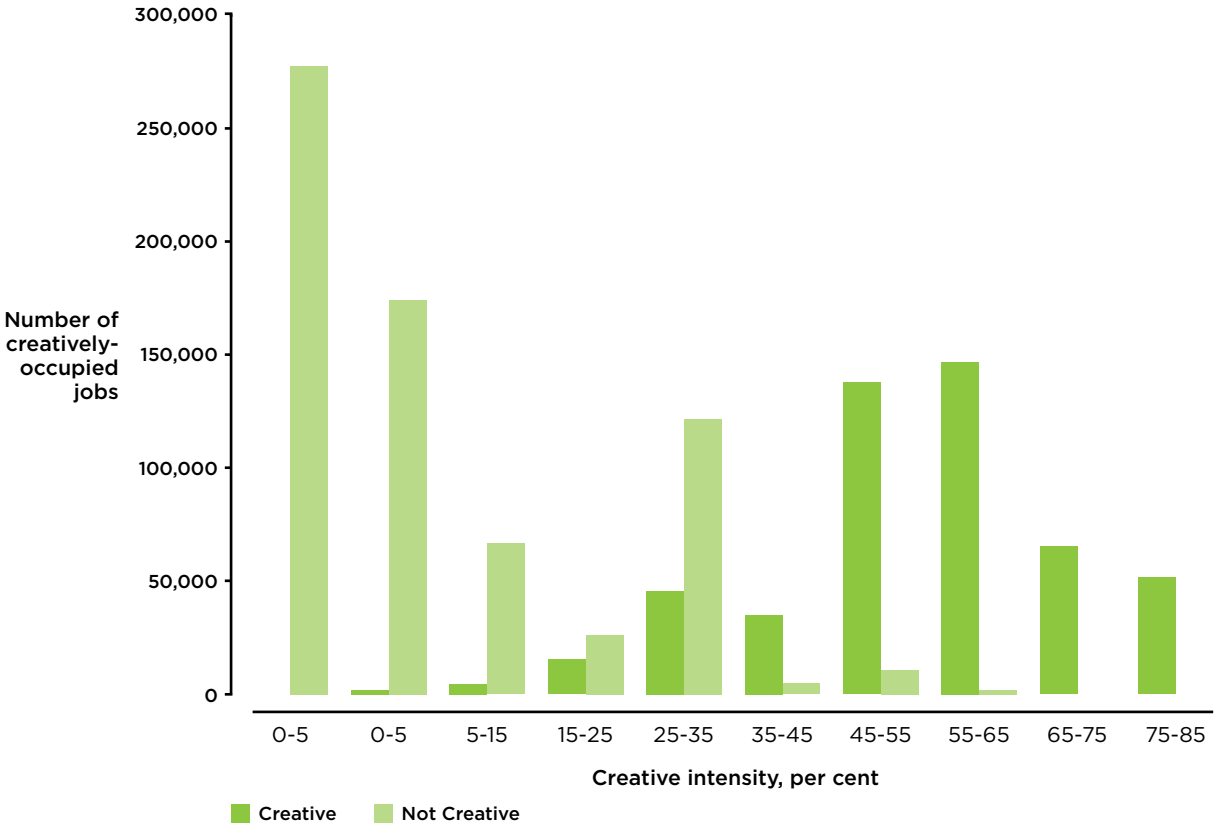


CHART 9.3B: SCENARIO 2: DISTRIBUTION OF CREATIVELY-OCCUPIED JOBS BY INTENSITY, WHEN THE TWO MOST GENERAL OCCUPATIONS HAVE BEEN DROPPED, AFTER PARTITIONING

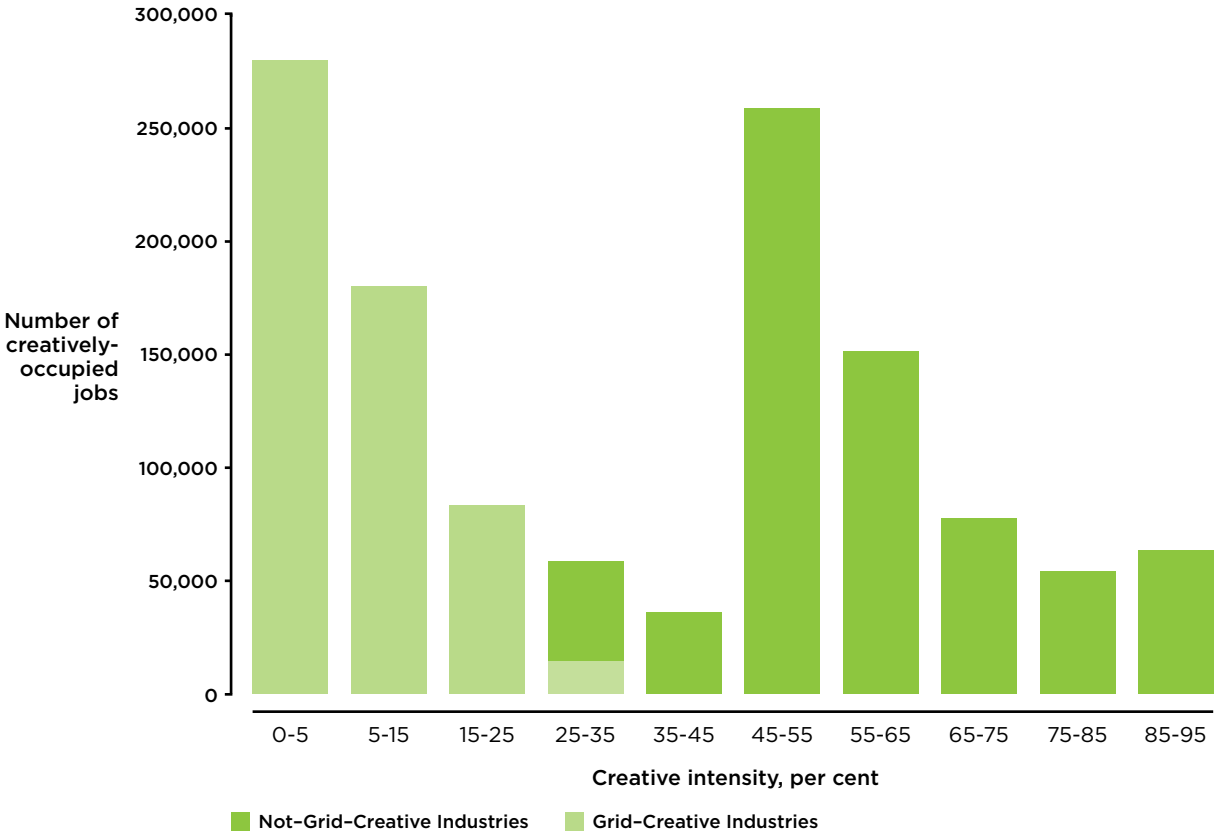


TABLE 9.4: MAXIMUM OCCUPATIONAL ('REVERSE') INTENSITIES FOR GRID-CREATIVE OCCUPATIONS WITHIN THE MAIN INDUSTRIAL SECTIONS

1132	Marketing and sales directors	22%
3543	Marketing associate professionals	23%
3412	Authors, Writers	26%
3433	Public Relations officers	33%
3434	Photographers and Audio-Visual equipment operators	36%
3416	Arts officers, producers and directors	36%
2451	Librarians	40%
1134	Advertising and Public Relations managers	45%
3421	Graphic Designers	45%
2132	Software professionals	47%
3422	Product, Clothing and related designers	50%
2432	Town Planners	52%
2452	Archivists and curators	53%
3414	Dancers and Choreographers	55%
3431	Journalists, Newspaper and Periodical editors	56%
2131	IT Strategy and Planning professionals	60%
5491	Glass and Ceramics makers, decorators and finishers	60%
5495	Goldsmiths, Silversmiths, Precious Stone workers	61%
3121	Architectural technologists and Town Planning technicians	67%
3413	Actors, Entertainers	67%
3415	Musicians	68%
3411	Artists	73%
3432	Broadcasting associate professionals	76%
2431	Architects	78%

RESULTS FROM USING THE ASHE DATASET

In contrast to the LFS section of the APS, which is completed by households, the ASHE (Annual Survey of Hours and Earnings) acquires data about workers from the firms who employ them. This is a useful comparator. First, data reliability is always improved if we can triangulate data from different sources; where there are significant discrepancies it indicates that some care is needed in using or interpreting the data. Second, the sample size for the ASHE is greater and so the statistical reliability of the estimates is, other things being equal, likely to be superior.

In one crucial respect, however, the coverage of the LFS differs from that of the ASHE: by its nature, the latter does not report on the self-employed. This turns out to be quite critical in accounting for some significant differences between the intensity measures yielded from the two sources. Qualitatively, the ASHE intensities confirm those of the LFS in that they show the baseline creative industries as having significantly higher creative intensities than the rest of the economy. Quantitatively, they are often lower; the difference illustrates an important characteristic of the creative industries, the most specialised users of creative talent, which is the strong presence of the self-employed including many freelancers, disproportionately large numbers of whom are in creative occupations.

Table 9.5 shows intensities for the main baseline industries for the ASHE, for the LFS, and for the self-employed within the LFS.

TABLE 9.5: COMPARISON OF CREATIVE INTENSITIES FROM ASHE, LFS EMPLOYEES, AND LFS SELF-EMPLOYED

Code	Description	ASHE intensity	APS/LFS intensity	APS/LFS Employee Intensity	APS/LFS Self-employed intensity	Is ASHE lower than APS/LFS?	Is self-employed intensity higher than employee intensity?
2341	Manufacture of ceramic household and ornamental articles	53%	57%	52%	100%	TRUE	TRUE
3212	Manufacture of jewellery and related articles	48%	59%	38%	90%	TRUE	TRUE
5811	Book publishing	27%	47%	44%	57%	TRUE	TRUE
5813	Publishing of newspapers	35%	38%	36%	76%	TRUE	TRUE
5814	Publishing of journals and periodicals	56%	62%	59%	78%	TRUE	TRUE
5829	Other software publishing	41%	60%	61%	47%	TRUE	FALSE
5911	Motion picture, video and television programme production activities	60%	68%	59%	78%	TRUE	TRUE
5912	Motion picture, video and television programme post-production activities	50%	83%	64%	100%	TRUE	TRUE
6010	Radio broadcasting	63%	79%	77%	100%	TRUE	TRUE
6020	Television programming and broadcasting activities	46%	59%	55%	83%	TRUE	TRUE

6201	Computer programming activities	44%	58%	55%	72%	TRUE	TRUE
6202	Computer consultancy activities	50%	55%	53%	67%	TRUE	TRUE
6209	Other information technology and computer service activities	32%	36%	37%	34%	TRUE	FALSE
7021	Public relations and communication activities	54%	67%	62%	83%	TRUE	TRUE
7111	Architectural activities	63%	66%	61%	79%	TRUE	TRUE
7311	Advertising agencies	43%	52%	52%	52%	TRUE	FALSE
7312	Media representation	34%	58%	50%	87%	TRUE	TRUE
7320	Market research and public opinion polling	25%	35%	33%	44%	TRUE	TRUE
7410	Specialised design activities	53%	58%	51%	64%	TRUE	TRUE
7420	Photographic activities	67%	75%	46%	92%	TRUE	TRUE
7430	Translation and interpretation activities	74%	74%	44%	85%	FALSE	TRUE
9001	Performing arts	77%	80%	49%	92%	TRUE	TRUE
9003	Artistic creation	84%	89%	63%	93%	TRUE	TRUE

10. THE CREATIVE ECONOMY: WHAT THE RESULTS TELL US

We now move on to present a set of new estimates of employment in the creative industries and wider creative economy.

This includes an attempt to derive realistic estimates of the time trends in creative economy employment between 2004 and 2010. One difficulty is that a new industrial classification system, SIC2007, was adopted in 2009; between 2004 and 2008 the earlier SIC2003 system was used. Some of the changes in estimated creative industries employment, between 2008 and 2009, are thus the effect of the reclassification rather than any actual change in creative employment. In the estimates below, we compensate for this insofar as we can.

Fortunately, the number of jobs held by workers in creative occupations – a figure we refer to as 'creatively-occupied jobs' – is not affected by the reclassification of SIC codes or other discontinuities in industrial reporting. It is measured on a strictly consistent SOC2000 basis throughout the period we consider in this paper and, as such, gives us a benchmark for making judgements about trends in creative employment more generally.

The number of creatively-occupied jobs is shown in Table 10.1

TABLE 10.1: CREATIVELY-OCCUPIED WORKERS, GRID DEFINITION

Year	Creatively-occupied jobs	Not creatively-occupied jobs	Total workforce	Annual growth in creatively-occupied jobs	Annual growth in jobs not creatively-occupied	Annual growth in the workforce	Creatively-occupied jobs as a share of the total workforce
2004	1,772,000	26,443,100	28,215,100				6.3%
2005	1,778,300	26,721,500	28,499,800	0.4%	1.1%	1.0%	6.2%
2006	1,833,400	26,893,300	28,726,700	3.1%	0.6%	0.8%	6.4%
2007	1,872,200	27,129,000	29,001,200	2.1%	0.9%	1.0%	6.5%
2008	1,902,900	27,191,900	29,094,800	1.6%	0.2%	0.3%	6.5%
2009	1,895,200	26,704,700	28,599,900	-0.4%	-1.8%	-1.7%	6.6%
2010	1,932,400	26,742,200	28,674,700	2.0%	0.1%	0.3%	6.7%
Cumulative Growth 2004-2008	**9.0%**	**1.1%**	**1.6%**				

Creatively-occupied jobs are clearly a dynamic and growing part of the economy; they grew by 9.0 per cent from 2004 to 2010 compared with 1.6 per cent for the workforce as a whole and 1.1 per cent for the non-creatively-occupied workforce. This part of the

workforce thus grew over five times faster than the remainder of the workforce. Its growth outpaced that of the whole workforce in every year except 2005 and as a consequence, its share of that workforce has risen steadily from 6.3 per cent in 2005 to 6.7 per cent in 2010. This is the most reliable and consistent single indicator available of the growth of creative employment in the UK.

This 'backbone' of creative occupations allows us to produce an estimate of creative industries employment for the years 2004-2008 which are as comparable as possible with the estimates for 2009 and 2010. With this in mind we produced our estimates for 2004-2008 in two stages. In the first stage, we constructed a baseline for 2004-2008, using exactly the same method as for the SIC2007 baseline described in Section 6. This produced very similar results with a threshold intensity of 29.5 per cent, yielding a set of baseline creative industries closely aligned with the comparable SIC2007 baseline creative industries. However, we then diverged slightly from the refinement process explained in Section 7, because we prioritised the production of comparable figures. Where there were doubts around industries close to the threshold, or with small sample sizes, we therefore opted to select those SIC2003 industries in which a high proportion of employment was reclassified into the codes that figure in the SIC2007 baseline.[13]

Our estimates are based on the Creative Grid occupations in Table 5.1, the baseline creative industries for 2009 and 2010 in Table 7.1, and the baseline creative industries for 2004-2008 computed using the procedure just described. Because our estimates differ from the DCMS's, we first present our own results before pinpointing, for sensitivity purposes, the precise sources of the differences between our estimates and the DCMS's.

As explained in Sections 1 and 7, we use a method of presentation described by Higgs et al. (2005, 2008) as the 'Creative Trident' method because there are in effect three components of the creative workforce: the 'specialists' who are creatively occupied and work within the creative industries; the 'support' workers who are not creatively occupied, but do work within the creative industries, and the 'embedded' workers who are creatively occupied outside the creative industries. Table 10.2 shows all three of these along with the remaining employment of non-creatively-occupied workers in the non-creative industries.

TABLE 10.2: CREATIVE TRIDENT, 2010

	Creative industries	Non-creative industries	All industries
Creatively-occupied jobs	Specialists 794,000	Embedded 1,138,400	Creatively-occupied jobs 1,932,400
Other jobs	Support 563,300	Non-creative 26,178,900	Non creatively-occupied jobs 26,742,200
All occupations	Working in the creative industries 1,357,300	Working outside the creative industries 27,317,300	Total Workforce[14] 28,674,600

The strength of the DCMS mapping, and the Creative Trident presentation, is that it allows us to see how creatively-occupied jobs are used by the UK's industries as a creative resource and in particular, how they are integrated into, and feed the growth of, the creative industries. To illustrate this, we first present the Creative Trident for 2010, in Table 10.2. Table 10.3 then presents our estimates of employment as a time series from 2004 to 2010.

TABLE 10.3: CREATIVE EMPLOYMENT 2004-2010

	Creative Industries		Non-Creative Industries		Total workforce	Creative Econ. Emp. (specialist + support + embedded)	Creative Econ. Emp. as proportion of the workforce
	Creatively-occupied (specialist)	Not creatively-occupied (support)	Creatively-occupied (embedded)	Not creatively-occupied			
2004	706,500	592,000	1,065,500	25,851,100	28,215,100	2,364,000	8.4%
2005	725,200	589,400	1,053,100	26,132,100	28,499,800	2,367,700	8.3%
2006	754,400	596,400	1,079,000	26,296,900	28,726,700	2,429,800	8.5%
2007	743,000	619,600	1,129,200	26,509,400	29,001,200	2,491,800	8.6%
2008	764,900	606,500	1,138,000	26,585,400	29,094,800	2,509,400	8.6%
2009	803,500	564,100	1,091,700	26,140,600	28,599,900	2,459,300	8.6%
2010	794,000	563,300	1,138,400	26,178,900	28,674,600	2,495,700	8.7%

Because of the discontinuity caused by the transition from SIC2003 to SIC2007, although we have taken considerable care that the two series should be as comparable as possible, there is still a residual change from 2008 to 2009 caused by reclassification alone, and conclusions about trends should not be drawn from this Table. To overcome this difficulty we have produced Table 10.4 which uses simple interpolation techniques to estimate how fast creative economy employment and its various components have been growing.[15]

TABLE 10.4: ANNUAL AND CUMULATIVE GROWTH OF THE COMPONENTS OF CREATIVE ECONOMY EMPLOYMENT, 2005-2010

	Creative Industries		Non-Creative Industries		Total workforce	Creative Econ. Emp. (specialist + support + embedded)
	Creatively-occupied (specialist)	Not creatively-occupied (support)	Creatively-occupied (embedded)	Not creatively-occupied		
2005	2.6%	-0.4%	-0.2%	1.1%	1.0%	0.2%
2006	4.0%	1.2%	2.5%	0.6%	0.8%	2.6%
2007	-1.5%	3.9%	4.7%	0.8%	1.0%	2.6%

2008	2.9%	-2.1%	0.8%	0.3%	0.3%	0.7%
2009[a]	*-0.4%*	*-1.8%*	*-0.4%*	*-1.8%*	*-1.7%*	*-0.7%*
2010	-1.2%	-0.1%	4.3%	0.1%	0.3%	1.5%
Cumulative 2004-2010	**6.5%**	**-0.6%**	**10.6%**	**1.2%**	**1.6%**	**6.8%**

[a]Growth rates for 2009 interpolated except for the total workforce

Finally, Table 10.5 compares our estimates and those of the DCMS. It furnishes an estimate of the extent to which the estimates of creative economy employment would increase, were the occupations and industries identified in this report to be included in full, in a subsequent revision of the estimates, compared to the 2011 estimates.

TABLE 10.5: COMPARISON BETWEEN CREATIVE EMPLOYMENT ON CREATIVE INTENSITY AND DCMS BASES

	Specialist	Support	Embedded	Creative Econ. Emp.	*Creatively-occupied jobs*
DCMS 2011	476,800	420,500	600,900	1,498,200	1,077,700
Baseline	794,000	563,300	1,138,400	2,495,700	1,932,400
Difference	317,200	142,800	537,500	997,500	854,700

The difference between DCMS's published estimate of creative economy employment and that suggested by our research is 997,500. Of this, 537,500 are creative jobs outside of the creative industries.

11. TRANSITION TO SOC2010

Our principal aim has been to derive, exhibit and test a sound methodology for defining and measuring creative employment, which allow comparisons to be made as the economy evolves, and with it the systems used for classifying occupations and industries.

Our starting point was the DCMS definition of the creative industries which, we have shown, offers a pragmatically valid description but which contains inconsistencies that can be corrected if addressed in a systematic manner.

We therefore worked with the SOC2000 and SIC2007 classifications that form the basis of the published DCMS estimates. We did this primarily in order that a rigorous comparison could be made between our own revised estimates and those of the DCMS that form our point of departure. What would our results look like were we to use the SOC2010 classifications that the DCMS will use in future statistical releases?

TABLE 11.1: GRID OCCUPATIONS IN THE SOC2010 CLASSIFICATION AND EMPLOYMENT WITHIN THEM

Code	Description	
1132	Marketing and sales directors	183,200
1134	Advertising and Public Relations Directors	19,100
2135	IT business analysts, architects and systems designers	86,300
2136	Programmers and software development professionals	233,000
2137	Web design and development professionals	54,500
2139	IT and telecommunication professionals	166,700
2431	Architects	45,700
2432	Town planners	20,700
2435	Chartered architectural technologists	1,400
2451	Librarians	28,100
2452	Archivists & curators	10,700
2471	Journalists, Newspaper and Periodical editors	65,000
2472	PR professionals	41,300
2473	Advertising accounts managers and creative directors	22,300
3121	Architectural and town planning technicians	15,500
3411	Artists	42,400
3412	Authors, writers and translators	55,400
3413	Actors, entertainers and presenters	44,200
3414	Dancers and choreographers	16,100

3415	Musicians	41,900
3416	Arts officers, producers and directors	61,300
3417	Photographers, audio-visual and broadcasting equipment operators	64,300
3421	Graphic Designers	65,700
3422	Product, Clothing and related designers	55,400
3543	Marketing associate professionals	41,100
5441	Glass and ceramic makers, decorators and finishers	12,000
Total		**1,493,300**

The transition to SOC2010 has had a less dramatic effect on the spectrum of occupational classifications than the transition to SIC07 on industrial classifications. Nevertheless the impact on employment figures is quite significant. For example, 549,400 people were employed in occupations falling within the former SOC2000 code for 'Marketing and Sales Directors' (1132) in 2010; but in 2011 only 183,200 were employed in occupations falling within the corresponding SOC2010 code of exactly the same name and number. There was thus a drop of 366,000 jobs in a code with exactly the same name and exactly the same description, due solely to a change in the classification system.

The reason for this fall is, overall, positive; the SOC2010 codes allow occupations that are critical for the creative economy to be identified much more precisely, on account of the finer subdivisions that SOC2010 makes possible. Thus, the transition to SOC2010 allows us to eliminate, from the total that we record as creatively employed, a significant number of jobs that we previously could not but avoid classifying as creative.

But, at the same time, and in consequence, estimates based on SOC2010 codes may be considerably less than those based on SOC2000 codes. As SOC2010 comes into general use, therefore, it is to be expected that all previous estimates, from all sources, will have to be revised downwards. Although the downward revision will vary according to the method used, we have calculated that in general, SOC2010-based estimates will be between 20 per cent and 30 per cent lower than SOC2000-based estimates. Thus, if two estimates of creative employment are produced, and if one of these estimates uses SOC2000 and the other uses SOC2010, then even if these are 100 per cent perfect and identical in all other respects, they will necessarily and unavoidably differ by at least 20 per cent and quite possibly more. This very basic point has to be thoroughly understood when comparing estimates from different sources, made at different times, or significant errors of judgement will result.

Nevertheless, because of our methodological approach, it is relatively easy to illustrate how the downward revisions are likely to affect our own estimates. The starting point is the total creatively-occupied workforce. Using the Creative Grid technique, we can identify those SOC2010 occupations that should be classified as creative. These are given in Table 11.1. Employment in 2011 in these occupations is also listed. Total SOC2010-based creatively-occupied jobs come to 1,493,300.

As shown in Table 10.1, on the basis of SOC2000 classification, in 2010 this same figure is 1,932,400. Thus, at least 439,100 jobs (=1,932,400–1,493,300) have been reclassified as not creative, simply as a result of the transition to SOC2010.

Starting from this known data, we have to make an estimate of what creative economy employment and its components would have been if data for 2010 classified on the basis of SOC2010 had been available. To do this, we divide the effect of the reclassification into two parts. One is the effect of the reclassification of code 1132 – the biggest source of change. The second is all the other reclassification changes taken together. This leads to the following revised estimates for 2010:

TABLE 11.2: ESTIMATES OF THE LIKELY IMPACT OF SOC2010 RECLASSIFICATION ON SOC2000-BASED ESTIMATES OF EMPLOYMENT IN THE CREATIVE ECONOMY

	Specialist	Support	Embedded	Creative Occupations	Creative Econ. Emp.
Baseline	794,000	563,300	1,138,400	1,932,400	2,495,700
Revised for SOC2010	708,500	648,800	784,800	1,493,300	2,142,100

For each of these two components, we apply the same method in order to determine how much employment would have been lower within the baseline industries (specialists) and how much would have fallen outside these industries (embedded). In order to make this estimate, we assumed that the intensity of employment of this component of the change is the same within all the baseline industries.

12. CONCLUSION

This paper uses detailed employment data to show that the creative industries are a clearly recognisable economic reality in the UK. They bring together a combination of creative skills (including content and software) within a set of industries that are characterised by the high intensity with which they use these skills.

We have also based our analysis on a clear definition of creativity leading to a set of well-defined criteria which, for the first time to our knowledge, clearly set out a procedure, which can be repeated by other researchers and by statistical agencies, to identify which occupations are creative and, on that basis, identify through their creative intensity which industries are creative. This yields a measure of creative employment and its components.

We believe that our sensitivity analysis shows our results to be superior to other possible classifications in that they are the most consistent, and that they also improve on the high standard set by the DCMS classification by removing and correcting its remaining inconsistencies.

This document is therefore only the first step in a process which ought to lead to a clearer analytical definition of the creative industries giving rise to a robust set of measurements and a reliable evidence base to inform policy. Much further research is needed and below we outline some of the issues which, we think, should be addressed.

The first point concerns the economic model itself. We have recognised the creative industries as a branch of industry with a set of well-defined inputs, process, and outputs. Work is needed to integrate our occupational analysis with other indicators of creativity arising from this model. For example, is it that the industries we have selected also invest heavily in intangible creative assets like design and advertising, as measured by Nesta's *Innovation Index*? Is it the case that they engage in the creative processes we have described such as pre-market selection, project-based production systems, open innovation and the exploitation of first-mover advantage and do these processes yield product differentiation patterns or other product features indicative of their creative nature? How do our selected industries compare with alternative understandings of 'creative' industries based on there position in industry value chains?

This area of research also implies a study of phenomena which appear secondary to creativity but may well turn out to be defining of it, such as spatial clustering and the distribution of creative industries within and between cities and other geographical locations; it calls for research into the relation between creativity as we have defined it and features such as gross value-added and labour productivity.

Finally, we believe that we have exhibited a method which meets the criteria we set out at the beginning, of being robust whilst capable of reacting to change, and of providing measures that will allow us to study the movement and evolution of creative industries over time and under the impact of persistent technological change.

In setting out a clear analytic standard, we hope we have offered the possibility for other researchers and policymakers to engage in an informed debate leading to a transparent set of statistics, by engaging with the arguments we have set out. We will have succeeded if our work provokes such a debate.

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ANNEX A:
INDUSTRIES AND OCCUPATIONS DEFINED AS CREATIVE IN DECEMBER 2011, IN WHOLE OR PART, BY THE DCMS

TABLE A1: INDUSTRIES

1411	Manufacture of leather clothes
1412	Manufacture of workwear
1413	Manufacture of other outerwear
1414	Manufacture of underwear
1419	Manufacture of other wearing apparel and accessories
1420	Manufacture of articles of fur
1431	Manufacture of knitted and crocheted hosiery
1439	Manufacture of other knitted and crocheted apparel
1512	Manufacture of luggage, handbags and the like, saddlery and harness
1520	Manufacture of footwear
1811	Printing of newspapers
1813	Pre-press and pre-media services
1820	Reproduction of recorded media
4778	Other retail sale of new goods in specialised stores
4779	Retail sale of second-hand goods in stores
5811	Book publishing
5813	Publishing of newspapers
5814	Publishing of journals and periodicals
5819	Other publishing activities
5821	Publishing of computer games
5829	Other software publishing
5911	Motion picture, video and television programme production activities
5912	Motion picture, video and television programme post-production activities
5913	Motion picture, video and television programme distribution activities
5914	Motion picture projection activities
5920	Sound recording and music publishing activities
6010	Radio broadcasting
6020	Television programming and broadcasting activities

6201	Computer programming activities
6391	News agency activities
7111	Architectural activities
7311	Advertising agencies
7312	Media representation
7410	Specialised design activities
7420	Photographic activities
7810	Activities of employment placement agencies
9001	Performing arts
9002	Support activities to performing arts
9003	Artistic creation
9004	Operation of arts facilities

Table A2: SOC2000 codes

SOC2000 code	Description
1134	Advertising and Public Relations managers
2126	Design and Development engineers
2431	Architects
2432	Town Planners
3121	Architectural technologists and Town Planning technicians
3411	Artists
3412	Authors, Writers
3413	Actors, Entertainers
3414	Dancers and Choreographers
3415	Musicians
3416	Arts officers, producers and directors
3421	Graphic Designers
3422	Product, Clothing and related designers
3431	Journalists, Newspaper and Periodical editors
3432	Broadcasting associate professionals
3433	Public Relations officers
3434	Photographers and Audio-Visual equipment operators

3543	Marketing associate professionals
5244	TV, Video and Audio engineers
5411	Weavers and Knitters
5421	Originators, Compositors and Print preparers
5422	Printers
5423	Bookbinders and Print finishers
5424	Screen printers
5491	Glass and Ceramics makers, decorators and finishers
5492	Furniture makers, other craft woodworkers
5493	Pattern makers (moulds)
5494	Musical Instrument makers and tuners
5495	Goldsmiths, Silversmiths, Precious Stone workers
5496	Floral arrangers, Florists
5499	Hand Craft occupations not elsewhere classified
8112	Glass and Ceramics process operatives
9121	Labourers in Building and Woodworking Trades

ANNEX B:
FULL LIST OF GRID-BASED INTENSITIES HIGHER THAN 10 PER CENT, WITH A SAMPLE SIZE FOR CREATIVE EMPLOYMENT GREATER THAN 1000

Description	Employment	Creative Employment	Intensity
Artistic creation	71,000	63,000	89%
Motion picture, video and television programme post-production activities	4,000	3,000	83%
Performing arts	45,000	36,000	80%
Radio broadcasting	16,000	13,000	79%
Manufacture of imitation jewellery and related articles	2,000	2,000	79%
Photographic activities	41,000	30,000	75%
Translation and interpretation activities	14,000	10,000	74%
Motion picture, video and television programme production activities	56,000	38,000	68%
Satellite telecommunications activities	3,000	2,000	67%
Public relations and communication activities	27,000	18,000	67%
Architectural activities	96,000	63,000	65%
Reproduction of recorded media	6,000	4,000	64%
Publishing of journals and periodicals	45,000	28,000	62%
Other software publishing	22,000	13,000	60%
Manufacture of jewellery and related articles	6,000	4,000	59%
Television programming and broadcasting activities	38,000	22,000	59%
Specialised design activities	105,000	61,000	58%
Computer programming activities	207,000	120,000	58%
Media representation	24,000	14,000	58%
Manufacture of ceramic household and ornamental articles	7,000	4,000	57%
Computer consultancy activities	202,000	112,000	55%

Support activities to performing arts	11,000	6,000	54%
Advertising agencies	87,000	45,000	52%
Sound recording and music publishing activities	10,000	5,000	51%
Book publishing	37,000	17,000	47%
Publishing of newspapers	51,000	19,000	38%
Other information technology and computer service activities	35,000	12,000	36%
Motion picture, video and television programme distribution activities	9,000	3,000	35%
Market research and public opinion polling	42,000	15,000	35%
Other publishing activities	37,000	12,000	32%
Manufacture of consumer electronics	5,000	2,000	31%
Wireless telecommunications activities	83,000	26,000	31%
Other telecommunications activities	30,000	9,000	30%
Computer facilities management activities	10,000	3,000	29%
Manufacture of computers and peripheral equipment	53,000	15,000	28%
News agency activities	11,000	3,000	28%
Wholesale of computers, computer peripheral equipment and software	6,000	2,000	28%
Manufacture of games and toys	10,000	3,000	27%
Library and archive activities	54,000	14,000	27%
Wholesale of mining, construction and civil engineering machinery	7,000	2,000	26%
Pre-press and pre-media services	8,000	2,000	26%
Data processing, hosting and related activities	12,000	3,000	26%
Other information service activities n.e.c. Manufacture of communication equipment	11,000 25,000	3,000 6,000	25% 25%
Agents specialised in the sale of other particular products	11,000	3,000	24%
Manufacture of other chemical products n.e.c.	13,000	3,000	24%
Wholesale of electronic and telecommunications equipment and parts	27,000	6,000	23%
Other amusement and recreation activities	88,000	19,000	22%
Tour operator activities	12,000	3,000	22%
Photocopying, document preparation and other specialised office support activities	13,000	3,000	21%

Museum activities	36,000	8,000	21%
Renting and leasing of other personal and household goods	10,000	2,000	21%
Installation of industrial machinery and equipment	27,000	6,000	20%
Wired telecommunications activities	59,000	12,000	20%
Cultural education	35,000	7,000	20%
Operation of arts facilities	26,000	5,000	20%
Other reservation service and related activities	23,000	4,000	20%
Business and other management consultancy activities	273,000	53,000	19%
Retail sale of computers, peripheral units and software in specialised stores	33,000	6,000	19%
Wholesale of beverages	15,000	3,000	18%
Other manufacturing n.e.c.	10,000	2,000	18%
Other business support service activities n.e.c.	40,000	7,000	18%
Manufacture of weapons and ammunition	10,000	2,000	18%
Manufacture of tools	9,000	2,000	17%
Manufacture of soft drinks; production of mineral waters and other bottled waters	14,000	2,000	17%
Manufacture of electric lighting equipment	10,000	2,000	16%
Motion picture projection activities	13,000	2,000	15%
Wholesale of furniture, carpets and lighting equipment	13,000	2,000	15%
Wholesale of clothing and footwear	33,000	5,000	15%
Agents involved in the sale of fuels, ores, metals and industrial chemicals	12,000	2,000	14%
Manufacture of beer	25,000	4,000	14%
Convention and trade show organizers	23,000	3,000	14%
Other research and experimental development on natural sciences and engineering	86,000	12,000	14%
Wholesale of pharmaceutical goods	37,000	5,000	14%
Repair of computers and peripheral equipment	36,000	5,000	14%
Wholesale of other machinery and equipment	63,000	8,000	13%
Wholesale of electrical household appliances	29,000	4,000	13%
Sea and coastal passenger water transport	13,000	2,000	13%

Other professional, scientific and technical activities n.e.c.	81,000	11,000	13%
Manufacture of instruments and appliances for measuring, testing and navigation	48,000	6,000	13%
Retail sale via mail order houses or via Internet	75,000	10,000	13%
Activities of head offices	70,000	9,000	13%
Renting and leasing of cars and light motor vehicles	29,000	4,000	13%
Activities of business and employers membership organisations	15,000	2,000	13%
Activities of professional membership organisations	99,000	12,000	12%
Manufacture of medical and dental instruments and supplies	49,000	6,000	12%
Other printing	110,000	13,000	12%
Manufacture of office and shop furniture	20,000	2,000	12%
Manufacture of other outerwear	14,000	2,000	12%
Remediation activities and other waste management serviceS	23,000	3,000	11%
Life insurance	31,000	4,000	11%
Security systems service activities	19,000	2,000	11%
Other credit granting	69,000	7,000	11%
Manufacture of pharmaceutical preparations	68,000	7,000	11%
Wholesale of chemical products	19,000	2,000	11%

ANNEX C: CLASSSIFICATION OF CODES IN SCENARIO 1 (SOFTWARE CODES REMOVED), COMPARED WITH CLASSIFICATION OF CODES IN THE BASELINE

Code	Description	Total Employment	Creative Employment	Creative Intensity	Creative in Scenario 1	Baseline
9003	Artistic creation	70,900	63,000	89%	✓	✓
5912	Motion picture, video and television programme post-production activities	3,800	3,200	83%	✓	✓
9001	Performing arts	45,200	36,100	80%	✓	✓
3213	Manufacture of imitation jewellery and related articles	2,400	1,900	79%	✓	
6010	Radio broadcasting	16,300	12,400	76%	✓	✓
7430	Translation and interpretation activities	4,200	10,500	74%	✓	✓
7420	Photographic activities	40,700	28,900	71%	✓	✓
7021	Public relations and communication activities	26,800	18,100	67%	✓	✓
5911	Motion picture, video and television programme production activities	55,700	37,100	67%	✓	✓
7111	Architectural activities	96,300	62,600	65%	✓	✓
5814	Publishing of journals and periodicals	45,100	27,900	62%	✓	✓
3212	Manufacture of jewellery and related articles	6,100	3,600	59%	✓	✓
2341	Manufacture of ceramic household and ornamental articles	6,700	3,800	57%	✓	✓
7410	Specialised design activities	104,800	59,600	57%	✓	✓
7312	Media representation	23,600	13,000	55%	✓	✓

6020	Television programming and broadcasting activities	37,900	20,700	55%	✓	✓
9002	Support activities to performing arts	10,800	5,700	53%	✓	✓
7311	Advertising agencies	86,900	43,800	50%	✓	✓
1391	Manufacture of knitted and crocheted fabrics	700	400	50%	✓	
2891	Manufacture of machinery for metallurgy	800	400	50%	✓	
4619	Agents involved in the sale of a variety of goods	800	400	48%	✓	
2342	Manufacture of ceramic sanitary fixtures	2,300	1,100	47%	✓	
1820	Reproduction of recorded media	6,300	2,900	46%	✓	✓
2680	Manufacture of magnetic and optical media	1,800	800	43%	✓	
5920	Sound recording and music publishing activities	10,500	4,500	43%	✓	
5811	Book publishing	36,800	15,400	42%	✓	✓
1104	Manufacture of other non-distilled fermented beverages	700	300	40%	✓	
5813	Publishing of newspapers	50,600	19,200	38%	✓	✓
5913	Motion picture, video and television programme distribution activities	8,600	3,000	35%	✓	✓
2824	Manufacture of power-driven hand tools	3,900	1,300	34%	✓	
7740	Leasing of intellectual property and similar products, except copyrighted works	1,400	400	32%	✓	
2640	Manufacture of consume electronics	5,300	1,700	31%	✓	✓
7734	Renting and leasing of water transport equipment	2,100	700	31%	✓	
7320	Market research and public opinion polling	42,400	12,800	30%	✓	✓
5819	Other publishing activities	37,500	10,700	28%	✓	✓
5821	Publishing of computer games	2,200	600	28%	✓	✓

4648	Wholesale of watches and jewellery	3,800	1,100	28%	✓	
1414	Manufacture of underwear	4,000	1,100	27%	✓	
2571	Manufacture of cutlery	1,600	400	26%	✓	
4616	Agents involved in the sale of textiles, clothing, fur, footwear and leather goods	1,200	300	25%	✓	
9101	Library and archive activities	53,600	13,300	25%	✓	
6391	News agency activities	10,700	2,500	24%	✓	
4651	Wholesale of computers, computer peripheral equipment and software	5,800	1,400	23%	✓	
4663	Wholesale of mining, construction and civil engineering machinery	7,400	1,700	23%	✓	
4666	Wholesale of other office machinery and equipment	4,100	900	23%	✓	
6130	Satellite tele-communications activities	2,900	600	22%	✓	
9329	Other amusement and recreation activities	87,600	19,200	22%	✓	
9102	Museum activities	36,300	7,700	21%	✓	
2443	Lead, zinc and tin production	600	100	21%	✓	
4665	Wholesale of office furniture	2,000	400	21%	✓	
2445	Other non-ferrous metal production	1,300	300	21%	✓	
2319	Manufacture and processing of other glass, including technical glassware	4,600	1,000	21%	✓	
3240	Manufacture of games and toys	10,300	2,100	21%	✓	
2712	Manufacture of electricity distribution and control apparatus	6,400	1,300	20%	✓	
8552	Cultural education	35,200	7,100	20%	✓	
4618	Agents specialised in the sale of other particular products	10,900	2,200	20%	✓	

9004	Operation of arts facilities	25,800	5,200	20%	✓	
7912	Tour operator activities	11,700	2,300	20%	✓	
5829	Other software publishing	22,200	4,300	19%	✓	✓
6312	Web portals	1,300	300	19%	✓	
7733	Renting and leasing of office machinery and equipment (including computers)	3,300	600	19%	✓	
1813	Pre-press and pre-media services	8,000	1,500	19%	✓	
2331	Manufacture of ceramic tiles and flags	2,300	400	19%	✓	
2660	Manufacture of irradiation, electromedical and electro-therapeutic equipment	5,300	1,000	19%	✓	
4634	Wholesale of beverages	14,900	2,800	18%	✓	
6201	Computer programming activities	207,000	34,500	17%	✓	
6209	Other information technology and computer service activities	34,500	3,300	10%	✓	
6202	Computer consultancy activities	201,800	11,800	6%	✓	

ANNEX D: CLASSSIFICATION OF CODES IN SCENARIO 2 (MARKETING CODES REMOVED) COMPARED WITH CLASSIFICATION OF CODES IN THE BASELINE

Code	Description	Total Employment	Creative Employment	Creative Intensity	Classified as Creative	Baseline
9003	Artistic creation	70,900	62,200	88%	✓	✓
5912	Motion picture, video and television programme post-production activities	3,800	3,200	83%	✓	✓
6312	Web portals	1,300	1,100	82%	✓	
9001	Performing arts	45,200	36,000	80%	✓	✓
3213	Manufacture of imitation jewellery and related articles	2,400	1,900	79%	✓	
7430	Translation and interpretation activities	14,200	10,500	74%	✓	✓
6010	Radio broadcasting	16,300	12,000	74%	✓	✓
7420	Photographic activities	40,700	29,600	73%	✓	✓
5911	Motion picture, video and television programme production activities	55,700	36,600	66%	✓	✓
7111	Architectural activities	96,300	62,400	65%	✓	✓
3212	Manufacture of jewellery and related articles	6,100	3,400	56%	✓	✓
6020	Television programming and broadcasting activities	37,900	20,800	55%	✓	✓
7410	Specialised design activities	104,800	55,700	53%	✓	✓
1820	Reproduction of recorded media	6,300	3,300	53%	✓	✓
6201	Computer programming activities	207,000	107,600	52%	✓	✓
6202	Computer consultancy activities	201,800	103,500	51%	✓	✓

9002	Support activities to performing arts	10,800	5,400	50%	✓	✓
5814	Publishing of journals and periodicals	45,100	22,700	50%	✓	✓
5920	Sound recording and music publishing activities	10,500	4,800	46%	✓	✓
6130	Satellite tele-communications activities	2,900	1,300	45%	✓	
2341	Manufacture of ceramic household and ornamental articles	6,700	3,000	45%	✓	✓
5829	Other software publishing	22,200	9,500	43%	✓	✓
7312	Media representation	23,600	9,800	41%	✓	✓
7021	Public relations and communication activities	26,800	10,600	40%	✓	✓
5821	Publishing of computer games	2,200	800	38%	✓	✓
5811	Book publishing	36,800	13,300	36%	✓	✓
2680	Manufacture of magnetic and optical media	1,800	600	34%	✓	
5813	Publishing of newspapers	50,600	16,800	33%	✓	✓
7740	Leasing of intellectual property and similar products, except copyrighted works	1,400	400	32%	✓	
7734	Renting and leasing of water transport equipment	2,100	700	31%	✓	
4648	Wholesale of watches and jewellery	3,800	1,100	28%	✓	
6209	Other information technology and computer service activities	34,500	9,300	27%	✓	✓
9101	Library and archive activities	53,600	13,700	26%	✓	
7311	Advertising agencies	86,900	22,100	25%	✓	✓
4616	Agents involved in the sale of textiles, clothing, fur, footwear and leather goods	1,200	300	25%	✓	
2652	Manufacture of watches and clocks	2,100	500	25%	✓	
2342	Manufacture of ceramic sanitary fixtures	2,300	600	24%	✓	

6391	News agency activities	10,700	2,600	24%	✓	
5913	Motion picture, video and televisionprogramme distribution activities	8,600	1,900	22%	✓	
5819	Other publishing activities	37,500	8,000	21%	✓	
7320	Market research and public opinion polling	42,400	8,100	19%	✓	
2640	Manufacture of consumer electronics	5,300	700	13%	✓	

ENDNOTES

1. Other problematic aspects of the DCMS definition are its emphasis on 'origination', which jars with the wide acceptance that creativity emerges in fact from highly collaborative processes, and its assumption that all creative outputs must be economically exploited in the form of intellectual property. These aspects of the DCMS definition will be explored in a future research report.
2. Annex A provides a full list of occupations and industries defined as creative in 2011 (DCMS 2011).
3. Other studies that emphasise the role of the embedded workforce include Growth Analysis (2009) for Sweden, Falk et al (2011) for the EU countries and Santos Cruz and Teixeira (2012) for Portugal.
4. And unexpected in the light of previous anticipatory writing which, wrongly, predicted that the spread of electronic communication would lead to consumption-at-a-distance as the new norm (McLuhan, 1964). This is most graphically refuted by the continued inexorable rise in urban concentration and in large cities, which precisely facilitate the interpersonal interactions which, it was once thought, would disappear with the electronic age.
5. The evidence, too extensive to repeat here, is summarised in Freeman (2008a).
6. See Goodridge et al. (2012).
7. See Stoneman (2010), for a wider discussion.
8. We actually decided to drop one code from this initial 'seed', namely 'Other retail sales of new goods in specialised stores' (4778) because of its distorting effect on the average intensity. This is a large four-digit code employing 108,200 people of whom only 4,000 are creative; only one-tenth of the employment in this industry, corresponding to the five-digit code 4778/1, is used by DCMS, in the Arts and Antiques sector. In the next section dealing with sensitivity we explore the potential consequences for our choice of baseline industries.
9. As modified by excluding the anomalous code 4778.
10. An exercise beyond the scope of this paper would be to study whether other such bimodal distributions of intensities exist, for various combinations of occupations, and whether these help determine the characteristics of employing industries. This could well be helpful in guiding employment and skills policies.
11. See for example GLA (2003).
12. For this reason, code 6202 is not classified as creative, and therefore does not appear in Annex C which lists those codes treated as creative on the assumptions of this scenario.
13. We made one further correction to SIC2003 code 7420 (Architectural and engineering activities and related technical consultancy). This is an amalgam of the SIC2007 codes 7111 (Architectural Activities) which is genuinely creative, and 7112 (Engineering and related technical consultancy) which is not. We disaggregated the SIC2003 code 7420 using a statistical decomposition based on the intensity of the occupations within it. Architectural employment in our SIC2003 estimates is therefore comparable with that in our SIC2007 estimates, greatly improving the overall comparability of the two sets of estimates.
14. The total workforce is calculated using the LFS section of the APS for compatibility with our estimates of creative economy employment. As a consequence it differs from the published ONS estimates of the workforce.
15. We interpolated growth for 2008-2009 as follows: we supposed creatively-occupied jobs, and the non-creatively-occupied jobs, all grew at the same rate as in the economy as a whole. (The growth rate of creatively-occupied jobs is given by Table 10.1, column 4 (-0.4%) and of non-creatively-occupied jobs by Table 10.1, column 5 (-1.8%)). We then interpolated creative employment as a whole for 2009 by summing the components arrived at by applying these growth rates, and estimated its growth rate by comparing the result with actual 2008 creative employment.

Nesta...

Nesta

1 Plough Place
London EC4A 1DE

research@nesta.org.uk
www.twitter.com/nesta_uk
www.facebook.com/nesta.uk

www.nesta.org.uk

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