

Discussion Paper 2020/01

Measuring the creative economy:

A guide for policymakers

Hasan Bakhshi

April, 2020

Director of the Creative Industries Policy and Evidence  
Centre (PEC) and Executive Director of Creative  
Economy and Data Analytics at Nesta

ISBN: 978-1-913095-09-3

---

Supported by



UK Research  
and Innovation



# Creative Industries Policy & Evidence Centre

Led by **nesta**

## About the Creative Industries Policy and Evidence Centre

The Creative Industries Policy and Evidence Centre (PEC) works to support the growth of the UK's Creative Industries through the production of independent and authoritative evidence and policy advice.

Led by Nesta and funded by the Arts and Humanities Research Council as part of the UK Government's Industrial Strategy, the Centre comprises of a consortium of universities from across the UK (Birmingham; Cardiff; Edinburgh; Glasgow; Work Foundation at Lancaster University; LSE; Manchester; Newcastle; Sussex; Ulster). The PEC works with a diverse range of industry partners including the Creative Industries Federation.

For more details visit <http://www.pec.ac.uk> and [@CreativePEC](https://twitter.com/CreativePEC)

## About the author

Hasan Bakhshi - Director of the PEC

Nesta, 58 Victoria Embankment, London EC4Y 0DS; [hasan.bakhshi@nesta.org.uk](mailto:hasan.bakhshi@nesta.org.uk)

## **1. Introduction**

Policy debates on the creative industries are mired in ambiguities and inconsistencies in terminology. Policymakers speak interchangeably of creative industries, cultural industries and creative economy. Cunningham (2009) compares the creative industries to a Rorschach blot, "being invested in for varying reasons and with varying emphases and outcomes." While the inconsistent use of terminology likely reflects a number of factors – including genuine differences in policy emphases and desired outcomes in different countries – it presents a significant impediment to an understanding of what, by any definition, is a segment of the economy that is becoming more important in many countries.

The lack of definitional consistency has led to measurement differences across countries. In general, Northern European countries, including the UK, Germany and Finland have tended to focus on 'creativity' rather than culture, whereas Southern European countries (including Italy and Spain) have tended to place greater emphasis on 'cultural' expression (Tether, 2016). The Scandinavian countries have instead focused on the demand side using the 'experience economy' as the guiding concept (Bille, 2011). This matters for measurement because conceptual differences lead to differences in what activities are or are not included (Deroin, 2011). Particularly significant in this context is the treatment of information technology-related activities, given the large economic contributions they tend to make (Garnham, 2015; Hesmondhalgh and Pratt, 2015; Campbell, O'Brien and Taylor, 2018).

**Supported by**



UK Research  
and Innovation



A practical challenge is deciding which activities should be considered within scope and this should properly depend on the economic importance of creativity to an industry's inputs, processes and outputs: in practice, however, creativity is very difficult to measure, so decisions are usually made based on top-down judgements (Flew, 2011).

The topic is of practical interest to policymakers as it is important to be able to critically assess the many studies showing the size and composition of the creative industries. These studies have been conducted in many countries and used to argue for the importance of the 'sector' to decision makers. The UK case is interesting in this regard, as researchers here have made particularly strong efforts to develop more systematic approaches.

In the rest of the paper, Sections 2 – 4 trace the history of attempts to identify and measure the creative economy, from the earliest efforts by the UK's Department for Culture, Media and Sport (DCMS), now the Department for Digital, Culture, Media and Sport, in 1998 to recent methods which make use of 'big data'. Section 5 presents a practical measurement exercise for policymakers, illustrating the use of the 'Dynamic Mapping' approach currently used by the DCMS. Section 6 gives suggested reading.

Supported by



UK Research  
and Innovation



## 2. The UK Case: mapping 1.0

In 1998, the DCMS introduced the idea that 13 creative sub-sectors as wide ranging as the performing arts, film, advertising and software could be grouped together and labelled 'creative industries': "*those industries which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property.*" (DCMS, 1998). Soon after, the DCMS began publishing regular economic estimates to support this idea, which matched, wherever possible, the creative sub-sectors to the official Standard Industrial Classification (SIC) codes used in the construction of the UK sector accounts (DCMS, 2001). The estimates also included an allied set of *occupational* codes drawn from the official Standard Occupational Classification (SOC), also labelled 'creative'. In other words, a set of sub-sectors and occupations were considered 'creative' for measurement purposes and, by implication, the remaining sub-sectors and occupations were not.

This development is widely regarded as having been successful in raising the economic profile of the creative industries across the world. In the eyes of policymakers – where the use of the internationally-recognised SIC codes allowed other countries to follow the DCMS's approach (Potts and Cunningham, 2008) – and in the eyes of educators and researchers– where we have seen an explosion in university courses and research

Supported by



UK Research  
and Innovation



programmes on the creative industries (Comunian and Gilmore, 2016). However, the non-systematic nature of the DCMS's procedures (Gross, 2020) created problems too.

Some of the measurement problems were technical in nature. For example, the DCMS statisticians applied 'weights' to some sub-sectors to recognise that not all of their activity was in fact 'creative'. But the validity of the weights was not clear – including to other statisticians, such as those at the Office for National Statistics (ONS) in the UK. It was also unclear what consistency there was between the selection of occupations deemed to be creative and of sub-sectors deemed creative (Higgs, Cunningham and Bakhshi, 1998).

The DCMS's approach also had conceptual problems. Firstly, theoretical ambiguities around key terms such as 'creativity' and 'intellectual property' led to debates about why certain sectors were included, and others were not. Secondly, a reluctance on the part of the DCMS to publish separate economic statistics on the 'cultural' industries – despite having the word 'culture' in its Departmental title – contributed to the conflation of the concepts of 'creative' and the 'cultural' and to an 'economisation' of cultural policy (Bakhshi and Cunningham, 2016). Thirdly, and most fundamentally, the lack of a transparent process for identifying which sub-sectors and occupations to be classified as 'creative', or not, meant that there was stasis in the classifications. More and more interests voiced concerns with the statistics – whether these were areas like Crafts (Crafts Council, 2014) and Design (Design Council, 2010) with a disproportionate number of creative freelancers working in sub-sectors not traditionally viewed as 'creative', or new

Supported by



UK Research  
and Innovation



and emerging sub-sectors like Video Games which were not well captured in the Standard Industrial Classification (Goumagias et. al., 2014). The absence of explicit classification criteria made it impossible to translate the serious measurement concerns of sub-sectors such as these into action by the DCMS.

The lack of a transparent method for classifying which sub-sectors and which occupations should be labelled as 'creative' also held back the development of a consistent international approach, resulting in a plethora of inconsistent classifications being implemented in different countries (Gordon and Beilby-Orrin, 2006).<sup>1</sup>

For all of these reasons, definition, classification and measurement of creative industries and occupations was a key focus of UK innovation foundation, Nesta's research effort in recent years and led to the development of a framework which attempts to address the main weaknesses in the DCMS's earlier work.

### **3. The Dynamic Mapping of the UK's Creative Industries: mapping 2.0**

---

<sup>1</sup> UNCTAD (2010) discusses more generally the reasons for why an international standard has been lacking: that "there is no "right" or "wrong" model of the creative industries, simply different ways of interpreting the structural characteristics of creative production. The attractiveness of the various models may therefore be different, depending on the analytical purpose. From the viewpoint of statistical data collection, however, a standardized set of definitions and a common classification system are needed as a basis for designing a workable framework for dealing with the creative industries within the larger standard industrial classification systems that apply across the whole economy". Page 6.

Supported by



UK Research  
and Innovation



The 'Dynamic Mapping' approach to classifying the creative industries and creative economy built on the early work of the European Leadership Group on Culture which produced a 'culture matrix' bringing together cultural professions and cultural activities (Deroin, 2011). The approach involves three steps. In step 1, explicit judgements are made on which occupations in the workforce should be considered creative. Creative roles are defined as those which deploy cognitive skills to bring about novelty whose final form cannot be fully specified in advance. Bakhshi et. al. (2013) bases these judgments on a subjective scoring of each SOC code in the UK workforce according to a handful of intuitive criteria derived from their reading of the different disciplinary literatures on creativity. The scoring is also informed by the ONS's job title coding index, which is an ordered list of job titles, showing the SOC codes to which the job title is classified. More recent studies have used detailed job task descriptions and machine learning methods to automate the task of labelling occupations as creative.<sup>2</sup> Armed with this list of creative occupations, in step 2, for each sub-sector the share of the total workforce that is in a creative occupation is computed (in other words, its 'creative intensity'). And in step 3, the distribution of creative intensity across different sub-sectors is analysed, and on this basis sub-sectors are partitioned into 'creative' and others. Specifically, those with particularly high creative intensities are labelled 'creative industries'. Employment in the 'creative economy' is defined as employment in the creative industries (in both creative and other roles) plus those working in creative occupations in sectors outside of the

---

<sup>2</sup> Bakhshi, Frey and Osborne (2015) use the DCMS's list of creative occupations and O\*Net data from the US Department of Labor on the skills make-up of occupations to train a machine learning classifier of whether any occupation at the 4-digit SOC level in the UK workforce is creative. Lima and Bakhshi (2018) again use the DCMS's list of creative occupations to train a machine learning classifier, but in this case use data on the skills make-up of occupations drawn from a database of millions of online job advertisements.

Supported by



UK Research  
and Innovation



creative industries – sometimes called the Creative Trident (Table 1) (Higgs et. al., 2007; Higgs et. al., 2018).

**Table 1 The Creative Economy**

Employment in Creative Industries	Other Industries
<b>Creative Occupations</b>	<b>Creative Occupations</b>
<b>Other Occupations</b>	Other Occupations

*Note: Employment in the Creative Economy shaded in purple*

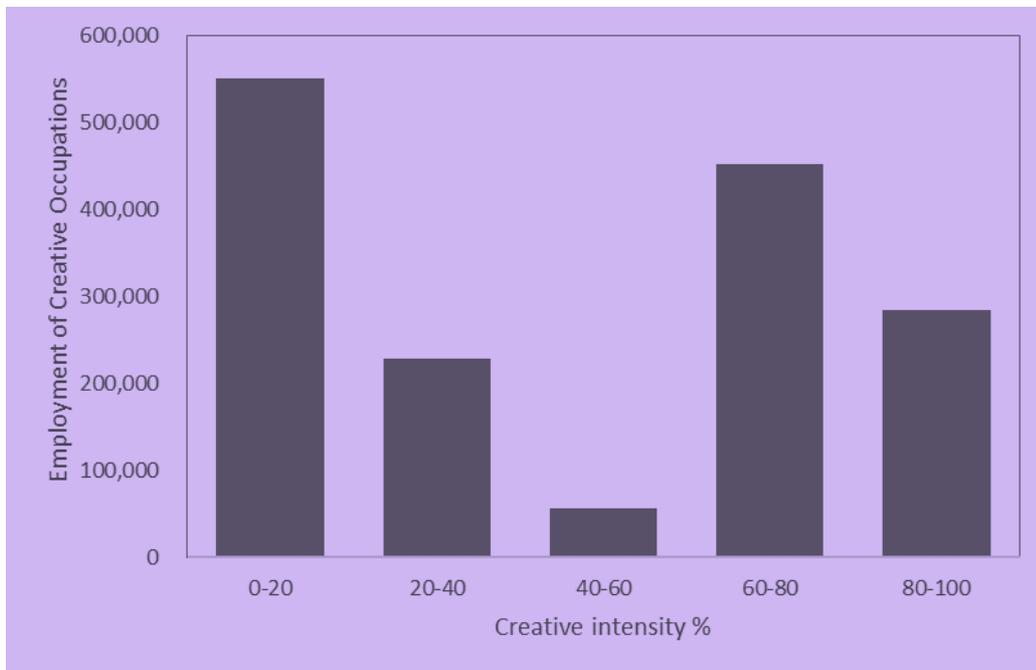
Figure 1 plots the distribution of UK employment in creative occupations by the creative intensity of industries in 2017. It turns out that there are a relatively small number of industries sharing the common characteristic that they employ a high share of people in creative occupations (relative to their overall workforce) – the right-hand side of the distribution. This compares with the vast majority of other industries which have a low creative intensity (the left-hand side), despite the fact that in aggregate they employ large numbers in creative roles (Bakhshi, Freeman and Higgs, 2013). This finding is important, as it suggests there is a strong statistical basis for considering ‘creative’ sub-sectors – with otherwise very different cultures, business and operating models – as a coherent grouping for economic policy, as part of a wider, more significant creative

Supported by



economy.

**Figure 1 Distribution of creative employment by creative intensity of industries, UK**



Note: The employment data for each 4-digit SIC industry broken down by 4-digit SOC occupations is sourced from the [ONS's 2017 Annual Population Survey](#).

The DCMS held a public consultation on and adopted the main principles of the Dynamic Mapping framework in 2014, though in a small number of cases it made different judgements on which occupations should be classified as creative and which industries sub-sectors should be classified as such on the basis of their creative intensities (DCMS, 2016). Dropping the use of arbitrary weights in its selection of sub-sectors also enabled the ONS to formally recognise the statistics as 'official'. As a result of the adoption of the approach, we can understand, for example, the geography of the UK's creative economy and creative industries workforces and where they agglomerate on a basis that

Supported by



is consistent with how other parts of the economy are measured e.g. Bakhshi, Davies, Freeman and Higgs (2015) compares the creative economy (industries) with the STEM economy (industries).

We have also been able to derive internationally consistent statistics, because the approach makes use of industry classifications (SIC codes) and occupational classifications (SOC codes) that are commonly used (Nathan, Pratt and Rincon-Aznar, 2015; Nathan, Kemeny, Pratt and Spencer, 2016; Kemeny, Nathan and O'Brien, 2019). An important finding is that creative intensity can be used to discriminate between creative and other industries in many countries, which suggests that the approach has strong potential as an international standard thereby allowing international comparisons to be made.<sup>3</sup>

Another important feature of the approach is that it acknowledges that sectors are dynamic and that the composition of their workforces should be tracked. Specifically, the creative intensity of industries is time-varying – as industries become more or less creative, depending on how technology and other structural changes lead them to alter their workforce compositions. Hence the name 'Dynamic' Mapping.

---

<sup>3</sup> See, for example, Oksanen, Kuusisto, Lima-Toivanen, Mantyla, Naumanem, Rilla, Sachinopoulou and Valkokari (2018). Also, Weckerle and Page (2018) and Creative Industries Innovation Centre (2013).

Supported by



UK Research  
and Innovation



#### **4. Limitations of the Dynamic Mapping and the big data revolution: Mapping 3.0**

As discussed, a strong advantage of the Dynamic Mapping approach is that it makes use of the industrial and occupational classifications which National Statistical Institutes (NSIs), including the UK's Office for National Statistics, typically use to measure other parts of the economy, drawing on official surveys and administrative data sources.

However, the NSIs face their own challenges in accounting for the economic contributions of dynamic parts of the economy like the creative industries; these challenges impart significant limitations on any creative industries measurement frameworks that use official classifications and data sources. One concern is that the classifications are too aggregated to accurately identify creative activity from other activity. Another is that the sample frames of official surveys and the nature of administrative data sources mean that they do not always pick up creative businesses (a problem compounded by the limitations mentioned earlier of the official industrial codes for sub-sectors like Video Games, which mean that even if the businesses are captured in the data, they may not be classified in a way that allows their contribution to be accurately identified). In such cases alternative means of identifying the activities of firms is valuable, and a potentially fruitful new area of research is to scrape company websites. Mateos-Garcia, Klinger and Stathoulopoulos (2018), for example, analyse data scraped from the websites of hundreds and thousands of UK businesses to identify those which should be labelled as 'creative' based on how they describe what they do on their websites. With these data, they pick up businesses that very frequently mention terms like 'design', 'virtual reality', 'video

**Supported by**



UK Research  
and Innovation



games' and 'music', and capture the extent to which creativity is embedded in firms in sub-sectors outside creative industries too. Specifically, they define 'specialised' creative businesses as those that should be characterised as creative with a high probability based on the text on their website, and 'embedded' creative businesses as those that also have a high probability of being engaged in creative industrial activity but less intensively so than those deemed 'specialised'. This way, the data they use enables measurement of the creative economy in a manner – unlike the Dynamic Mapping – that is independent of the SIC codes. Developing these approaches further, and understanding and addressing the potential biases, is a priority for research in this area (Kinne and Axenbeck, 2019).

## **5. A practical exercise**

Policymakers must acknowledge the conceptual and empirical challenges in defining and measuring the creative economy. Analysts should reflect on the different approaches that have been adopted in different studies and develop a clear understanding of why transparent definition and measurement is important for policy-making purposes (Jones, Lorenzen and Sapsed (2015)).

There is no better way to engage with the issues than looking at some data. In many countries, the NSIs make available to analysts employment statistics – commonly collected through Labour Force Surveys or Household Censuses and coded at the occupation and sub-sectoral level.

As an example, for the UK, [the ONS has made available employment data](#) from the 2017

**Supported by**



UK Research  
and Innovation



Annual Population Survey for each 4-digit SIC industry broken down by 4-digit SOC occupations in the UK workforce. These data are used to create Figure 1 in this paper.) Readers can obtain the list of thirty 4-digit SOC codes that the DCMS considers 'creative occupations' from Table 1, page 6 of '[Creative Industries Economic Estimates Methodology](#)' and the thirty-one 4-digit SIC codes it considers 'creative industries' from Table 2.2, Page 11 of '[DCMS Sector Economic Estimates Methodology](#)'.

Readers should consider whether the DCMS creative occupations are justifiably labelled as such and whether or not there are omissions. Which codes are most contested? They should compute creative intensity for all the different 4-digit SIC codes and confirm that the creative intensities of the DCMS set of creative industries are indeed much higher than those found in other industries. Are the creative industries that are so defined consistent with your expectations, and if not how do they differ? How many workers are employed in the creative industries and what per cent of the overall workforce does this account for? How many creative workers are employed in sub-sectors outside of the creative industries and what does that say about the importance of the wider creative economy in the UK?

## **6. Some recommended readings**

Bakhshi, H., J. Davies, A. Freeman and, P. Higgs (2015), *The geography of the UK's creative and high-tech economies*, London: Nesta.

Bakhshi, H., C. Frey and M. Osborne (2015), *Creativity vs Robots: the creative economy and the future of employment*, London: Nesta.

Supported by



UK Research  
and Innovation



*Discussion Paper 3 - Measuring the creative economy: a guide for policymakers*

Bakhshi, H. and S. Cunningham (2016), *Cultural policy in the time of the creative industries*, Nesta Provocation, London: Nesta.

Bakhshi, H, A. Freeman, and P. Higgs (2013), *A dynamic mapping of the UK's creative industries*, London: Nesta.

Bille, Trine (2011), 'The Scandinavian approach to the Experience Economy – does it make sense?', *International Journal of Cultural Policy*, **18** (1), 93-110.

Campbell, O'Brien and Taylor (2018), 'Cultural engagement and the economic performance of the cultural and creative industries: an occupational critique', *Sociology*.

Crafts Council (2014), 'Measuring the Craft Economy: Defining and measuring craft: report 3', London: Crafts Council.

Creative Industries Innovation Centre (2013), 'Valuing Australia's Creative Industries: Final Report', Sydney: UTS.

Cruz, S and A. Teixeira (2011), 'Methodological approaches for measuring the creative employment: a critical appraisal with an application to Portugal', *FEP Working Paper No. 455*, University of Porto.

Comunian, R and A. Gilmore (2016), *Higher Education and the Creative Economy: Beyond the campus*, Routledge.

Cunningham, S. (2009), 'Trojan horse or Rorschach blot? Creative industries discourse around the world', *International Journal of Cultural Policy*, 15: 375-386.

DCMS (2016a), *DCMS Sector Economic Estimates 2016: Gross Value Added*, accessed 6 April 2019 at

Supported by



UK Research  
and Innovation



[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/662958/DCMS\\_Sectors\\_Economic\\_Estimates\\_2016\\_GVA.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/662958/DCMS_Sectors_Economic_Estimates_2016_GVA.pdf)

DCMS (2016b), *Creative Industries Economic Estimates Methodology*, London: DCMS.

Department for Culture, Media and Sport (2016), *Creative Industries Economic Estimates Methodology*, accessed 14 April 2020 at

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/499683/CIEE\\_Methodology.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/499683/CIEE_Methodology.pdf)

Department for Culture, Media and Sport (1998), *Creative Industries Mapping Document*, accessed 6 April 2019 at

<https://www.creativitycultureeducation.org/publication/creative-industries-mapping-document-1998/>.

Department for Culture, Media and Sport (2001), *Creative Industries Mapping Document*, accessed 6 April 2019 at

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/183544/2001part1-foreword2001.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/183544/2001part1-foreword2001.pdf)

Department for Digital, Media, Culture and Sport (2019), *DCMS Sector Economic Estimates Methodology*, accessed 14 April 2020 at

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/829114/DCMS\\_Sectors\\_Economic\\_Estimates\\_-\\_Methodology.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/829114/DCMS_Sectors_Economic_Estimates_-_Methodology.pdf)

Deroin, V. (2011), *European statistical works on culture: ESSnet-Culture Final Report, 2009-2011*, Culture Etudes: Politiques Publiques et Regulations.

Supported by



UK Research  
and Innovation



*Discussion Paper 3 - Measuring the creative economy: a guide for policymakers*

Design Council (2010), 'Design Industry Research 2010', London: Design Council, accessed 14 April 2020 at

[https://www.designcouncil.org.uk/sites/default/files/asset/document/DesignIndustryResearch2010\\_FactSheets\\_Design\\_Council.pdf](https://www.designcouncil.org.uk/sites/default/files/asset/document/DesignIndustryResearch2010_FactSheets_Design_Council.pdf)

Flew, T (2011), *The Creative Industries: Culture and Policy*, SAGE Publications Ltd.

Garnham (2005), 'From cultural to creative industries', *International Journal of Cultural Policy*, **11** (1): 15-29.

Gordon, J. and H. Beilby-Orrin (2006), *International measurement of the economic and social importance of culture*, OECD Statistics Directorate, accessed 6 April 2019 at <https://www.oecd.org/sdd/na/37257281.pdf>

Goumagias, N., I. Cabras, K. Fernandes, F. Li, A. Nucciarelli, P. Cowling, S. Devlin and D. Kudenko (2014), 'A phylogenetic classification of the video-game industry's business model ecosystem', *Collaborative Systems for Smart Networked Environments*, Springer, Berlin Heidelberg, 285-294.

Gross, Jonathan (2020), 'The birth of the creative industries revisited: an oral history of the 1998 DCMS Mapping Document', Kings College London, accessed 13 April 2020 at <https://www.kcl.ac.uk/cmci/assets/report.pdf>

Hesmondhalgh, D. and A. C. Pratt (2005), 'Cultural industries and cultural policy', *International Journal of Cultural Policy*, **11** (1): 1-14.

Higgs, P., Cunningham, S. and H. Bakhshi (2008), 'Beyond the creative industries: Mapping the creative economy in the United Kingdom,' London: NESTA.

Supported by



UK Research  
and Innovation



*Discussion Paper 3 - Measuring the creative economy: a guide for policymakers*

Higgs, P., Cunningham, S. and J. Pagan (2007), 'Australia's Creative Economy: Definitions of the Segments and Sectors', CCI, Brisbane: Queensland University of Technology.

Jones, C., M. Lorenzen and J. Sapsed (2015), *The Oxford Handbook of Creative Industries*, OUP.

Kemeny, T., Nathan, M. and D. O'Brien, (2019), 'Creative differences? Measuring creative economy employment in the United States and the United Kingdom', *Journal of Regional Studies*, DOI: [10.1080/00343404.2019.1625484](https://doi.org/10.1080/00343404.2019.1625484).

Kinne, J. and J. Axenbeck (2019), 'Web mining of firm websites: a framework for web scraping and a pilot study for Germany', ZEW Discussion Paper No. 18-033.

Lima, A. and H. Bakhshi (2018), 'Classifying occupations using web-based advertisements: an application to STEM and creative occupations', *ESCoE Discussion Paper 2018-08*, London: ESCoE.

Mateos-Garcia, J., J. Klinger and K. Stathoulopoulos (2018), *Creative Nation: how the creative industries are powering the UK's nations and regions*, London: Nesta.

Nathan, M., A. Pratt and A. Rincon-Aznar A (2015), *Creative economy employment in the EU and the UK: a comparative analysis*, London: Nesta.

Nathan, M., T. Kemeny, A. Pratt and G. Spencer (2016), *Creative economy employment in the US, Canada and the UK: a comparative analysis*, London: Nesta.

Office for National Statistics (2018), *Four and five digit industry (SIC) cross referenced with four digit occupation (SOC), January to December 2017*', accessed 14 April 2020 at <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentand>

Supported by



UK Research  
and Innovation



[mploeyetypes/adhocs/008889fourandfivedigitindustryisiccrossreferencedwithfourdigitoccupationsocjanuarytodecember2017](https://employee.types/adhocs/008889fourandfivedigitindustryisiccrossreferencedwithfourdigitoccupationsocjanuarytodecember2017)

Oksanen, J., O. Kuusisto, M. Lima-Toivanen, M. Mantyla, M. Naumanem, N. Rilla, A.

Sachinopoulou and K. Valkokari (2018), 'In search of Finnish creative economy ecosystems and their development needs – study based on international benchmarking', Publication series of the Government's analysis, assessment and research activities 50/2018.

Potts, J. and S. Cunningham (2008), 'Four models of the creative industries', *International Journal of Cultural Policy*, **120** (1), 163-180.

Tether, B. (2016), *Final Project Report of the Cre8ve.eu Collaborative Research Project funded by 7th Framework Programme*, accessed 6 April 2019 at

<https://cordis.europa.eu/docs/results/320/320203/final1-cre8tv-final-report-16-september-2016.pdf>

Weckerle, C. and R. Page (2018), *Creative Economy Switzerland: Creative Economy Report 2018*, CreativeEconomies, Zurich. Creative Industries.

Supported by



UK Research  
and Innovation



## Disclaimer

This is a Discussion Paper published by the Creative Industries' Policy and Evidence Centre (hereafter the PEC). All PEC Discussion Papers have been peer reviewed prior to publication. In keeping with normal academic practice, responsibility for the views expressed in this paper, and the interpretation of any evidence presented, lies with the authors. These views and interpretations may not be shared by the Director of the PEC or the editor of the Discussion Paper series. Readers who wish to challenge the evidence and/or interpretations provided are encouraged to do so by contacting the lead author directly and/or by writing to the PEC's Discussion Paper Editor and Research Director at Bruce.Tether@manchester.ac.uk.

## PEC consortium

The PEC is led by innovation foundation Nesta and involves a consortium of UK-wide universities, comprising Birmingham; Cardiff; Edinburgh; Glasgow; Work Foundation at Lancaster University; LSE; Manchester; Newcastle; Sussex, and Ulster. The PEC's Director and Principal Investigator is Hasan Bakhshi, who is also Executive Director, Creative Economy and Data Analytics at Nesta.

For more details visit <http://www.pec.ac.uk> and [@CreativePEC](#)



## Supported by

