Designing the Future Economy

Design Skills for Productivity and Innovation

Methodology

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This document was prepared for Design Council by Ortus Economic Research Ltd.

Ortus Economic Research Ltd

Economic research, data and analysis

Contents

Methodology

All analysis in the *Designing a future economy* report is based on the most recent data available at the time of writing. The methodology for this research is designed to reflect and build on that used in the *Design Economy* research[1]. This methodological appendix outlines the processes used for the analysis reported.

Defining designers

Designers are defined using the Standard Occupational Classification 2010, as set out in the *Design Economy* report.

Table 21: Designers: Standard Occupational Classification 2010

Design group	SOC 2010	SOC description	Example job titles
Architecture and Built Environment	2121	Civil engineers	Building engineer, structural engineer
	2431	Architects	Architect, architectural consultant, landscape architect
	2432	Town planning officers	Planning officer, town planner
	2435	Chartered architectural technologists	Architectural technologist
	3121	Architectural and town planning technicians	Architectural assistant, construction planner
	3122	Draughtspersons	CAD operator, cartographer
	5113*	Gardeners and landscape gardeners	Garden designer, gardener, landscape gardener
Multidisciplinary Design	3422	Product, clothing and related designers	Fashion designer, product designer, interaction designer
Advertising Design	2473	Advertising accounts managers and creative directors	Advertising manager, campaign manager, brand identity manager
Clothing Design	5414	Tailors and dressmakers	Fabric cutter, tailor
Craft Design	5211	Smiths and forge workers	Blacksmith, farrier
	5411	Weavers and knitters	Carpet weaver, knitwear manufacturer
	5441	Glass and ceramics makers, decorators and finishers	Glass blower, potter

[1] Design Council (2015), *The Design Economy – The value of design to the UK*, http://www.designcouncil.org.uk/what-we-do/design-economy

	5442	Furniture makers and other craft woodworkers	Cabinet maker, antiques restorer
	5449	Other skilled trades n.e.c.	Engraver, goldsmith
Digital Design	2135	IT business analysts, architects and systems designers	Business analyst, systems analyst, technical architect
	2136	Programmers and software development professionals	Database developer, games programmer, software engineer
	2137	Web design and development professionals	Internet developer, web designer, user interface designer
Graphic Design	3411*	Artists	Illustrator, portrait painter, sculptor
	3421	Graphic designers	Graphic artist, graphic designer
Product and Industrial Design	2122	Mechanical engineers	Aerospace engineer, automotive engineer
	2126	Design and development engineers	Design engineer, research and development engineer
	2129*	Engineering professionals not elsewhere classified	Metallurgist, project engineer

Subject to the following exclusions: Employment/value in SOC 5113 is only included only where this occurs within SIC 71.11 and 81.30. Employment/value in SOC 3411 is only where people are working outside of SIC 90.03 and excludes those working in an educational setting. Employment/value in SOC 2129 is only included for those working in product and industrial manufacturing industries (SIC 13-32), other creative industries (as per the DCMS definition) or those identified as design industries).
Source: Design Council (2015) *The Design Economy 2015*

Identifying the 13 skills used for design

The following five domains were examined in detail in the development of the taxonomy:

- Skills
- Knowledge
- Abilities
- Work activities, and
- Work styles

These domains were selected because they provide data that can be used to develop the taxonomy and they align best to the aims and objectives of the study. For example, the Tasks domain was examined but excluded on the basis that the range of tasks applicable to different occupations was so diverse and variable that it did not support comparative analysis of one occupation against another.

Within the O*Net system, each domain is disaggregated into a number of 'elements'. For example, in the Skills domain, there are six sub-domains (e.g. basic skills, social skills, etc.) and these in turn are broken down into 35 elements (e.g. within basic skills, these include active learning, active listening,

critical thinking and so on). We are therefore interested, in this analysis, in identifying the elements which are deemed most important by the design workforce in comparison with the workforce overall.

Note that whilst the O*Net system provides ratings for both **level** and **importance** for each element and by occupation, it was decided during the course of the analysis to focus solely on the **importance** scores. This was because the study is primarily interested in the skills which differentiate the design workforce from others, and that including level would complicate the analysis and potentially influence results such that they become difficult to interpret. In other words, the study is about what the design workforce does, not the level at which it does it. Additionally, some elements (e.g. 'innovation) are scored only on importance, so would be disadvantaged in any scoring system which used level also.

Using the existing SOC definition of design occupations, the prevalence of elements, relative to all occupations, was explored across the domains identified above using the data provided by O*Net on the importance of each element within SOCs. The methodology for identifying the elements which are more prevalent in the design workforce is as follows:

1. For the whole workforce, calculate the mean average 'importance' values from the O*Net data (note that the elements within the Work Styles domain are not given a level value).

2. For the design workforce (using the Design Economy SOC definitions), calculate the mean average 'importance' values from the O*Net data. Note that we also tested employing median averages as an alternative but discovered that this approach made no difference to the results.

3. For each element, calculate an 'Importance Premium' based on the values for the design occupations against the values for the whole workforce. For example, if the importance value for the Operations Analysis element for the design workforce is 2.79 and the equivalent value for the whole workforce is 2.09, we divide the first by the second and calculate an importance index of 1.33. When converted into a percentage, this gives an Importance Premium of 33%. We have done this for importance for every element in the domains of interest.

4. Given that the analysis thus far takes no consideration of the *scale* of presence of each skills in the workforce, and that without doing so we may over-emphasise highly niche design skills and under-emphasise widely prevalent skills, the next stage was to weigh the indices according to employment density. We therefore applied a weighting according to the employment scale of each design occupation (calculated as a proportion of the whole economy), based on the design group in which it sits (using the estimates in the Design Economy study, which is published at Design Group level). Note that we also tested the application of weighting by GVA but decided that employment was a better measure of skills density, whereas GVA might be a better measure of value. However, the link between skills and value is to be explored in the subsequent analysis, and therefore to introduce a value-based weighting at this point would interfere with the results later.

In order to identify the most prominent elements (i.e. skills) for the design workforce, for each domain those elements that achieved an Importance Premium greater than 0% for design occupations relative to the workforce as a whole.

Identifying design-skilled occupations and design-active industries

The process of identifying design-skilled occupations (to complement the design economy definition of designers) was as follows:

- Using the 13 design skills elements identified through the taxonomy analysis, calculate an Importance Premium for all UK SOCs.

- Review each of the 13 design skills individually, examining and identifying the occupations with the highest Importance Premium scores for each.
- Apply criteria 1 – apply a simultaneous filter on the Design element to ensure all candidate occupations have an Importance Premium for Design of at least 0%
- Apply criteria 2 – simultaneously apply an Importance Premium threshold to identify those occupations which rate at least two other elements at least 50% more important than in the workforce generally. In the case of two elements – Thinking Creatively and Interacting with Computers – the threshold was lowered to 30% as there were no occupations with an Importance Premium of at least 50%.
- Filter - identify all occupations which meet both criteria 1 (for at least two skills other than Design) and criteria 2 above.
- Deduplicate any occupations which are already within the design economy definition.

Having identified design-skilled occupations, the approach used in the *Design Economy* research to identify design industries was employed. All industries with at least 30% of employment in either design occupations or other design-skilled occupation were defined as design-active industries.

Identifying innovation-intensive industries

The process of developing the innovation skills taxonomy is similar to that employed to develop the design skills taxonomy, but with one important difference; the starting point for the development of the design skills taxonomy was to take a pre-existing definition of the design workforce (from the *Design Economy* study) and to investigate, using the O*NET database, how this workforce differs from the wider workforce in terms of skills. However, as far as we are aware there is no pre-existing definition of innovation-intensive occupations that we could use in a similar manner.

Therefore, we compared the importance premium for the Innovation element (within the Work Styles domain of the O*NET database) for each occupation. This provided the basis of a ranking of occupations by the importance of innovation. However, there are 157 UK occupations with an Innovation importance premium of 1% or above. It was agreed that a definition based on such a large number of occupations would be relatively meaningless and that a mechanism by which the number could be reduced was required. Given the nature and objectives of the study, its inherent focus on design and the fact that the design element is the strongest in our analysis of design skills, it was decided that firstly, a more stringent selection criteria should be applied to the importance of innovation, and secondly that the importance of design to individual occupations should also be taken into consideration.

The definition of innovation-intensive occupations is therefore SOCs with:

- a minimum Innovation Importance Premium of 10%, *and*
- a minimum Design Importance Premium of 10%.

Table 22: Innovation-intensive industries

SIC 2007	SIC description	Design skills-intensive?
14.19	Manufacture of other wearing apparel and accessories	Clothing Design

16.29	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	Product and Industrial Design
23.41	Manufacture of ceramic household and ornamental articles	Craft Design
23.49	Manufacture of other ceramic products	Design-active industries
62.02	Computer consultancy activities	Design-active industries
81.30	Landscape service activities	Design-active industries
95.24	Repair of furniture and home furnishings	Design-active industries
01.43	Raising of horses and other equines	–
01.62	Support activities for animal production	–
03.22	Freshwater aquaculture	–
13.30	Finishing of textiles	–
17.23	Manufacture of paper stationery	–
18.20	Reproduction of recorded media	–
23.11	Manufacture of flat glass	–
46.23	Wholesale of live animals	–

Employment estimates

Employment estimates are taken from the Annual Population Survey (APS). The APS is the largest ONS household survey, and is based on the Labour Force Survey but includes a boosted sample. Each survey includes around 130–140,000 individuals who are in employment (either employed or self-employed). The survey provides a wide range of indicators including demographics, employment, education and health, though a relatively small number of variables are used in this report.

The report uses APS microdata, analysed within the Office for National Statistics' secure data facility using SPSS. Employment estimates include main jobs and second jobs. Estimates are weighted using the appropriate variables in each APS dataset.

Financial calculations

Gross value added estimates are taken from the Annual Business Survey (ABS). The measure of gross value added used in this report is *approximate gross value added* (GVA), which is the measure recommended by the ONS when analysis at a detailed industrial level is required.

The ABS is the key ONS survey for understanding the detailed structure and performance of businesses across the UK, and is one of the main sources of business information in the UK National Accounts. Around 47–49,000 businesses are surveyed each year. The survey only includes businesses with VAT and/or PAYE schemes. In addition, the ABS covers only the non-financial business economy.

It includes the production, construction, distribution and service industries, and represents about two-thirds of the UK economy in terms of GVA.

GVA measures the contribution to the economy of each individual producer, industry or sector in the United Kingdom. GVA is closely linked to Gross Domestic Product (GDP), the measure more commonly used at national level:

GVA + taxes on products – subsidies on products = GDP

The ABS provides GVA figures for design skills-intensive industries only. This is apportioned to design skills-intensive and non-design skills-intensive occupations based on their share of gross earnings in design skills-intensive industries. The earnings data used in this analysis are taken from the Annual Survey of Hours & Earnings (ASHE)[2]. Similarly, an estimate of the contribution to GVA of people working in design skills-intensive occupations outside design skills-intensive industries is based on their share of gross earnings (derived from the ASHE). GVA is measured in current prices (i.e. estimates are not adjusted for inflation).

Productivity figures are calculated by dividing GVA estimates by employment.

Innovation activity

Innovation activity is measured using the UK Innovation Survey (UKIS), the main source of information on business innovation in the UK. The UKIS is the UK's contribution to the Europe-wide Community Innovation Survey (CIS), and is conducted following the guidelines set out in the Organisation for Economic Co-operation and Development (OECD) publication known as the Oslo Manual (OECD 2005). As well as methodological advice, this manual provides a review of the range of concepts that fall together under the umbrella term 'innovation'.

The survey has a sample of around 16,000 UK businesses. Only businesses with 10 or more employees in sections B–N of the Standard Industrial Classification 2007, which are registered for VAT and/or PAYE, are included. The report uses UKIS microdata, analysed within the Office for National Statistics' secure data facility using SPSS. Estimates are weighted using the appropriate variables.

Note that the Design and Innovation section contains a number of charts which report percentages (e.g. Figure 6, Figure 7, Figure 8) and the section on Design Skills Productivity Gaps contains a number tables also doing so (i.e. Table 16, Table 17, Table 18 and Table 19)41. The absolute values associated with these percentages are not reported but, where the data refers to employment, these can be calculated with reference to base numbers set out in Table 12.

Recruitment, skills and qualifications, and training

Several data sources are used to investigate skills-related themes in this report, including the UK Employer Skills Survey (ESS), the Skills & Employment Survey (SES) and the Workplace Employment Relations Survey (WERS).

[2] The ASHE is one of the largest surveys of the earnings of individuals in the UK. Data on the wages and paid hours of work of almost 1% of the working population (around 140,000–185,000 people) are collected. While limited in terms of detail on personal characteristics compared to the APS, the ASHE is useful not only because of its larger sample size, but also the responses regarding wages and hours are considered to be more accurate since the responses are provided by employers rather than from employees themselves. Estimates based on earnings data from the APS in *The Design Economy 2015* have been revised and updated in this report using data from the ASHE.

- The ESS is a biennial UK-wide survey of businesses, providing the most detailed picture of training, vacancies, skills gaps, and investment in training. Each survey has a sample of around 90,000 UK establishments with two or more people working at them (regardless of whether they own the business or not). The report uses data from the 2011, 2013 and 2015 surveys.
- The SES aims to provide data on the skills and employment experiences of working life in Britain, including the level and distribution of skills requirements of jobs in British workplaces. The report uses data from the most recent survey conducted in 2012, with comparisons to the previous 2006 survey where available. The 2012 survey interviewed 3,200 employed adults; the 2006 survey had a larger sample of 6,600 employed adults.
- The WERS is a national survey of employment relations and practices in Great Britain. The report draws on two components of the most recent survey, conducted in 2011: a survey of managers (around 2,700 respondents) and a survey of employees (around 22,000 respondents).

Analysis of these sources was undertaken in Ortus' secure data laboratory using SPSS. Estimates are weighted using the appropriate variables in each survey.

Cost of skills shortages and skills gaps

The cost of skills shortages and skills gaps was calculated using ESS estimates of the number of skills shortage vacancies and the number of people not fully proficient in their current jobs in design industries, and multiplying these by estimates of GVA per head.

Data sources

Department for Business, Innovation and Skills, Advisory, Conciliation and Arbitration Service, National Institute of Economic and Social Research (2015) *Workplace Employee Relations Survey, 2011* [data collection]. 6th Edition. UK Data Service. SN: 7226, http://doi.org/10.5255/UKDA-SN-7226-7

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U.S. Department of Labor, Employment and Training Administration (2016) *O*NET 21.0 Database* [computer file]. Downloaded 7 December 2016. https://www.onetcenter.org/database.html

UK Commission for Employment and Skills (2016) *Employer Skills Survey, 2011* [data collection]. 3rd Edition. UK Data Service. SN: 7430, http://doi.org/10.5255/UKDA-SN-7430-3

UK Commission for Employment and Skills (2016) *Employer Skills Survey, 2013* [data collection]. 2nd Edition. UK Data Service. SN: 7484, http://doi.org/10.5255/UKDA-SN-7484-2

UK Commission for Employment and Skills (2017) *Employer Skills Survey, 2015: Special Licence Access* [data collection]. 2nd Edition. UK Data Service. SN: 7997, http://doi.org/10.5255/UKDA-SN-7997-2

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