

Creative Industries Mapping: Where have we come from and where are we going?

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Abstract

Attempts to measure the bundle of activities termed the creative industries commenced with the UK's Department of Culture, Media and Sport (DCMS) release in 1998 of its Creative Industries Mapping Study. Like many earlier attempts to study the size and impact of the cultural industries, these focused on the employment and business activities (within selected industrial classifications) of either census of industry employment or surveys of businesses within industries. Since then, there have been mapping exercises in several countries, based to a greater or lesser extent on the 1998 UK exercise. This paper proposes that there have been three iterations of creative industries mapping to date. It outlines the issues faced, the methodologies applied and the findings produced by representative projects in each iteration.

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Introduction

This article discusses a representative group of studies prompted by the release of the first Creative Industries Mapping Study by the UK Department of Culture, Media and Sport (DCMS 1998). This important work became the template for numerous other studies commissioned by governments at the national (including those of Taiwan, New Zealand, Singapore and Australia¹), regional and even city level (for example, Queensland, London and Brisbane²). It built on several earlier attempts to study the size and structure of the cultural industries (for example, those of UNESCO, StatisticsNZ, and cultural economist Andy Pratt³). The first iteration of creative industries studies primarily focused on the employment and business activities within selected industrial classifications using data from either population surveys (or censuses) of the industry of people's employment, or on surveys of businesses within industries, most often labour force surveys. The second iteration of mapping studies, exemplified by the Hong Kong Creative Industries Baseline Study (Centre for Cultural Policy Research 2003), used a more comprehensive approach including examining specific creative occupations in an endeavour to overcome some of the limitations evidenced in the DCMS approach.

Keywords

Creative Industries
Mapping
International
Comparative
Mapping
Australia
United Kingdom
Employment Statistics
Creative Trident

1. See Cultural and Creative Industry Promotion Team (2004); Walton and Duncan (2002); Heng et al (2003); DCITA (2002).
2. ICF Consulting and SGS Economics and Planning (2003); Creative London Commission (2002); Cunningham et al (2003).
3. UNESCO (1986); Statistics New Zealand (1995); Andy C. Pratt (1997).

4. This is the subject of a significant academic and policy literature, eg., Burns Owens Partnership et al (2006) and in Australia, Pattinson (2003). See also Andy Pratt (forthcoming 2008) and Wyszomirski (forthcoming 2008).

Steps towards implementing a third iteration for measuring employment of the creative industries workforce have been taken in parallel in France and Australia. The French Culture Ministry's Department for Planning and Statistics' report (French Ministry of Culture 2005) parallels work which we have conducted at the ARC Centre of Excellence for Creative Industries and Innovation. This approach has provided, at this early juncture, some key findings. The size and significance of creative industries cannot be accurately measured by using the totals of a number of industry activity codes alone. As a result, we estimate previous studies have underestimated the employment impact of some creative sectors by up to 40%, and the pre-2006 versions of some industry classification systems produce significant errors in sizing, possibly up to 25%.

Mapping studies can be of value to policy and industry as they provide core data about industries which are hard to classify and document statistically. In many cases they can be used as background justification for government support. The development of robust methodologies is critical to achieving the primary function of mapping studies. Both undervaluation and overvaluation carries dangers.

These issues are part of the broader challenges of measuring effectively domains undergoing substantial change through the progressive convergence of the computer, communication, cultural and content industries.⁴ New hybrid occupations and industry sectors emerge that do not comfortably fit into standard statistics classifications. The 10–15 year gap between updates of these classification schemes means there is almost no comprehensive, standardised employment or industry data available during the critical emergence period of many sectors. Measuring the production and purchasing of physical products is difficult enough but measuring the number, 'size' and value of the delivery of services is an order of magnitude more difficult. The challenges in seeking to measure the flow-on impact of emergent digital creative industries services to other sectors of the economy are even greater.

In response to these challenges, four types of metrics recur in creative industry mapping studies to express the size or contribution of the sector:

- Employment: primarily the full time employment within specific industry classifications;
- Firm activity: primarily the number of firms, sometimes banded according to their turnover and occasionally the degree of concentration of the industry;
- Gross value add to the economy determined by national input/output tables or specialist surveys;
- Exports: The value of exports from the industry usually determined by either survey and extrapolation or from official product and service export statistics.

Other measures relating to output, such as the numbers of books and film titles, as used in the DCMS work, are more problematic as there are no common denominators across the sectors. Manufactured, finished goods such as film DVDs, music CDs, printed books are relatively easy to count but have little in common to provide a relevant quantity grouping except 'units'.

Service outputs, such as product design or web development services, however, represent a substantial part of creative industries activities and these do not lend themselves to standard measures that support cross sectoral comparisons other than the financial transaction value of the service. In addition, many physical products are now also being transformed into service-based delivery: digital music subscriptions instead of CDs, video downloads substituting for DVDs and cinema attendance and application service providers (ASPs) delivering previously very expensive specialist software to online subscribers on a monthly per-user fee basis.

First Iteration: The DCMS ‘Template’

Famously, the DCMS defines the creative industries as ‘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’ (DCMS 2001a:4). The thirteen segments selected in the UK Creative Industries Mapping Document 1998 (Advertising, Architecture, Art & Antiques Market, Crafts, Design, Designer Fashion, Film & Video, Interactive Leisure Software, Music, Performing Arts, Publishing, Software & Computer Services and Television & Radio) had their own focused reports.

This groundbreaking DCMS work was hampered by limitations beyond their control: in the classifications, granularity and availability of relevant data. Broadly speaking, the original DCMS definitions of the creative industries and segments appear to align more closely with government portfolio responsibilities than with a rigorous framework to support analysis because one did not yet exist. Notwithstanding, the 1998 and 2001 mapping documents broke new ground in defining the creative industries, highlighting their importance and difficulties of measuring this diverse and rapidly evolving section of the economy. The innovation and importance of the reports should not be underestimated: they established a platform for the creative industries to have a voice to governments at all levels. Their impact was not confined to the UK as shown by the rapid undertaking of similar studies in many countries.

The segment reports included data on the level of employment generated, the number, size, turnover and margins of firms in the segments and the outputs including the value of exports and estimates of the value of ‘Gross Value Added’. Some of the segment reports – depending on available data – also looked at the nature of the value chains, the level of competition and concentration within the industry and the industry’s international competitiveness. The method and coverage of the UK Creative Industries Mapping Document 1998 ‘template’ was developed further in the 2001 version and, as we have noted, was adopted widely.

There was no primary data in the two DCMS Mapping Studies reports, instead they relied on a range of existing data collated from government statistical agencies and from reports or surveys conducted by the various industry bodies, such as the Royal Institute of British Architects for Architecture, the Design Business Association and the Design Council for Design, and the Arts Council of England for Performing Arts. Where no direct data was available for creative activities that are subsumed in other industries, proportional estimates were made. For example, the value of the

5. Now known as the DCMS Evidence Toolkit Department of Culture, Media and Sport (2004).

Fashion Design segment in the UK was estimated as 5% of the apparel related industries – a best effort estimate at the time.

The UK Mapping Studies’ three key limitations concerned segment definition (leading to overreach, overlaps and gaps), data source and classification (inconsistencies in measures, frequency and time periods), and granularity (from relying on highly aggregated source data). These limitations reduce the ability to compare the performance of segments over time as well as between segments, regions and countries.

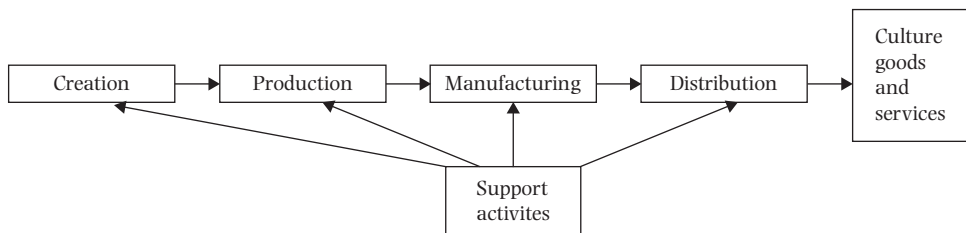
Definitional limitations

The industry activity-based segment definitions developed by the DCMS are not consistent with respect to the definition of creative industries nor are they consistent with respect to the stage of the value chain. While much of these inconsistencies are the result of the limitations in industrial classification systems, consistency is important as it provides the basis for cross-sectoral and cross economy comparisons. As Andy Pratt (2000) points out, there are problems with a focus for the selection of segments in the creation stage and the retail or exchange stage of the cycle at the expense of the production stage. Even within the retail group of industries, there are inconsistencies: newsagencies, Art and Antique Dealers and retailing of Recorded Music are included but Real Estate Sales offices are not.

The selection of industries appears to be based more on sectors covered by the portfolio than on a comprehensive approach to measure the creative industries as such. Such an approach would require a consistent framework focusing on the primary activities of each segment and enabling the sizing of the segments to be combined to determine the overall size of the creative industries without double counting. The 2002 UK DCMS Cultural Data Framework⁵ was a substantial effort to address the need for consistency in metrics as it details the industry activities and occupations for each stage of a value chain for each segment:

1. Creation > 2. Making > 3. Dissemination > 4. Exhibition/Reception > 5. Archiving/Preservation > 6. Education/Understanding.

Unfortunately the framework does not differentiate between the primary activities of the value chain and the support or infrastructure requirements. As pointed out by those who developed the ‘Creative Chain’ from the Canadian Framework for Culture Statistics (Culture Statistics Program (2001) some important activities, such as training, government bodies and associations are not part of the core value chain but are autonomous support activities.



We would take this further and suggest that while accounting for many of these ‘autonomous’ activities is essential when conducting input/output and multiplier factor studies they are not directly relevant when calculating the level of creative employment.

6. This is examined in detail in a case of regional design in Higgs et al (2005).

Comparability limitations

The UK Mapping documents utilised different sources for the data for each of the segments which means that caution has to be exercised when comparing segments or when adding them together in attempt to create a total for the creative industries in a specific year. Another concern is highlighted by the caveats in the 2001 Mapping Document that suggests there is little point in comparing the figures for 1998 report to that of the 2001 report because of methodological differences in the years used as reference points, the time period covered and the classifications used (DCMS 2001b). The DCMS research unit addresses this issue by commencing in 2002 to release reports that endeavour to use the same metrics from the same source for each segment as a time series: employment, the number of firms, the exports and the level of gross value add. This is a valuable basis for further creative industries mapping work.

The UK’s Annual Business Inquiry (ABI), a major data source sited in the DCMS Evidence Toolkit, collects data from enterprises with employees and codes the number of employees with the standard industry code. Unfortunately the ABI does not survey non-employing enterprises so the significant number of sole-practitioner creatives is not counted. (The creative industries are composed to a greater extent than many other industry sectors by sole traders: ‘39 per cent of those employed in cultural occupations as a main job are self-employed compared with 12 per cent of those in non-cultural employment’ [Davies and Lindley 2003].) Also, the UK Labour Force Survey, according to the DCMS Evidence Toolkit, needs to be used with caution when looking at sectors within the creative industries as it is conducted as a survey of UK households with a sample size of approximately one in 400 to provide the weighted results. As a consequence it could be hard to determine reliably the detailed patterns of employment within sub-segments. Data from a population census would be much more suited for this – but can quickly go out of date.

Classification limitations affecting data availability

The first iteration of mapping studies naturally focused on the industry activities and therefore gathered data about the specialist firms operating within each specific segment. However Pratt (2004) and Roodhouse (2006) have noted that standard industrial classifications are poorly suited to creative industries especially in the Design and Interactive Media segments. This means that the direct economic impact of creative industries has been substantially under-estimated.⁶ For instance, the approach used by most analysts to measure the employment impact of (say) the Design segment is to count the people employed within firms in the specialist design industries of Architectural Services and Photographic Services. Our analysis (which we will exposit later) in the Australian instance has shown this leads to under-counting by approximately 50 percent because of the

high number of designers embedded in other industries and poor statistical industry definition coverage.

Many specialist design consulting activities are lost within broad classifications such as the Australian category of 'Business Services' or 'Consultant Engineering Services' or even the several classifications related to clothing manufacturing. Simon Roodhouse's report on Fashion Design pointed to the special difficulties of meaningfully defining sub-sectors in this sector: 'The need to define the sector is central to any attempt at collecting data and the importance of being precise about the descriptors for sub-sectors. This is where judgements are needed to reflect the extent of a sub-sector within the accepted national norms such as SIC and SOC and avoids some of the problems of overlap or double counting' (Roodhouse 2003:4).

As an example of the problems Roodhouse identifies, in 2001 there were 2402 Fashion Designers employed across Australia but only 133 of these were employed within the appropriate specialist industry classification ('Business Services') where they represented less than 1% of that industry's employment. 17% of Fashion Designers are working in 'Clothing Manufacturing', undefined, 16% in 'Clothing Wholesaling' and a further 14% are working within 'Womens and Girls Wear Manufacturing'. Similarly for 1,903 people whose occupation in 2001 was as an Industrial or Product Designer, only 300 or 15% were employed in the 'correct' industry of 'Consultant Engineering Services' where they constitute less 1% of the 38,000 employed.

As we have noted, the DCMS Mapping studies used proportional estimates to address this problem. The UK Design sector has no UK Standard Industrial Classification (SIC) code and therefore data for it could not be sourced from national surveys. The Design Mapping Report therefore had to rely on industry surveys and other estimates which creates potential inconsistencies with the data of other segments.

The 2003 Singapore study (Heng et al 2003) utilises a subset of the copyright industries selection of industry classifications to size its industry, ignoring the distribution stage of the value chain. The study was notable for its comprehensive attempt to compare Singapore's performance on a number of employment and economic indicators with the US, Hong Kong, Australia and UK. But again a number of the industries selected, such as newsagencies, are open to challenge for overreach and inconsistency as libraries, cinemas and museums were excluded.

Second Iteration: Industry and Occupation

2003–4 saw the release of a second iteration of mapping methodology, including the Hong Kong Baseline Study (Hui 2003) and the Ontario Design Study (Gertler And Vinodrai 2004). This iteration also includes *UK Creative Industries Economic Estimates Statistical Bulletin July 2003* (DCMS [2003-] and subsequent issues). In an effort to address the data availability and industry classification shortcomings in the first iteration, these looked beyond industry codes and began to include occupational data. This approach had been previously used when measuring arts and cultural employment (ABS 1991, 1993; Statistics New Zealand 1995). (To foreshadow our view of this iteration, our approach argues that by itself a 'creative occupation' approach can still result in a significant underestimation

of total employment as it does not take into account the support and management staff that work within specialist creative firms.)

The annual DCMS Creative Industries Economic Estimates Statistical Bulletin series (since 2003) has been developing this more comprehensive approach. The October 2005 report states: ‘In the summer quarter of 2004, creative employment totalled 1.8 million jobs. This included just over 1 million jobs in companies in the creative industries. There were a further estimated 0.8 million creative jobs within companies outside the creative industries’ (p2). These data were adduced by examining the annual labour force survey (which is not a census) which records the occupations and industries of people employed. The inclusion of embedded employment adds a further 75% to the UK total creative employment. This rectifies to some extent the underestimate of creative industries activity that was occurring in previous mapping studies. This method of combining data from occupation and industry classifications was further developed by the Centre for Cultural Policy Research at the University of Hong Kong in their Baseline Study on Hong Kong’s Creative Industries for the Central Policy Unit of Hong Kong SAR. The Centre defines three types of creative employment: (1) Occupations of Creative Production (OCP); (2) Associate Profession of Content/Creative Production (APCP) and (3) Occupations of Creative/Content Production in all other industries.

		Occupational Codes of Census Population	
Code	9 Industry Group	Occupations of Creative / Content Product Occupational codes	Associate Professions Occupational codes
342	Printing/Publishing/& Allied Industries	Data set A 10 types of OCCP <i>Relevant codes include: 214, 252, 253, 254, 256, 261, 262, 266, 353, 361</i>	Data set B 9 types of AP <i>Relevant codes include: 121, 122, 123, 314, 362, 363, 364, 431, 522</i>
835	Arch., Surveying & Projects Engineering Services		
836	Advertising & Related Services		
837	Data Processing and Tabulating Services		
940	Motion Pictures & Other Entertainment Services		
942	Lib., Museums, Gardens & Cultural Services		
949	Misc. Amusement & Recreational Services		
838	Engineering & Technical Services	Data Set C Occupations of Creative / Content Production in all other industries	---
839	Miscellaneous Business Services		
N	Other Industrial Categories		

Notes:

A + B = total number of creative labour (OCP & APCP) in 7 groups of creative industries
A + C = total number of creative workforce (OCP) in all sectors of the local economy

Table 1: Hong Kong’s Matrix of Mapping Employment Data from Population Census.

Source: HK Creative Industries Baseline Study 2004.

For type 1 and 3 it developed a list of 10 core occupation codes and for type 2 a separate list of 9 occupation codes. These are mapped across 9 industry groups.

Unfortunately the low resolution (3 digit) of the occupation and industry codes available and used in the study constrained the accuracy of this approach and substantially limits analysis at the segment level. In addition the specifications of nine occupation codes to define the Associate Profession of Content/Creative Production (APCP) is superfluous as this unnecessarily constrains the identification of those employed in support roles within the specialist creative industries. Our Australian analysis has shown that there is a much wider range of occupations employed within the creative industries in support and managerial roles than the nine codes selected by Hong Kong.

The importance of combining occupation and industry data matrices is evidenced in the 2004 Ontario Design Study. This was notable for, firstly, comparing the number of people in a range of design occupations in Ontario and the US per 1,000 people in the workforce. The benchmarking of cities and regions on the basis of specific occupation densities revealed some striking patterns in the competitiveness of some population centres that would have been missed if the analysis was just made on the basis of employment within the specialist design services industry. Secondly the study was the first example we have been able to identify which analyses the proportion of employment of a creative segment's workforce across the economy. The study looked beyond the simple number of "embedded" designers to look for patterns in where they were employed and on what basis.

Methodological limitations of the second iteration

Accurate metrics for the creative industries are most effectively generated by teasing out the individual fine "strands" of creative occupations and industry activities and then combining them into a "cord" for each segment which can then be joined together to form the creative industries "rope". It cannot be reliably and consistently achieved by combining an arbitrary slice or proportion of one rope with other slices or sections of other ropes as this approach easily unravels under scrutiny.

Therefore it is important to analyse from the finest resolution of classification possible. We use the term 'resolution' to refer to the degree of classification for which data is available. In a classification hierarchy, the finest resolution is the one with the most digits. The lowest resolution is the top level single digit classification which in the case of industry activity is the 'division' (in Australia) and in occupation it is the 'Skill Level' or 'Major Group'. The UK has a similar level of resolution in its occupation (SOC) and industry (SIC) classifications but it would appear that because of the limitations of the employment survey, the analysis was not conducted at the finest possible level of detail.

Care also needs to be taken in selecting the industry and occupation classifications used as the ones selected should vary depending on the purpose and context. For instance the industry and occupation classifications used to calculate employment by the UK DCMS appear to have been selected in isolation with considering how they would interact. The UK

Annual Economic Estimates 2006 report includes in the publishing segment four occupations which would be correct when counted within the publishing industries but which could not be considered creative occupations when embedded in the broader industry. These include Originators, Composers and Print preparers, Printers, Bookbinders and Print finishers and Screen printers. Of the 35 occupation codes it uses to calculate embedded creative employment, 10 are substantially or wholly irrelevant and would substantially increase the size of the 'embedded' workforce. Furthermore of the 25 industry classifications used by the DCMS in the calculation of the industry employment, export and business numbers, six are highly contentious as they would have a low degree of correlation with the core creative industry value chain. These industries include Clothing Manufacture, Newsagencies, Other Business Activities not elsewhere classified, Other Retail Sale in specialised stores, and Retail Sale of second-hand goods in stores.

The use of broad classifications would prevent researchers from identifying, separating and combining their threads of data and the use of inappropriate classifications would result in erroneous or misleading results.

Third Iteration: The 'Creative Trident' Approach

The first steps towards implementing a third iteration to measuring employment of the creative workforce, building, as we have noted, on cultural employment frameworks, were taken in parallel in France and Australia. Following from the recommendations of the European Union 'Leadership Group (LEG) on Cultural Statistics', the French Culture Ministry's Department for Planning and Statistics (2005) produced a report on *Cultural Employment in Europe in 2002* (French Ministry of Culture 2005). This defined cultural employment as 'the total of active workers having either a cultural profession, or working with an economic unit within the cultural sector'. The definition supported three distinct occupational 'situations' which are directly equivalent to the parallel work which we have dubbed the Creative Trident:

- Workers with a cultural profession working in a cultural sector (e.g. an artist in an opera);
- Workers having a cultural profession but working outside the cultural sector (e.g. a designer in car industry);
- Workers having a non-cultural profession and working in the cultural sector (e.g. a secretary in a film production company).

Our research has shown that the primary impact of creative industries in both employment and value add terms can be determined from a methodology analysing a census-based matrix that combines the employment within the specialist creative industry activity and the specialist occupations in a way that either double counts or excludes people or businesses because of shortcomings in occupation and industry classification schemes.

Our methodology looked to provide metrics, especially employment and earnings, that would be especially robust and of national scope. This could not be achieved from scaling up from a survey of a proportion of the segment or sector as the scaling factor is always open to challenge. We

developed a methodology and suite of tools that could enable robust analysis of a range of national data-sets, such as census-based employment and business activity, from different periods that could be combined, despite each data-set having different classification schemes such as industry, occupation and qualification: often different versions of them and different levels of aggregation.

Our project benefited from all the previous work outlined above. In addition, Richard Florida's work (Florida 2002; Florida and Tinagli 2004) on the 'Creative Index' – notwithstanding its implausible corralling all white and no-collar workers into its orbit – highlighted the importance of those in creative occupations being studied in their own right, rather than focus narrowly on industries in which they work. He has highlighted the importance of such an occupational analytical focus to the competitive advantage of cities and regions. We also were able to pilot the approach in a series of reports at a regional level in Australia (CIRAC and SGS 2005).

Towards the Creative Trident

The straight forward approach to measuring the impact of creative industries is to count the number of people employed within a given bundle of industry classifications. In Australia this is currently 28 classifications within the Australian and New Zealand Standard Industry Classification (1993 release).

Australian Employment 2001 Population Census	Employment within 28 Creative Industries
Total Creative Industry	299,916

Table 2: 2001 Australian employment using 22 tightly defined industry classifications.

An alternative approach is to count the number of people employed within eighty nine occupation codes (at six digits in Australia) that are defined as specialist creative occupations.

Employment 2001	Total Creatives
Employment of people in 89 specialist Creative Occupations	271,467

Through analysis of a custom data extract of the Census of population consisting of the number of people employed in every occupation in every industry at the finest level of occupation (at six digits) and industry (at four digits) coding available it is possible to break down the creative industry employment into two components: those within specialist occupations and those performing other roles within the firms in the selected creative industries.

Australian Employment 2001 Population Census	Employment within 28 Creative Industries
People employed in Creative Occupations	134,450
People employed in Support and Management Occupations	165,466
Total Creative Industry	299,916
Specialist Proportion	44.8%

Furthermore, by focussing on the specialist creative occupations it is possible to determine those employed within the specialist creative industries and those in employment in other industries.

Employment 2001	Employment within 22 Creative Industries	Employment within Other Industries	Total Creatives	Embedded Proportion
Employment of people in 89 specialist Creative Occupations	134,450	137,017	271,467	50.5%

The Employment Creative Trident

We dub the combination of these two approaches into a single table the 'Creative Trident'. (The metaphor of the trident is used because it points to three parts of an employment quadrant composed of an occupation/industry matrix of two rows and two columns.) This is the total of creative occupations within the *core* creative industries (Specialists), plus the creative occupations employed in *other* industries (Embedded), plus the *non-creative* (better titled business and support) occupations employed in creative industries who are often responsible for managing, accounting for, and technically supporting creative activity. Simply put, the number of people employed in the Creative Economy is the total of Creative Industries employment (299,916) plus embedded employment (137,017) which in 2001 totalled 436,933 people.

Australian Census 2001 Employment	Employment within Creative Industries	Employment within Other Industries	Total Creatives	Embedded Proportion
Employment of people in 89 specialist Creative Occupations	134,450	137,017	271,467	50.5%
Business and Support Workers	165,466		165,466	
Total Creative Industry	299,916	137,017	436,933	35.7%
Creative Occupation Proportion	44.8%		62.1%	

Without a framework such as the trident it would be easy to double count employment or overlook some embedded employment. The trident aids the visualisation of the complete creative economy of a country, city or region or at a finer level of a specific creative segment.

The values for the Trident are best captured from a single, custom population Census table of the number of people employed in every occupation in every industry at the finest level of occupation and industry coding available. This is not a trivial analytical task as the 2001 Australian Census dataset contained over 13 million cells.

While the Australian developed Trident is conceptually similar (after rotation) to the methodology developed by Centre for Cultural Policy Research at the University of Hong Kong, it differs in two important ways:

- The Creative Trident utilises combined occupation and industry matrices and uses its toolset to enable two or three dimensional analysis by specifying the industries and occupations that are part of the core segment or sector of interest. The remaining industries and occupations do not have to be specified but the level of employment within them is counted.
- The Creative Trident uses much higher resolution classifications to select the occupations and industries of interest and excludes those that are too broad or includes a significant proportion of activities that are not core creative ones. It manages this complexity using the CCI toolset.

The Trident is also an advance on the UK Economic Estimates approach of reporting creative industries employment plus embedded employment as the Trident explicitly delineates specialist employment and business occupations employment. Given that there is movement, especially between specialist and embedded employment, it is important to be able to monitor such trends as they can reveal significant patterns within a segment. The other advantage of the Trident approach is that it compensates for many of the coverage weaknesses in industry classifications by also being able to integrate the employment from the often more finely-grained creative occupations. This is especially true in many of the design segments where the industry coding is weak in Australia and non-existent in the UK. But there is good coverage of design occupations in both jurisdictions.

The Financial Creative Trident (Creative Economy)

It has been very difficult for economists and industry researchers to develop a consistent measurement of the overall 'creative economy'. However the Creative Trident has a contribution to make here as the custom Census tables we used include the number of people employed within 16 income bands for every occupation in every industry at the finest level of occupation and industry coding available. Determination of the mid value of each of the 16 income bands enables the calculation of the total annual income generated by all persons employed for every combination of income band, occupation and industry.

This is not the turnover of organisations within the industry but the gross amount received as declared on the 2001 Census form. The total

Australian Census 2001	Creative Industries \$Million	Other Industries \$Million	Total \$Million
Creative Occupations	\$6,343	\$6,467	\$12,810
Other Occupations	\$8,013		\$8,013
Total	\$14,356	\$6,467	\$20,823

Table 3: Annual Earnings generated from Employment in the Creative Trident.

costs to business of these personal earnings would be an estimated 30% higher because of superannuation and other benefits, payroll tax and other administrative costs.

To put this in context, the economic gross value added by an industry or segment would approximate, within plus or minus 10%, the value of the earnings of the people within the segment with much of that gap being accounted for by the profit of the firms. This correlation has been observed in economic modelling conducted on a statistically significant survey of the creative industries in Queensland we conducted in 2004.

Creative Segments	Total trident Employment Australia 2001 (Persons)	Total Trident Earnings from Employment Australia 2001 \$Millions
Music & Performing Arts	29,618	\$964
Film, Television & Radio	34,212	\$1,670
Advertising & Marketing	45,401	\$2,192
Software Development & Interactive Content	133,847	\$8,605
Writing, Publishing & Print Media	80,686	\$3,098
Architecture, Design & Visual Arts	113,169	\$4,295
Total Creative Segments	436,933	\$20,692

Table 4: Employment and Earnings within the segments in the Creative Trident.

Using the Trident approach to measure the Creative Segments

The Trident approach to analysing the combined industry and occupation employment matrix works just as effectively when analysing the individual creative segments as it does on the total 'creative economy' employment and earnings.

However each segment has different patterns in the proportion of support and embedded employment.

The Creative Industry Sub-total column is what first and second iteration studies would identify as the size of the segment. The third iteration approach reveals the variations between the segments with the Film, Television & Radio segment having a very low (7%) rate of embeddedness to the Advertising & Marketing segment having a very high rate at 44%.

Whole of economy impact

The significance of Creative Trident is felt across the whole of the Australian economy either directly or through embedded employment. Almost 2% of the total Australian workforce are people that are embedded,

Creative Segment	Employment of Creative Occupation within that Creative Industries	Employment of Others in that Creative Industry	Creative Industry	Employment of Creative talent in other Industries	Creative Occupations Sub-Total	Total Trident
	(Specialist)	(Support)	Sub-Total	(Embedded)	Sub-Total	Total
Music & Performing Arts	9,812	8,568	18,380	11,238	21,050	29,618
Film, Television & Radio	17,760	14,048	31,808	2,404	20,164	34,212
Advertising & Marketing	7,963	17,390	25,353	20,048	28,011	45,401
Software Development & Interactive Content	34,818	60,930	95,748	38,099	72,917	133,847
Writing, Publishing & Print Media	25,167	37,068	62,235	18,451	43,618	80,686
Architecture, Design & Visual Arts	38,930	27,462	66,392	46,777	85,707	113,169
Grand Total	134,450	165,466	299,916	137,017	271,467	436,933

Table 5: The employment of each Creative Segment within the different Trident Modes.

Division	Total all Occupations Employed within Division	Total Creative Segments and Embedded Creatives		Specialist Creative Segments within Divisions	Total Embedded Creatives	
	#	#	%	#	#	%
A Agriculture, Forestry and Fishing	319,879	623	0.2%		623	0.2%
B Mining	73,827	520	0.7%		520	0.7%
C Manufacturing	987,986	78,886	8.0%	58409	20477	2.1%
D Electricity, Gas and Water Supply	59,841	1,286	2.1%		1286	2.1%
E Construction	543,746	3,957	0.7%		3957	0.7%
F Wholesale Trade	428,546	8,808	2.1%		8808	2.1%
G Retail Trade	1,181,922	10,340	0.9%		10340	0.9%
H Accommodation, Cafes and Restaurants	400,604	2,429	0.6%		2429	0.6%
I Transport and Storage	347,455	3,031	0.9%		3031	0.9%
J Communication Services	146,008	5,675	3.9%		5675	3.9%
K Finance and Insurance	308,402	10,274	3.3%		10274	3.3%
L Property and Business Services	904,689	186,735	20.6%	161947	24788	2.7%
M Government Administration and Defence	365,337	12,662	3.5%		12662	3.5%
N Education	587,953	16,838	2.9%		16838	2.9%
O Health and Community Services	791,761	2,775	0.4%		2775	0.4%
P Cultural and Recreational Services	198,851	79,767	40.1%	74791	4976	2.5%
Q Personal and Other Services	294,874	9,681	3.3%	4769	4912	1.7%
R Non-Classifiable Economic Units	43,602	1,305	3.0%		1305	3.0%
Z Not Stated	117,736	1,341	1.1%		1341	1.1%
Total	8,103,019	436,933	5.4%	299,916	137,017	1.7%

Table 6: Using the Creative Trident to calculate the significance of creative segments and embedded creatives within the broader economy.

Source: Analysis by CCI of custom data-set from the Australian Bureau of Statistics 2001 Census of Population and Housing.

Census Year	Specialist Creative	Support	Specialist Industry Subtotal	Embedded Creative	Creative Occupations Sub Total	Total Trident
Census 1976 4 digit occupations	26,932	58,207	85,139	73,759	100,691	158,898
Census 1991 4 digit occupations	45,507	126,205	171,712	57,698	103,205	229,410
Census 1996 4 digit occupations	87,430	150,496	237,926	101,008	188,438	338,934
Census 2001 4 digit occupations	95,936	194,929	290,865	124,679	220,615	415,544
Census 2001 6 digit occupations	134,450	165,466	299,916	137,017	271,467	436,933

Table 7: The numbers of people employed within the Creative Trident for 1978, 1991, 1996 and 2001.

Source: Analysis by CCI of custom data-set from the Australian Bureau of Statistics Census of Population and Housing.

that is, are employed in creative occupations outside of specific creative industries. They are spread across all industry divisions. The extent of this embeddedness can be totalled by generating from the combined industry and occupation matrix a table of the industry division of employment of those in creative industries and creative occupations.

3.5% of employment within the M Division (Government) are in core creative (embedded) occupations which is almost as high as the proportion of Division J (Communication Services) at 3.9%. By way of comparison, the embedded employment within Manufacturing is relatively low at 2.1%. The proportion increases to 8% when the specialist employment within the publishing industries is considered.

The Trident applied to Time Series

The Trident approach is very useful when applied to combined census matrices from different years as it allows the identification of the shifts in the patterns of employment between specialist and embedded that occurs as segments mature or with changes in the economic climate.

We sourced and analysed custom census tables from 1976, 1991, 1996 and 2001 at the highest resolution available in industry and occupation industry classification. To align more closely with prior census classification structures the 2001 census table were recalculated at 4 digits of occupation classification as well as at 6 digits.

Because of the strict criteria used in selecting the occupation and industry classification that are used, both at 6 and 4 digits, this led to 20,000 difference in the calculation of total employment in 2001 at 4 digits compared to 6 digits of occupation.

Between 1976 and 2001 the number of people employed in the Creative Trident has tripled. However the limitations of some the historical industry or

Year	Specialist Creative	Support	Specialist Industry Subtotal	Embedded Creative	Creative Occupations Sub Total	Total Trident
Census 1976 4 digit occupations	470	1,015	1,484	1,286	1,756	2,770
Census 1991 4 digit occupations	662	1,837	2,499	840	1,502	3,339
Census 1996 4 digit occupations	1,145	1,971	3,116	1,323	2,468	4,438
Census 2001 4 digit occupations	1,184	2,406	3,590	1,539	2,723	5,128
Census 2001 6 digit occupations	1,711	1,825	3,536	1,968	3,679	5,504

Table 8: The density of employment within the Creative Trident for 1978, 1991, 1996 and 2001 per 100,000 people in the workforce.

Source: Analysis by CCI of custom data-set from the Australian Bureau of Statistics Census of Population and Housing.

occupation classifications shows up in some of the shifts between specialist, support and embedded employment. When looking for these sorts of patterns we have found it more useful to compare the density of employment per 100,000 people in the work force.

The steady increase in the density of the Australian Creative Trident from 1976 to 2001 can be clearly seen as the density of employment has doubled. There has been a cumulative annual growth in the density of employment of 2.5% which is more meaningful in some contexts than the natural cumulative annual growth in employment of 3.9% as this does not acknowledge the 1.4% annual growth in the workforce.

The density approach more clearly reveals classification weakness artefacts such as the drop in embedded density between 1976 and 1991 but also the peak in support density. A strength of the Trident approach is that weaknesses in one classification dimension such as occupation maybe be compensated for by the industry classification still covering relevant employment. The total employment figures are likely to be more accurate even if there are artefact-driven shifts in the mode of employment figures. This is not the case where single dimension source tables such as count of industry of employment are used.

The Trident approach applied to different industry grouping definitions

Our methodology allows the analysis of large multidimensional census tables in ways that are relatively definition agnostic. For example, the Creative Digital Industries is a partial subset of the Creative Industries which has many elements in common with the Cultural Industries. It was therefore critical not only to be able to track over time the transitions between them,

Definition	Specialist Creative	Support	Specialist Industry Subtotal	Embedded Creative	Creative Occupations Sub Total	Total Trident
Creative Industries	134,450	165,466	299,916	137,017	271,467	436,933
Digital Creative Industries	109,457	146,125	255,582	120,545	230,002	376,127
Cultural Industries	61,482	91,110	152,592	50,743	112,225	203,335

Table 9: The numbers of people employed in Australia in 2001 within the Creative Industry, the Creative Digital Industry and the Cultural Industries.

Source: Analysis by CCI of custom data-set from the Australian Bureau of Statistics 2001 Census of Population and Housing.

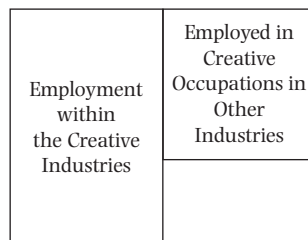
but also to be able to support the comparative analysis of any number of different segment definitions that are relevant.

Conclusion

The argument of this paper can be simply summarised. The first mapping iteration determines the employment within the businesses operating within the creative industries. There is little ability to differentiate the employment characteristics except on the basis of the limited number, and therefore limited resolution, of industry classifications, thus:



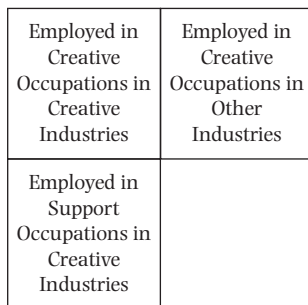
The second iteration establishes total creative employment by adding employment within the businesses operating within the creative industries and creative occupations working outside of these businesses. While the total may be accurate this approach does not reveal any of the mix of occupations in the businesses, thus:



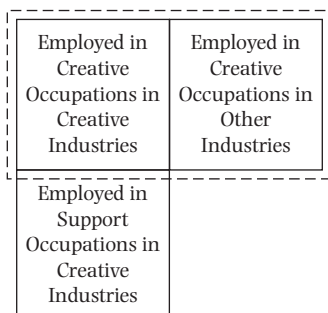
An alternative ‘second’ approach, common in cultural employment studies, is to add the total employment in creative occupations to the number of people in support occupations (those outside of creative occupations) that are working within the creative industries, thus:



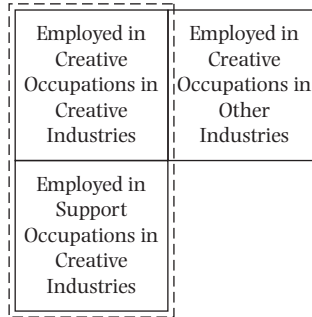
The third iteration determines the employment within each of three of the four possible combinations of occupations and industries: specialist, support and embedded (the fourth being the rest of the economy). Each of the creative segments has a different ratio between the three quadrants that would be missed in the first or second iteration, thus:



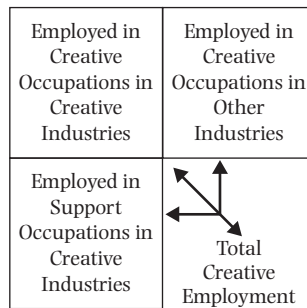
The third iteration aids alternative perspectives. For instance, it is possible to determine the total employment in creative occupations by adding specialist and embedded employment modes:



Employment within the creative industries can be determined by adding specialist and support employment:



The level of total creative employment is determined by adding all three modes. Because all three modes are determined from the same dataset at the same time there is no likelihood that there is any double counting:



Compared to previous iterations, the Creative Trident methodology has increased our ability to analyse accurately the employment characteristics of the creative economy. There are two key criteria for what defines a third iteration mapping methodology:

- It is based on analysis of multi-dimensional comprehensive datasets that provide the count of the number of people within every income band for every combination of occupation and industry of employment at the finest level of detail. It is therefore able to calculate the annual earnings generated from employment as well as the counts of the people employed.
- It reports specialist, embedded and support employment levels, total annual earnings and characteristics for sectors, segments and the creative workforce as a whole and not just overall levels of employment.

This methodology is more resilient to weaknesses in the coverage of a specific segment or sub-segment than a first iteration approach. A shortcoming in one dimension – in an occupation or, as is more likely, an industry classification, are at least partially counter-balanced by the other dimension. For example, the 1981 and 1991 UK censuses had no usable industry classification for Architectural Services, but we can calculate ‘embedded’ employment through the architecture occupations.

It also supports comparability across the segments and the economy than second iteration approaches. Being generated from a whole-of-economy matrix, employment and income in the creative segments, and embedded employment, can be compared economy-wide or to large-scale sectors such as manufacturing or services. Also, the annual earnings in individual segments are more accurate as they are calculated from the mean income of each combination of a specific occupation with a specific industry. This is a superior approach for creative employment than using the mean income for an industry or occupation classification where any significant variations are lost in the averages. With the right source dataset, the methodology allows us to examine the distribution pattern of annual earnings within a segment and to compare the distribution patterns of specialist, support and embedded roles.

For industry strategists and government policy makers, the trident methodology could have important implications. First, as we have noted, it tells us that the size of the creative economy is significantly larger than previously assessed. It places a strong focus on the human capital dimension, encouraging a stress on the value to the wider economy of creative 'inputs' as well as a focus on the robustness of creative industry sectors themselves. Programmes that focus on business development, account management or support skills within the creative industries may find integrated data on support occupations useful. Industry sectors such as product design may find that analysis of the linkages between specialists and embedded creatives may be useful in addressing the export potential of a country's manufacturing sector.

We are moving to apply the Creative Trident methodology in 2007 to diverse national data sets, including the Australian and New Zealand census conducted in 2006 which used recently updated classification schemes. We expect this to demonstrate significant sizing advances as classifications catch up with major changes in the structure of the workforce and industry – as contemporary economies begin to look more 'creative'.

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