The Urban Emergence of a New Information Industry: Sydney's Multimedia Firms

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Abstract
This paper analyses the multimedia industry in Sydney. It seeks to understand whether the emergence of the industry has involved dense horizontal and vertical inter-firm linkages characteristic of an industrial cluster, or whether the industry has grown because of general urbanisation economies related to such factors as skilled labour supply and market demand. The industry is highly concentrated in and around central Sydney. This provides the best access to firms' main clients, notably advertising companies and other multimedia firms. It also reflects the centralised location of skilled labour such as web designers. While there is evidence of an emerging inner Sydney multimedia cluster which includes graphic design and advertising and related media, the main driver of the industry's development appears to have been general demand from advertising and related media companies, in association with the pool of computer graphics talent generated by these companies.

KEY WORDS *Industry clusters; central Sydney; multimedia-advertising-media cluster; graphic design industry; labour and market urbanisation economies*

Introduction

The multimedia industry has emerged over the last fifteen years or so as a result of new information technologies allowing the digitisation of most information, and its consequent transmission through carriers with increased bandwidth (Wallis, 1995). These features have allowed information to be accessed and manipulated interactively, a key property of multimedia in most definitions. More widely, the emergence of the multimedia industry in the 1990s can be seen as a feature of the 'new economy' arising from the convergence of the information technology and telecommunications industries (Negroponte, 1998). A growth surge occurred in providing information and arranging transactions using the new economy tools of electronic commerce, e-business, and other forms of internet-based trading. The number of so-called dot.com companies grew rapidly to an unsustainable level, only and inevitably to decline as the new century began. Nevertheless, the use of multimedia products, notably web sites, became established within business and government. The new multimedia technology also allowed information content producers, such as media companies and publishers, to provide their output in new computer-based formats.

The new multimedia industry that has developed in response to these forces has grown in a geographically uneven fashion. Certain metropolitan areas have become the centres of this industry; in turn, the inner areas of these cities are the most favoured multimedia industry locations within these urban areas.

This paper analyses the emerging multimedia industry in Sydney. It seeks to understand the structure and operation of this industry and its resulting location, especially in terms of contested notions for explaining concentrations of high technology industries.

The multimedia industry and the space economy

There is no standard definition of multimedia, but there is general agreement on its central features. Braczyk *et al*. (1999, 7) define multimedia as the combination of two or more of audio

(speech/music), still images, video, text/numbers, graphics and animations being used interactively and in an integrated manner.

A conceptualisation of the structure of the industry has been given by Scott (2000, 131). He sees the industry as having four levels:

1. The first level comprises the hardware base of the industry — computer and communication systems, plus associated components and peripherals.
2. Access to this base is provided by a programming interface level, in which the creation of software allows specific operations, such as animation and hypertext manipulation.
3. The third level is the core of the industry, in which multimedia come into existence at the intersection of basic visual, print and audio media in conjunction with full digitisation and interactivity.
4. The last level comprises the heterogeneous outputs of the industry, such as games and entertainment, educational products and business applications.

As this structure suggests, the multimedia industry is characterised by strong inter-industry relationships, particularly between multimedia, computing and the cultural industries. These relations are not mutually exclusive: two or more activities can be successfully carried out in the same firm (Brail and Gertler, 1999, 106).

The information technology (IT) base of the multimedia industry means multimedia are marked by uncertainty resulting from changing technology and product markets, short product life cycles, and intense global competition (Benner, 2002). Multimedia content is subject to similar uncertainty, whether the content is cultural or technical. In terms of cultural content, the multimedia industry has been at the forefront in applying digital technology to satisfy a contemporary growth in demand for design-intensive goods (Amin and Thrift, 2002), while major entertainment, publishing and advertising media sectors have driven multimedia demand in Los Angeles and New York, for example (Brail and Gertler, 1999; Scott, 2000). This design and media demand is intrinsically uncertain because of changing fashion and its short product cycles, together with strong global competition in most areas.

The nature of competition in the information-rich IT and content sectors, and the resulting need for innovation in order to remain competitive, mean that flexible production practices in the multimedia industry are highly advantageous (Benner, 2002, 29). Firm sizes are small (with an average of nine workers in California), with supplementation from part time and freelance workers as the need for extra labour arises (Scott, 2000, 143). This structure is reinforced by the project basis and recurrent labour mobilisation of much multimedia work, arising from the intermittent demands of leading firms in multimedia-related industry complexes, such as film studios and publishers (Heyderbrand, 1999, 67; Scott, 2000, 12). By contrast, larger firms cope with uncertainty more by a strategy of offering a range of products and skills, which gives greater stability and thus allows economies of scale (Scott, 2000, 143–144) and scope. These strategies echo those of the 'flexible firm' as originally conceptualised by Atkinson, with its distinction between numerical or external flexibility involving peripheral workers, and functional or internal flexibility involving core workers (Atkinson, 1985).

Joint ventures are another strategy for reducing risks and increasing economies and flexibility, such as those undertaken with large media firms in motion pictures and publishing (Scott, 2000, 147). Such relationships allow multimedia firms to gain access to the content and distribution networks of major media firms. Conversely, these media firms are able to tap into the highly specialised multimedia skills (Scott, 2000, 147).

Uncertainty for these characteristically small firms can be notably reduced if they locate in areas with concentrations of specialised multimedia-related workers. Thus Scott sees the concentration of multimedia firms in southern California as being closely related to the region's role as a major centre of the entertainment industry. Because of this, it has a dense concentration of specialised workers in such fields as story writing, visual dramatisation and scenario production, and a ready supply of subcontract services such as film and video production, graphic art, musical composition, acting and voice-over (Scott, 2000, 155).

The benefits from this concentration of specialised workers are also reinforced by interaction between these workers. Scott's research has shown that multimedia-related workers have many different intersecting networks of association. These allow workers to 'collectivize their individual experiences, knowledge, etc. … [constituting] an important basis of worker expertise and innovative activity' (Scott, 2000, 168).

As this relationship between multimedia production and concentrations of specialised workers

suggests, the need for 'flexible specialisation' production structures can generate industry clusters (Piore and Sabel, 1984). In this situation, the function of local horizontal and vertical networks of specialised and independent firms is central, facilitating information, materials and labour linkages within the cluster in response to changing market circumstances. The development of networks to weave together ideas, resources and relationships has been central in the development of the multimedia cluster in New York's Silicon Alley (Indergaard, 2003). Strong input-output linkages and joint ventures also characterise the multimedia clusters in San Francisco and Los Angeles (Scott, 2000, 146–148). The need for rapid outputs in sections of the multimedia industry, such as advertising, further reinforces the formation of local vertical input-output clusters (Leisink, 2002, 121).

Nevertheless other authors suggest that such local input-output linkages are, in practice, infrequent and that other explanations of agglomeration in high technology industries, such as multimedia, are more powerful (Oakey *et al*., 2001; Amin and Thrift, 2002). For example, over two thirds of a sample of multimedia and related non-broadcast visual communications firms in the UK had no business linkages with any other firms in their local cluster (Oakey *et al*., 2001). More generally, much of the input-output of small and large high tech firms involves international origins and destinations (Oakey *et al*., 2001, 403; Green *et al*., 2002). Similarly, in clusters such as media/advertising, the leading firms are internationally structured, are frequently dependent on project teams around the world, and are linked up virtually and through placements (Grabher, 2001).

As one alternative agglomeration explanation, academic 'spin-offs' from higher education establishments are argued by Oakey (1984) to be the main reason for the clustering of high tech small firms in the US around such establishments. Actual linkages between 'spin-off' firms, the incubating 'parent' or other local firms are uncommon (Oakey, 1984). However, spin-offs from one or two pioneer firms are claimed to be significant in explaining the development of the multimedia industry in Montreal (Crowe, 2003) and Lyon (Moriset, 2003).

Another potential agglomerating force is the attraction for skilled workers of urban districts of high environmental quality for living and working (Sassen, 1995, 68; Oakey *et al*., 2001; Moriset, 2003). In New York's advertising/media complex (and its satellite multimedia concentration), the new, small, creative advertising agencies tend to be located close to areas with cultural amenities, new middle-class lifestyle, or 'artistic scenes' (Leslie, 1997, 1030). This locational preference may also allow place-specific knowledge/social networks to be developed which may be informal but productive, without necessarily involving systematic input-output linkages. For firms in creative industries as with much of the multimedia sector, clustering in fashionable inner areas can provide firms with resources, inspirations, contacts and social enjoyment (Amin and Thrift, 2002, 66). In the media and advertising cluster in Soho, London, project workers frequent the area's nightspots to feed their creativity, exchange ideas and soak in the 'state-of-the-art' (Nachum and Keeble, 1999). In turn, Soho's reputation as the place for designer media products, fast creativity and 'hypersociability' attracts customers and more talented workers (Nachum and Keeble, 1999; Amin and Thrift, 2002, 66). While there are no systematic linkages between local advertising/media firms in Soho, what seems to matter is the combination of the global corporate reach of some firms with the time savings that the local concentration provides to project teams (Grabher, 2001).

A further set of factors influencing the location of multimedia firms and acting as a potential agglomerating force is the institutional context. In particular, 'institutional thickness' has been postulated as a critical determinant of the local embeddedness of an industry (Amin and Thrift, 1994). Educational and training institutions can promote local multimedia development by producing a pool of appropriately specialised workers (Scott, 2000). Partnerships between public development agencies, educational institutions and business can result in favourable cluster development conditions through provision of incubator facilities and additional training support, for example, as in Galway's software cluster (Green *et al*., 2002). The provision of generous provincial and city financial subsidies within a public-private development precinct has been crucial to the growth of a large multimedia zone in Montreal (Crowe, 2003). In Silicon Alley, the private sector institutional structure has been significant, with specialist venture capitalists and real estate interests promoting the new media cluster through a trade association, venture capital, subsidised wired space, wired labs and industry surveys

(Callon, 1986; Indergaard, 2003). The importance of wired facilities reflects the industry need for specialised fibre optic cable infrastructure, which acted as a significant early force for clustering in Silicon Alley (Indergaard, 2003).

The range of favourable location factors arising from these various industry influences has thus far caused the multimedia industry to be concentrated in selected major metropolitan areas. In summary, these factors include a complex of content-supplying industries, advanced technology companies, creative-technical educational facilities and/or courses, and venture capital (Pavlik, 1999, 94). Social and economic diversity seems to be an advantage, notably the presence of several industry bases to drive multimedia demand, and a variety of ethnic and cultural environments (Heyderbrand, 1999, 113). Economic diversity also meets the multimedia industry's reliance on talent from diverse backgrounds, particularly traditional media, programming, arts, and related fields (Brail and Gertner, 1999, 135). In this regard, the importance of urban locations for multimedia activity is reinforced by the history of large city-regions as centres of culture (Scott, 1998).

Within city regions, the nature and organisation of multimedia activity favour urban core locations. This is linked to the importance of ease of access to potential collaborators and supplier firms, freelancers, potential employees, amenities, educational and training facilities and also to facilitating interaction and networking with clients, especially with major customers in the central city. It is also linked to areas around the city centre having cheap and 'funky loft-style' space in old industrial buildings which suits the image and working style of creative firms (Brail and Gertler, 1999, 123, 125). As multimedia firms grow, however, they may change their location from older buildings not easily wired with fibre optic cabling, to state-of-the-art premises with broadband access in the CBD or in peripheral high tech parks (Moriset, 2003).

After an overview of the Australian multimedia sector, the rest of this paper uses these insights to frame an analysis of Sydney's multimedia industry, drawing primarily on a survey of a sample of firms in the industry.

The Australian multimedia sector

The rapid growth of Australia's multimedia sector in recent years has been seen as driven to a significant extent by the rapid expansion of innovative information and communication technology usage (National Office for the Information Economy, 2002). This has particularly involved major growth in internet usage and growing acceptance of online services such as e-commerce, coupled with falling technology costs. Businesses with internet access grew rapidly from 29% in 1998 to 56% in 2000, and then to 72% in 2002 (Australian Bureau of Statistics, 2003). This was matched by similar growth in the acquisition by businesses of a web presence, from 6% in 1998 to 16% in 2000 and 24% in 2002. A large number of new multimedia firms has also become involved in digital production and post-production for film and television, and in the manufacture of interactive games (National Office for the Information Economy, 2002). The former movement has, in part, been driven by growth in the film and video industry, in which payments to other businesses for production services rose by 25.5% between 1996–97 and 1999–2000 (Australian Bureau of Statistics, 2001).

By 2001 it has been estimated that those Australian industries developing multimedia content generated revenue of A$8.4 billion per annum (Victorian Office of Training and Tertiary Education, 2002). As in other nations, small and medium-sized firms dominate the industry, with over 75% of multimedia companies having less than 20 employees. Some evidence of cluster development has been observed in the interactive computer games segment of the industry, with Melbourne being named as one of the games development industry's 'global hot spots' by leading technology magazine *Wired* in 2003 (Multimedia Victoria, 2003). Other data suggest that Sydney is the main centre of overall multimedia production, with New South Wales (essentially Sydney) having 51% of Australia's media professionals (O'Connor *et al*., 2001, 111; citing Kavanagh, 2000, 48–81).

Intra-urban trends in the industry have not been analysed to date except for the multimedia-related industry of graphic design in Sydney, where there was a relatively centralised distribution of firms related to client location (Searle, 1998). This pattern conforms to that of firms involved in information production, processing, and distribution as a whole, where the location of jobs in Sydney and Melbourne shows a strong concentration in and near the central city (O'Connor *et al*., 2001, 156; citing Newton, 1995). This distribution is reinforced by the concentration of key information industry workers — the 'symbolic analysts' — in the

inner suburbs as well as in affluent middle suburbs (O'Connor *et al*., 2001, 144–145).

The survey

In order to analyse the structure of Sydney's multimedia industry, a mail survey was carried out of all firms listed under 'Multimedia Services' in the 2000 Sydney *Yellow Pages*. The survey used a questionnaire to ask firms for details of their size, activities, workforce profile, client type and location, sub-contracting and service inputs, and alliances/partnerships. Firms were offered an email version of the questionnaire. A follow-up letter was sent to non-respondent firms.

The same survey was also carried out of all 'Designers — Graphic' firms listed in the 2000 Sydney *Yellow Pages*. This was done in order to obtain a more nuanced interpretation of the multimedia survey results. In particular, it helped to identify those characteristics of the fledgling multimedia industry which distinguish it from the older graphic design industry, which has provided a starting point for much new multimedia activity. Thus a comparison of the two industries was intended to provide some evidence on the kinds of structural and spatial changes that occur when new digital and related technology allows a new industry to evolve within the media/design area.

The response rate for multimedia firms was 29 of a total 279 firms listed in the Yellow Pages, or 10.4%. For graphic design, 40 firms of a total of 1023 listed firms, or 4%, responded. While these were low response rates, the high turnover of firms in each industry meant that a number of firms in the Yellow Pages were not in business at the time of the survey, a situation compounded by the requirement for listings to be submitted to the Yellow Pages a number of months before publication. Twenty five multimedia industry questionnaires were returned because firms were no longer at the listed address, and it is likely there was a number of other such firms. Taking this into account, it is estimated that the adjusted response rate for multimedia firms was of the order of 13–14 per cent. Though still low, it is comparable with that of some overseas surveys of the multimedia industry (for example those in Braczyk *et al*., 1999; Leisink, 2002). The much lower response rate for graphic designers means that survey data for these firms need to be treated as only potentially suggestive at a general level.

The survey data on the age of firms suggested that the samples were biased toward older firms, when compared with other surveys of the multimedia industry (for example, Scott, 2000). Of the multimedia respondents, nine (32%) had been in business for more than ten years, while a further ten (36%) had been in business for five to ten years. Only nine (32%) had existed for under five years, a lower proportion than the image of the multimedia industry would suggest, and lower than in Scott's (2000) data for the Californian multimedia industry. The graphic design sample had a similar age profile. A partial explanation may be a sample bias to older firms within the Yellow Pages population itself. Thus conclusions from the sample data need to be seen as reflecting the more established end of the multimedia (and probably also that of the graphic design) industry.

An analysis of the location of multimedia sample firms against the location of total firms in the Yellow Pages did not indicate any sample bias on this account. A 2×2 chi square analysis of sample and total firms divided according to whether they were located in inner Sydney (Sydney City, South Sydney, Leichhardt, North Sydney and Willoughby local government areas (LGAs)) or the rest of Sydney showed no difference at a 1% level of probability of error.

Sydney's multimedia industry

The multimedia industry in Sydney was analysed using the survey results for the sample of firms, plus Australian Bureau of Statistics (ABS) data and independent data on the location of web designers' residences. The following sections use this information to describe and analyse the industry in terms of size and location, activities, markets, labour, and contracting/subcontracting and service inputs.

Industry size, growth and location

The multimedia industry is not separately defined by ABS. Nevertheless an overview of the size, structure and location of Sydney's multimedia sector can be obtained by collating ABS statistics for industries involved in the production chain of multimedia. This results in a definition of a multimedia sector comprised of audiovisual media, media hardware, print media, telecommunications and software, and advertising, as used by Hilbert *et al*. (1999, 135–136). Table 1 shows 1996 and 2001 employment in Sydney's multimedia sector using this definition.

With a total employment of over 90 000, the multimedia sector, as defined in Table 1,

Table 1 Employment in the multimedia sector, Sydney Statistical Division and selected sub-regions, 1996 and 2001 (*Source*: *Census of Population and Housing* 1996 and 2001. Journey to Work tables (Australian Bureau of Census and Statistics, Canberra)).

Industry	Sydney SD		Sydney City		City fringe[1]		Lower N. Shore core[2]	
	1996	2001	1996	2001	1996	2001	1996	2001
Recorded media manufacturing & publishing	759	1 209	21	220	193	264	55	196
Motion picture, radio & television services, undefined	248	80	46	15	51	25	69	3
Film & video services, undefined	243	152	26	21	84	61	54	31
Film & video production	3 102	3 235	190	328	813	1022	947	706
Film & video distribution	519	478	114	161	50	81	94	71
Radio & television services undefined	123	357	23	164	6	15	49	110
Radio services	1 808	1 465	889	620	25	36	267	260
Television services	5 632	7 263	695	1 836	466	332	2 845	2 974
Sound recording studios	413	335	110	62	95	56	102	47
Photographic film processing	1 823	2 392	202	184	211	226	352	323
Photographic studios	1 891	1 301	101	81	343	212	194	122
Total Audiovisual media	16 561	18 257	2 417	3 692	2337	2330	5 028	4 843
Photographic & optical good manufacturing	411	455	9	3	24	56	35	29
Computer & business machine manufacturing	1 366	2 672	28	67	209	248	133	375
Telecommunication, broadcasting & transceiving equipment manuf'g	2 101	2 457	29	59	187	347	65	191
Total Media hardware	3 878	5 584	66	129	420	651	233	595
Newspaper printing or publishing	6 078	5 935	2 215	2 537	823	451	234	178
Other periodical publishing	3 057	5 122	934	1 583	491	881	753	1 046
Book and other publishing	2 979	3 411	174	482	197	395	771	749
Printing, publishing & recorded media, undefined	132	162	12	24	26	18	22	15
Publishing, undefined	1 522	1 088	209	276	252	159	218	199
Total Print media	13 768	15 718	3 544	4 902	1789	1904	1 998	2 187
Advertising services	6 651	9 434	827	2 219	941	1603	2 744	2 454
Market research services	3 950	4 761	448	645	335	668	1 178	1 003
Total Advertising	10 601	14 195	1 275	2 864	1276	2271	3 922	3 457
Information storage/retrieval services	686	880	188	330	158	121	144	123
Computer maintenance services	1 190	1 990	74	163	143	131	217	271
Computer consultancy services	20 171	34 978	2 713	8 272	1200	2321	5 462	9 959
Computer services, undefined	1 460	2 176	178	604	93	152	374	464
Total Computer services	23 507	40 024	3 153	9 369	1594	2725	6 197	10 817
Total Multimedia	68 315	93 778	10 455	20 956	7416	9881	17 378	21 899

1 Leichhardt and South Sydney Statistical Local Areas.
2 North Sydney and Willoughby Statistical Local Areas.

represents a significant and growing component of Sydney's economy. The sector's share of Sydney Statistical Division's employment increased from 4.5% in 1996 to 5.6% in 2001. The broad definition of multimedia used in Table 1 includes employment in areas such as book publishing and market research that are not conventionally considered to be in multimedia. Nevertheless, since the table includes the range of industries in the multimedia production chain, it also allows some observations about the kinds of activities most strongly associated with 'core' multimedia industries.

The major industries in Table 1 indicate that, at the centre of Sydney's multimedia complex, are relationships within and between the traditional media and the new computing technology. This in turn indicates that Sydney's leadership

of Australia's print, visual and audio media industries, and its concentration of national and Asia-Pacific corporate headquarters, which carry out or require advanced computer services, are the main regional economic motors driving multimedia activity.

Within Sydney, most parts of the sector are focussed toward central Sydney and the lower North Shore business centres. Overall, more than half of the sector's employment is in this central zone. The most centralised patterns of employment are found in the audio-visual media — notably film and video production, television, radio, and sound recording — and in magazine publishing. It is notable that these industries produce products which are always 'one-off' with no replication. Thus they confirm the importance of central locations for project-based multimedia networking activities. The least centralised industries are those involved in hardware manufacturing.

The sector experienced rapid expansion from 1996 to 2001, mainly driven by computer consultancy growth. This period also saw employment in the sector become even more centralised, particularly in the CBD (Sydney City). The global crash of dot.com companies in 2000–2001 is only apparent in employment declines in three of the 'undefined' media services categories.

This paper focusses on the 'core' of the multimedia industry, namely interactive digital media production, and the overlapping graphic design industry. These are not shown separately in Table 1, but a comparison of the Sydney *Yellow Pages* for 1996 and 2000 (which use data for 1995 and 1999 respectively) (Telstra Corporation, 1995 and 1999) suggests that the 'core' multimedia industry expanded even more rapidly than indicated by the data for the wider sector shown in Table 1. The 1996 Yellow Pages lists 100 firms under 'Multimedia Services', just over one third of the 279 firms recorded four years later.

The growth of the multimedia and graphic design industries has produced a highly centralised location distribution (Figures 1 and 2). Both industries have cores in the lower North Shore and the CBD and adjacent suburbs. There are also a number of firms, especially in graphic design, located in high amenity residential suburbs, notably the North Shore and inner east, inner south and inner western areas; but with more distant beach and river suburbs also prominently represented. The distribution of multimedia firms in 1995, as indicated in the Yellow Pages, was essentially similar to that in Figure 1, with a concentration in and around central Sydney and on the Lower North Shore. The overall location distribution of multimedia and graphic design firms suggests the joint influences of access to the main locations of main clients and specialised services, and of proximity to the residences of proprietors and skilled labour (see below). The survey evidence of the influence of these factors is discussed in later sections.

Activities

The main group of respondent multimedia firms carried out several types of activities (Table 2). The most important of these were graphic design, computer imaging, web design, and film and video production. More than 80% were involved in graphic design, though this was usually less than 15% of each company's total activity. This perhaps reflects the graphic design origins of many multimedia companies. As

Table 2 Major activities of multimedia and graphic design firms (*Source*: Authors' survey).

Per cent of total activity	Graphic design		Computer imaging		Web design		Film/video production		Other	
	MM	GD	MM	GD	MM	GD	MM	GD	MM	GD
Number of companies										
0–15	18	3	11	8		15	10	4	4	6
16–30		3	5	5	9	6	2	1	2	1
31–45		4	2	4	2	2	3		2	2
46–60	5	4	2		1	2	2		2	5
61–75	1	13	2		2	1	1		4	2
76–100		12		3	1	1	1		7	

MM denotes multimedia firms. GD denotes graphic design firms.

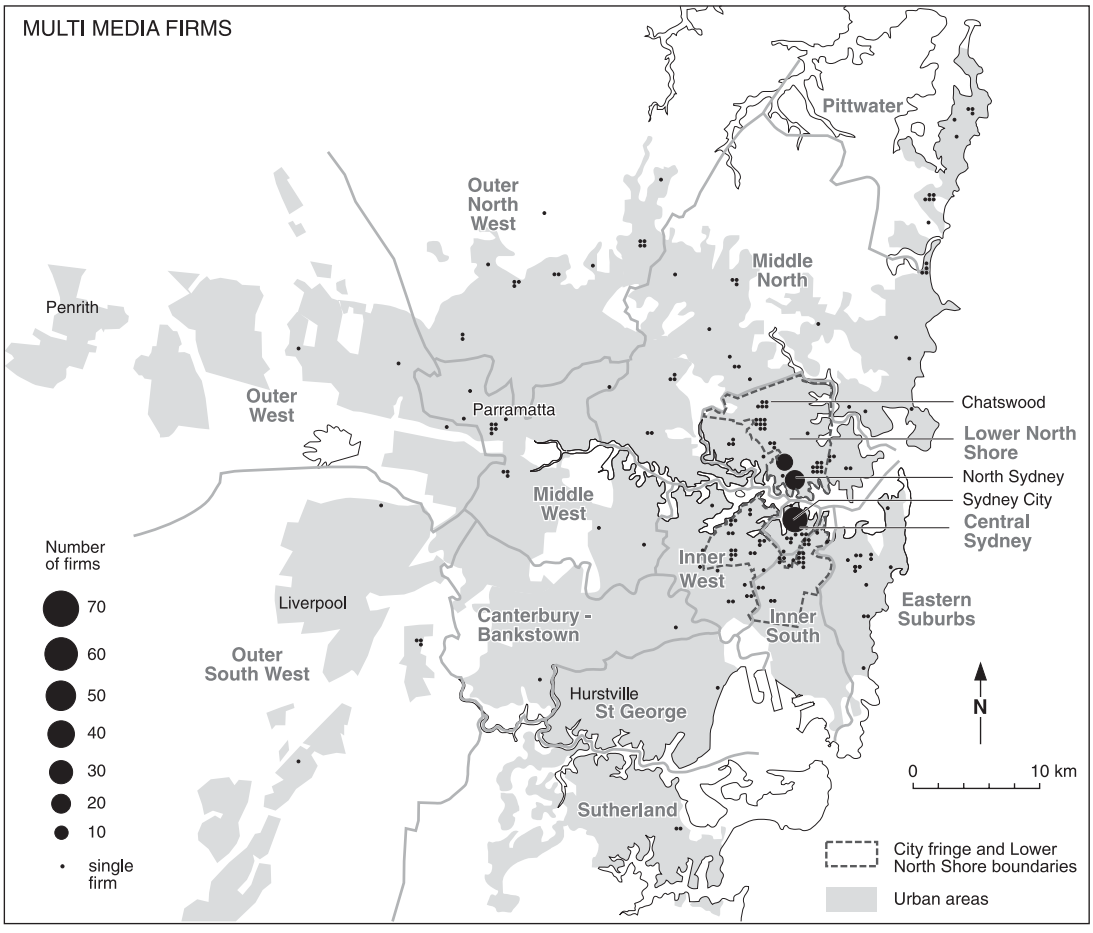

Figure 1 Location of Sydney multimedia firms (*Source*: Sydney Yellow Pages 2000).

these companies have developed newer types of multimedia activities, they may have retained graphic design capacity to reduce business fluctuations or to provide a more integrated product service. More than 75% of the firms carried out computer imaging, though at higher levels than graphic design. Slightly less than two thirds of the firms engaged in film or video production. The other common activity was web design, found in just over half of respondent firms. Unlike the other main multimedia activities, however, web design was not often a sideline activity. It constituted over 15% of total activity in all firms where web design was carried out. Even so, companies generally did not specialise in this activity. Thus the picture is of a multimedia industry in which most firms are engaged in several types of activity. Such diversification reduces the risks of operating in the very uncertain multimedia environment, in which rapid technological change is the norm and where most work is of a 'one-off' kind for a range of clients.

By contrast, a minority of multimedia firms specialised in niche activities. In nine firms a single activity comprised over 75% of total activity. In six of these, this activity was in a specialised niche area including audio and music applications, CD duplicating, on-line media training, multimedia presentations, and multimedia and software development. This specialisation would allow these firms to remain competitive by developing and using special skills and, frequently, costly specialised equipment, to the maximum.

This pattern of specialisation was repeated in the graphic design firms. A minority (30%) of these respondents reported that graphic design comprised 76% to 100% of total activities. On the other hand, 30% of all respondents reported

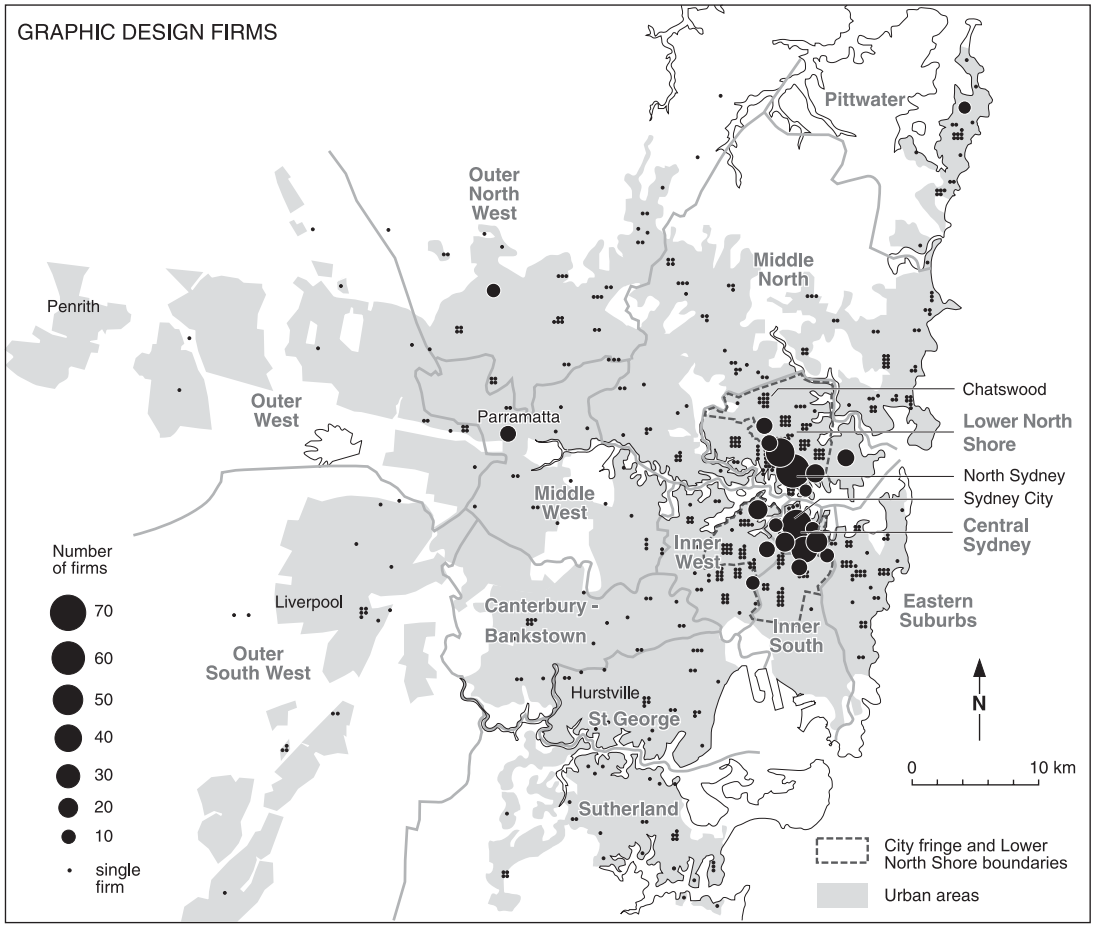

Figure 2 Location of Sydney graphic design firms (*Source*: Sydney Yellow Pages 2000).

significant activity (comprising over 15% of all activity) in each of computer imaging and web design, reflecting the rising importance of multimedia formats for graphic design. Indeed, fully 68% of graphic design respondents reported carrying out some web design. Thirteen other types of activities were also carried out by respondents, mostly comprising non-multimedia activities vertically or horizontally linked to graphic design, such as printing, publishing, photography and signage. Other firms obtained such linked services externally, as discussed below.

However, a higher proportion of graphic design firms than the multimedia firms specialised in a single activity, mostly in graphic design itself, but also in computer imaging and web design. Each of these activities was generally part of a suite of activities in multimedia firms, indicating that the latter had generally more flexibility than graphic designers in responding to changing market opportunities.

Changes over the last five years in the structure of activity in respondent companies reflected new developments in the multimedia industry. Seven multimedia firms reported more web-based activities or related computer imaging and animation activities. Several other firms noted more activity in areas such as interactive touch-screen products and internet software. Changes in graphic design firm activity were even more common, nearly always toward more multimedia-based work, particularly web design, but also internet and intranet design, CD Rom production and 3D animation. Thus the survey suggests that the graphic design industry is becoming increasingly multimedia in its character, mainly through growing web design activity.

In both the multimedia and the graphic design industries, the average establishment size was

small. The average employment level of multimedia establishments in respondent firms was 8.1, a figure very similar to that in California (Scott, 2000). In graphic design firms it was 5.9, mirroring the generally smaller range of activities in graphic design companies. Those small average sizes reflect the relative ease of entry to each industry (requiring little more than a PC and off-the-shelf software for basic activities). It also reflects the absence of economies of scale (individual creativity is the leitmotif of these industries), and the relative immaturity of the industries (except for the non-digital segment of graphic design).

Markets

The increasing use of multimedia products and services by a broad spectrum of the economy means that multimedia firms have a wide potential client base, especially for those companies with generalist skills, such as web design. But, equally, provision of emerging niche multimedia applications could also result in a wide client potential. The survey results were ambiguous regarding these propositions. Fifty five per cent of multimedia respondents generated over 60% of their turnover from 'major' clients though, in many cases, there were a half dozen or more major clients (Table 3).

Thirteen of the 27 multimedia respondents to this question said that their biggest client generated over 45% of their turnover. This pattern was broadly replicated for graphic design firms (Table 3). These results and a perusal of the individual survey forms can be used to suggest one dimension of the structure of the multimedia/graphic design industries. At one extreme, a minority of multimedia and graphic design firms obtain less than half their turnover from major clients, suggesting that their main activity is one of two kinds. First, a niche service which may or may not be customised (for example, CD duplicating and computer imaging); second, a more common service (such as web design) involving essentially small jobs, provided on a one-off, tailored basis to a wide range of clients. At the other extreme, a majority of firms have a significant reliance on major clients. This is likely to involve provision of services that require high customisation to individual client needs, such as film/video production or special multimedia presentations.

The industry sector of the major clients is significant in understanding the growth of the multimedia and graphic design industries in Sydney (Table 4).

The multimedia industry itself is the main client industry for multimedia firms and is the second most important client industry for graphic designers. This indicates that multimedia production often requires specialised inputs from other multimedia/graphic design firms, suggesting the emergence of a multimedia complex in Sydney. The other major client industry is advertising. Thus Sydney's dominance of Australia's advertising industry, arising in turn from its dominance in publishing and mass media, generates a significant part of Sydney's multimedia/graphic design production.

The related sector of publishing, plus the finance sector, in both of which Sydney also has national leadership, are significant clients for some multimedia/graphic design firms; as is the retail sector. Only one (multimedia) firm indicated that it had worked for Fox Studios, a major recent addition to Sydney's media sector. But five graphic designers had done Fox Studios work, though none on actual movie production.

Table 3 Turnover from major clients of Sydney multimedia and graphic design firms (*Source*: Authors' survey).

Number of major clients	1	2	3	4	5	More than 5
Number of sample multimedia firms	2	3	5	2	3	14
Number of sample graphic design firms	1	3	5	4	8	19
% total turnover from major/biggest clients	0–15	16–30	31–45	46–60	61–75	76–100
(1) Major clients						
Number of sample multimedia firms	1	3	3	5	5	10
Number of sample graphic design firms	1	4	2	9	14	10
(2) Biggest clients						
Number of sample multimedia firms	3	7	4	8	3	2
Number of sample graphic design firms	7	12	8	8	4	2

Table 4 Industry of major clients of Sydney multimedia and graphic design firms (*Source*: Authors' survey).

Major client industry	Multimedia firms	Graphic design firms
Multimedia	13	10
Advertising	9	15
Printing & publishing	3	5
Retailing	3	4
Finance services	2	4
Film/Broadcasting	2	–
Recreation/Entertainment	2	–
Other (includes unknown industry)	14	36

Overall, Table 4 suggests that the distinctive components of Sydney's economic base have been important in determining the market for (and, prospectively, the nature of) the city's multimedia/graphic design sector. Nevertheless, Sydney multimedia and graphic design firms also gain an important share of business from clients in the rest of Australia or overseas (Table 5).

More than half the sample of multimedia and graphic design firms had at least 10% of their major clients outside Sydney. About two thirds of such clients were located in other States and about one third overseas. Substantial interstate and international business was being done through offices which had been set up in those markets by some firms. Two firms had Melbourne offices while companies in the sample had also set up three overseas offices. Generally, however, the main markets for firms were within Sydney.

The more significant globalisation within the multimedia/graphic design industries exists via alliances and partnerships. Around one third of multimedia firms (eight out of 25) and just under 30% of graphic design firms (11 out of 39) reported that they participated in international alliances or partnerships. About half of these participated in more than one such alliance/partnership. An even greater number of alliances/partnerships were reported with Australian firms (15 in multimedia and 17 in graphic design). The most common type of partner relationship in both multimedia and graphic design was collaboration (project-based cooperation), followed by alliances (long term relationships/understandings), then joint ventures (legal relationships). Overall, the significant use of alliances and partnerships allows multimedia firms to engage in larger and more complex projects, to gain access to new knowledge which in turn drives competitive advantage, and to increase market access or reduce market uncertainty.

With the main customer base being within Sydney, we asked whether these customers were spatially concentrated within Sydney, as were the multimedia firms themselves. The questionnaire findings indicate that the main Sydney market for multimedia and graphic design firms is indeed very concentrated around central Sydney (Table 6).

Table 5 Significance of non-Sydney clients for Sydney multimedia and graphic design firms (*Source*: Authors' survey).

Location of major clients	Percentage of firm's total major clients					
	1–9	10–24	25–49	50–74	75–90	91–100
	Number of firms					
Sydney						
Multimedia	–	–	–	3	12	12
Graphic design	–	1	1	3	13	23
Rest of Australia						
Multimedia	6	10	1	–	–	–
Graphic design	6	11	3	–	2	–
Overseas						
Multimedia	5	5	–	–	–	–
Graphic design	7	1	1	–	–	–

Table 6 Market locations within Sydney for sample multimedia and graphic design firms (percent of total Sydney markets) (*Source*: Authors' survey).

Sub-region	Number of multimedia firms			Number of graphic design firms		
	1–9%	10–49%	50–100%	1–9%	10–49%	50–100%
Inner						
Sydney City	–	8	7	1	15	10
Lower North Shore[1]	1	11	8	2	16	10
Inner west[2]	3	6	2	2	10	–
Inner south[3]	4	2	–	–	7	2
Eastern[4]	3	2	–	2	7	–
Total inner	11	29	17	7	55	22
Middle						
Northern[5]	2	6	1	2	6	2
Western[6]	5	2	–	3	5	3
South western[7]	2	–	–	1	–	1
Southern (St George)[8]	2	–	–	1	2	–
Total middle	11	8	1	7	13	6
Total outer	16	3	2	3	9	3

[1]Lane Cove, Mosman, North Sydney, Willoughby LGAs.
[2]Ashfield, Drummoyne, Leichhardt, Marrickville LGAs.
[3]Botany, South Sydney LGAs.
[4]Randwick, Waverley, Woollahra LGAs.
[5]Hunters Hill, Ku-ring-gai, Manly, Ryde, Warringah LGAs.
[6]Auburn, Burwood, Concord, Parramatta, Strathfield LGAs.
[7]Bankstown, Canterbury LGAs.
[8]Hurstville, Kogarah, Rockdale LGAs.

The main concentration of customers for both multimedia and graphic design firms is the lower North Shore and CBD. In particular, this central zone is by far the main market for firms with over half their market in a single sub-region. This reflects the concentration there of the main industries using multimedia and graphic design: the advertising industry (which is centred on North Sydney); media and finance industries (each with higher order decision-making centred on Sydney's CBD and fringes), and multimedia and graphic design firms themselves. This has in turn encouraged a clustered location pattern of multimedia firms because this maximises access to key customers. Subsidiary to the central market core is a secondary market ring around the core, comprising the middle north, inner west, inner south and eastern suburbs.

Labour

The centralised location pattern of the multimedia industry maximises access to proprietors and to skilled labour residences, a significant consideration in an industry where new ideas and knowledge are critical, placing a premium on attracting workers who possess them. North Sydney and its environs are central to key workers living in the professional/managerial belt of the North Shore. Central Sydney and its environs give firms maximum access to the new breed of IT-related workers seeking the 'buzz' of the inner city lifestyle with its cafés and warehouses for living and working.

The significance of inner Sydney in providing high accessibility to key professional workers is indicated by data on the location of freelance web designers. Figure 3 shows the residential locations of such designers on the books of one major web designer employment agency. The most striking feature is the highly centralised residential location pattern. Sydney CBD is easily the most common place of residence for this sample of web designers (the figure excludes post office addresses which could have distorted results here). This points to the attraction of central city locations as residences for highly creative workers within multimedia and graphic design, a phenomenon assisted by the large increase in apartment construction in central

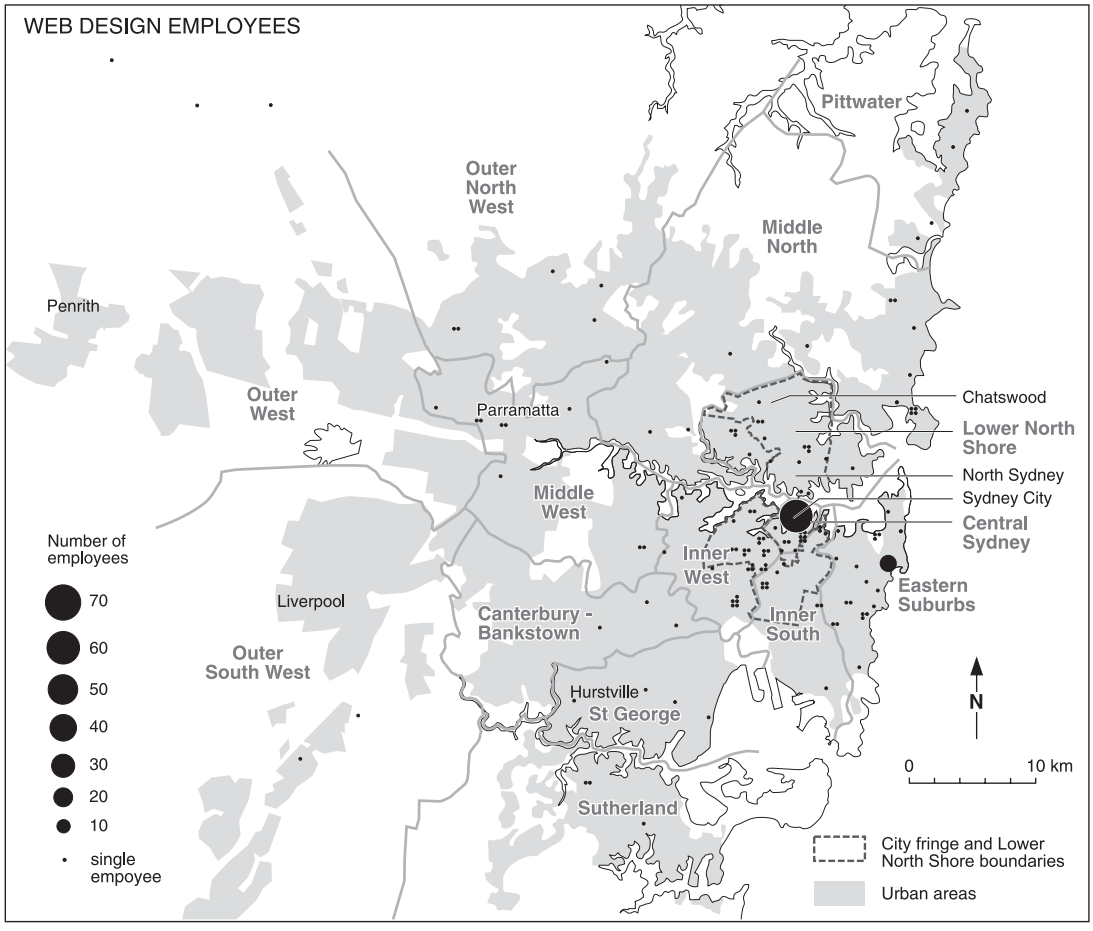

Figure 3 Residential locations of web designers listed at a Sydney web design employment agency.

Sydney during the 1990s. Some of this attraction for freelancers is probably due to the access that a central Sydney location gives to clients for web designers who are working from home offices. Given the centralised distribution of the multimedia industry, a central Sydney location also places freelancers at the centre of networks of personal contacts and potential employers who can provide recommendations for jobs, or jobs themselves (Ho, 2001).

The importance of designers in the labour market of the multimedia industry is clear in the firms surveyed. Staff with design education were the most common in these firms: in nearly three fifths (n = 16), over 15% of staff had a design education background (as did 75% of graphic design firms). The only other common skill was computer science: just over one third of multimedia firms (n = 10) had over 15% of their staff with a computer science education.

The greater use by the multimedia industry of employees with advanced or creative computing and design skills, who ostensibly prefer the 'buzz' of the inner city café lifestyle, may help explain the somewhat greater spatial concentration of multimedia compared to graphic design employees. The converted warehouse spaces in inner suburbs, such as Surry Hills, with their large open-plan offices and high ceilings, are a preferred work environment for creative IT personnel, while adjacent new cafés provide an agreeable locale for work meetings (Brown, 2000; Cummins, 2000a; 2000b). Small companies frequently operate out of the inner city apartments and terrace houses where their proprietors live.

As part of structuring operations to provide more flexibility in an uncertain market environment and perhaps to allow the use of needed specialised but guaranteed labour in small

amounts, considerable use was made of part time employment by multimedia companies. Over half the multimedia firms (n = 16) reported using part-time staff, as did 30% of graphic designers.

Contracting/subcontracting and service inputs

The use of contractors (staff) and subcontractors by respondent firms was quite significant, reflecting the advantages that contracted labour gives in meeting fluctuating project demands or in allowing use of highly specialised skills. Around 35% (n = 10) of the multimedia firms employed staff contractors, and the same number employed outside subcontractors. While the latter figure is significant, it nevertheless indicates that most firms offer a full service in multimedia production (cf. Leisink, 2002, 120) and do not rely on input linkages from other firms. The graphic design firms also employed a similar proportion of contractors.

The subcontractors were drawn from a wider area than the multimedia/graphic design firms themselves. While most of the Sydney multimedia subcontractors' locations were identified in the inner suburbs, nearly one third of the subcontractors (7 out of 23) were located outside Sydney, with Melbourne locations significant (n = 4). This points to the activity of specialised multimedia tasks provided on-line and at a distance. Graphic design subcontracting showed a broadly similar pattern.

Contractors and subcontractors are a key source of critical services used by some multimedia/graphic design companies. To assist in the identification of the nature and extent of a multimedia complex in Sydney, firms were asked to list those services which they saw as critical to the firm's operations (Table 7).

Both multimedia and graphic design firms are heavily reliant on specialised computer and graphic design services. Both industries rely on keeping up with new computer technology, and make extensive use of software and hardware upgrading and development services. The greater technical complexity and innovation of much multimedia production is indicated by the relatively greater use of software programming services by multimedia firms than by graphic design firms. The use of video services by some multimedia firms represents a linkage with Sydney's prominent inner area film/TV/TV advertising cluster.

Concluding overview

This example of the Sydney multimedia industry provides some insights into the ways in which new economic activity generated as part of the shift towards an information economy takes place in a large, global-status city. In particular, this analysis of the industry provides some indication of the role of the urban socio-economic context on industry structure and operation, and the extent to which it is locally 'embedded'. However, the possible survey bias toward older firms means that the picture here of Sydney's multimedia industry does not fully reflect the ways in which new firms operate. The survey also immediately predated the global dot.com crash of 2000–2001, which caused a severe contraction of multimedia-related activities. It is uncertain how this has affected the structure and operation of the multimedia industry in Sydney. Bearing these factors in mind, the following snapshot of the industry can be drawn from the preceding analysis.

Sydney's multimedia industry is concentrated around the central city. The survey data suggest that this is at least partly associated with a

Table 7 Services critical to multimedia/graphic design firms' operation (number of times mentioned) (*Source*: Authors' survey).

Service	Multimedia firms	Graphic design firms
Programming/software development	10	6
Web design	3	3
Graphic design	10	14
Software/hardware development	10	19
Internet development	2	2
Printing	–	7
Photography	–	5
Artwork	–	5
Video production	4	–
Other	13	18

nascent inner city multimedia complex. For a third of firms, a range of critical multimedia services is provided by other inner area firms in particular, although most firms engage in a variety of multimedia activities which provide in-house inputs. The spatial concentration of the industry is reinforced by the strong focus of freelance, multimedia-skilled workers on central Sydney. The existence of this nascent cluster is also supported by indications that other multimedia firms are the most important clients for multimedia output, with advertising clients next in significance. The main market for overall outputs is again the inner city (including the lower North Shore). Frequent input-output linkages also exist between multimedia and graphic design firms, and the latter seem to be adding multimedia activities to their operations.

These factors, together with the importance of advertising as a graphic design market, suggest an emerging inner Sydney multimedia cluster which includes graphic design, advertising and related media. But a significant number of multimedia firms also appear to operate independently, outside any such cluster, drawing on the agglomeration advantages of a wide metropolitan demand for multimedia products and a deep supply of skilled multimedia workers. In contrast to these prevalent intra-metropolitan linkages, global linkages are much less significant (with the possible exception of transnational advertising firms in Sydney), although a number of multimedia firms have international alliances and partnerships.

Rather, two local factors appear to have been particularly significant in the growth of a multimedia industry in Sydney. First, the industry's general output linkages suggest the importance of a metropolitan-scale demand for internet services and other multimedia services, especially by Sydney's concentration of headquarters and related producer services firms, including advertising and media companies. Second, a large, prior and concurrent demand by these and other Sydney firms for computing and graphic services has created a sizeable pool of computer graphics talent that has stimulated and fed multimedia activity. Here, Sydney's national leadership in information and communication technology and media industries has been crucial (cf. Scott 2000, 130; Leisink 2002, 120). In these ways Sydney's pre-existing economic size and structure — its particular urbanisation economies — have been critical to the emergence of its multimedia industry.

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ACKNOWLEDGMENTS

The authors acknowledge the assistance of Myra Nikolich in carrying out the survey, which was made possible by a University of Technology Sydney Faculty of Design, Architecture and Building research seed fund grant. The assistance of Ferry Jie in preparing the revised manuscript is also acknowledged.

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