

## Multimedia and digital visual effects: an emerging local labor market

*Surveys of this industry in southern California reveal that its workers are predominately young, white, highly educated, and well paid; most of them originated from outside the region, but their labor market activities are characterized by complex social networks*

Allen J. Scott

Since the 1980s, the multimedia and digital visual effects industry has been emerging at an extremely rapid pace in the State of California.<sup>1</sup> Two geographic areas, namely, the Bay Area and southern California (principally Los Angeles County) contain most of the industry's establishments. The southern California region is now moving into a position of dominance, not only in the State, but probably in the world at large.

In its narrowest sense, the multimedia industry consists of firms that produce compact disks and materials for diffusion over the worldwide web. These products can be further categorized by substantive content, such as games, interactive stories, educational and self-help materials, business aids, and advertising. In this sense, the multimedia industry is currently pushing all media (visual, textual, and audio) into convergence around interactive, digital methods of presentation. However, the industry can be defined in a somewhat wider sense so that it includes not only the activities previously indicated, but also all forms of digital enhancement of conventional media—particularly, a wide range of computerized approaches to graphic design. It is this larger conception of the industry—the multimedia and digital visual effects industry—that will predominate in this article. Applications of computer graphics, particularly in the fields of animation and special effects, have developed apace in recent years, and Hollywood feature films and tele-

vision programs now routinely depend on ancillary high-technology image-processing operations for their commercial success.<sup>2</sup>

The remarkable dynamism of southern California's multimedia and digital visual effects industry is, of course, closely related to the region's overwhelming and long-standing importance as a center of the entertainment industry. As such, southern California represents the country's most densely developed concentration of specialized workers in such domains as storywriting, visual dramatization, and scenario production. It is also a place where multimedia content providers can always find an available supply of subcontracting services in film and video production, photography, graphic art, scriptwriting, musical composition, acting, voice-over, and so on. Even so, and in view of the recent mushrooming of the multimedia industry in the region, many firms interviewed for this research reported an acute shortage of workers with computer graphics skills and other forms of multimedia expertise.

The precise size of the multimedia and digital visual effects industry in southern California is extraordinarily difficult to calculate. There is no generally agreed upon definition of just what the industry is, or how it might be distinguished from functionally adjacent sectors such as motion picture production, publishing, software services, and so on. An earlier study, based on the narrow

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definition of the industry (as described earlier), suggests that in 1995 there were about 188 multimedia establishments in the entire southern California area, south of and including Santa Barbara. However, according to the broader definition of the industry (that is, including all forms of digital visual effects), the number of establishments in the region can be provisionally estimated at 382. The median number of workers employed in these establishments is roughly 10. The total number of employees in the industry is unknown and could not be assessed without more complete information on the frequency distribution of employment by establishment. For comparative purposes, it might be useful to note that in 1994, total employment in Los Angeles County in sic 781 (motion picture production and services) was 129,863 in 4,416 establishments.<sup>3</sup>

This article describes the shape, form, and emergence of the local labor market for multimedia and digital visual effects workers in southern California. Much of the article is devoted to a description of data collected in a questionnaire survey of workers in this new and important industry. The article is concerned more generally with the spatial and temporal filtering of workers through the large metropolis and associated institutions.<sup>4</sup> Concomitantly, it also seeks to provide a number of specific empirical insights into the broader problem of locational agglomeration and regional development.<sup>5</sup>

## Empirical framework

The study of local labor markets is almost always greatly hampered by a dearth of pertinent statistics. It is usually quite difficult to find information about the personal and occupational characteristics of workers on an individual basis, especially for cases in which there is a requirement that the data be coded, in addition, by location and sector of employment. Obviously, the best way to obtain microdata of this sort is by direct questionnaire methods, which are invariably expensive and time consuming. A particular problem in the present context is actually identifying a target population of individuals to be surveyed, and all the more so because there is no official designation of the multimedia and digital visual effects industry. Even when the definitional problem is resolved, the major obstacle of actually delivering questionnaire forms to workers remains. One possible line of attack is to distribute questionnaires to workers at their place of employment, but this approach encounters the difficulty of securing the cooperation of firms. Also, this approach is subject to peculiar biases because it typically results in returns being clumped by firm—a problem that is exacerbated when only a few firms can be induced to participate in the survey (above all, when some of them are unusually large in size).<sup>6</sup> The alternative method is to survey workers at their place of residence. How-

ever, this approach faces the even more daunting problem of constructing, at the outset, an unbiased list of home addresses. A third approach is to gain access to potential respondents through employee organizations, such as unions or guilds,<sup>7</sup> although again, strong biases may be expected to enter into any resulting survey when these organizations account for only a fraction of all employees in the selected industry.

Unfortunately, there is no organization in southern California that claims or even seeks to represent all multimedia and digital visual effects workers in the region; and there is none that comes close to embracing a majority of these workers. That said, there are various interest groups in the region whose members are either employed in the industry or are actively seeking jobs in it. Two of these interest groups are of particular significance in this study because they are fairly large in size and because, taken together, their membership appears to provide a good representation of employment structures in the industry. Each of these groups is a local chapter of a wider international society. They are:

- *International Interactive Communications Society* (hereafter, Communications Society). The objectives of this group are to provide information, professional support, and skills development for individuals across the spectrum of the interactive arts and technologies business. Its membership is recruited broadly from professionals in multimedia, computing, telecommunications, education, online services, media, publishing, and entertainment. In total, the Communications Society has 34 individual chapters throughout the world. When this study was initiated in the summer of 1996, the Los Angeles chapter had a membership of 612.
- *Association of Computing Machinery's Special Interest Group on Computer Graphics* (hereafter, Graphics Group). Like the Communications Society, the Graphics Group is dedicated to providing information, professional assistance, and training, but to a rather more narrowly defined membership. This group focuses primarily, but not exclusively, on computer graphics specialists. There are 26 chapters worldwide. The Los Angeles chapter had 820 members when this project started.

Despite the fact that members of the Communications Society are drawn from the entire spectrum of occupations in the industry (including business and financial operations, production management, writing, and so on), while Graphics Group members tend to be rather more technically oriented, there is some overlap of membership between the two. Neither of the two organizations provides an exhaustive or unbiased window onto local labor markets in the multimedia and digital visual effects industry, but together, they probably yield as comprehensive a picture as is possible to obtain at

this time with limited resources. The advantage of basing the study on two different but complementary organizations is that the information they offer provides a degree of focus that would otherwise assuredly be lacking if we looked only at one of them in isolation from the other.

With the full cooperation of the officers of the local chapters of the Communications Society and the Graphics Group, an identical questionnaire was mailed to all members during the second half of 1996. The total number of responses from members of the Communications Society was 171 (a response rate of 27.9 percent) and 159 from the Graphics Group (a response rate of 19.4 percent). These response rates are fairly representative for this kind of survey, although the sharp and statistically significant difference between the two rates obtained remains inexplicable. In the absence of any definitive information on the social characteristics of the underlying population of workers, we have no way of assessing what specific biases may exist in the questionnaire returns, although it is probably safe to assume that bias of some sort is present. Accordingly, the results reported in later sections need to be treated with due caution. In view of this warning, premature generalization of the survey results will be avoided. Even so, the results, taken simply on their own terms, tell us much about significant fractions of the labor force in this burgeoning industry and its associated employment structures in southern California. They are also generally consistent with information gathered in a parallel series of some 25 face-to-face interviews with representatives of multimedia and digital visual effects firms in the region.

### Profiles of questionnaire respondents

*Geographic profile.* Exhibit 1 maps out the residential locations of all questionnaire respondents together with a set of isolines indicating the generalized spatial pattern of the digital visual effects industry in southern California. The residences of questionnaire respondents are depicted individually. Any given isoline in the map represents a locus of points with identical levels of accessibility to establishments in the multimedia and digital visual effects industry, where accessibility is defined as  $\sum d_j^{-1}$ , and  $d_j$  is the distance from any arbitrarily given point to the  $j^{\text{th}}$  establishment in the industry.<sup>8</sup>

The main locational buildup of the multimedia industry is in and around Santa Monica and the western part of the city of Los Angeles. The industry then extends eastward and northward through Hollywood and Burbank and into the San Fernando Valley. A very minor outlier of the industry can be observed in Orange County to the south. The exhibit reveals the existence of a correspondence between respondents' residences and the general location of workplaces in the industry. This same observation is corroborated by questionnaire data which indicate that the median commuting time for re-

spondents of the Communications Society is 15 minutes, and 20 minutes for the Graphics Group. In fact, this kind of tight spatial relationship between employment places and the residential locations of workers is a persistent feature of local labor markets in all large metropolitan areas, even in Los Angeles, which is often (mistakenly) seen as being a more-or-less fluid commuting field across its entire extent. The correspondence is magnified in the present instance by the fact that the demographic features of questionnaire respondents match closely to the generalized social profile of the residential neighborhoods of the western reaches of the Los Angeles metropolitan area.

*Demographic profile.* Questionnaire respondents can be represented, for the most part, as a rising cohort of young, successful professionals in which women play a noticeable and presumably increasing role. Of the Communications Society respondents, 39.9 percent are female, compared with 29.1 percent in the Graphics Group. As shown in table 1, most of the individuals who returned a questionnaire are in their 30s—for communications respondents, the median age is 39 and for graphics respondents, it is 37. Both groups, in addition, are overwhelmingly dominated by whites, with Asians, Hispanics, and African-Americans representing disproportionately small percentages of all respondents. (See table 1.) Annual salaries are high; the median salary for communications respondents is \$55,000, and for the more technically oriented graphics respondents, \$70,000.

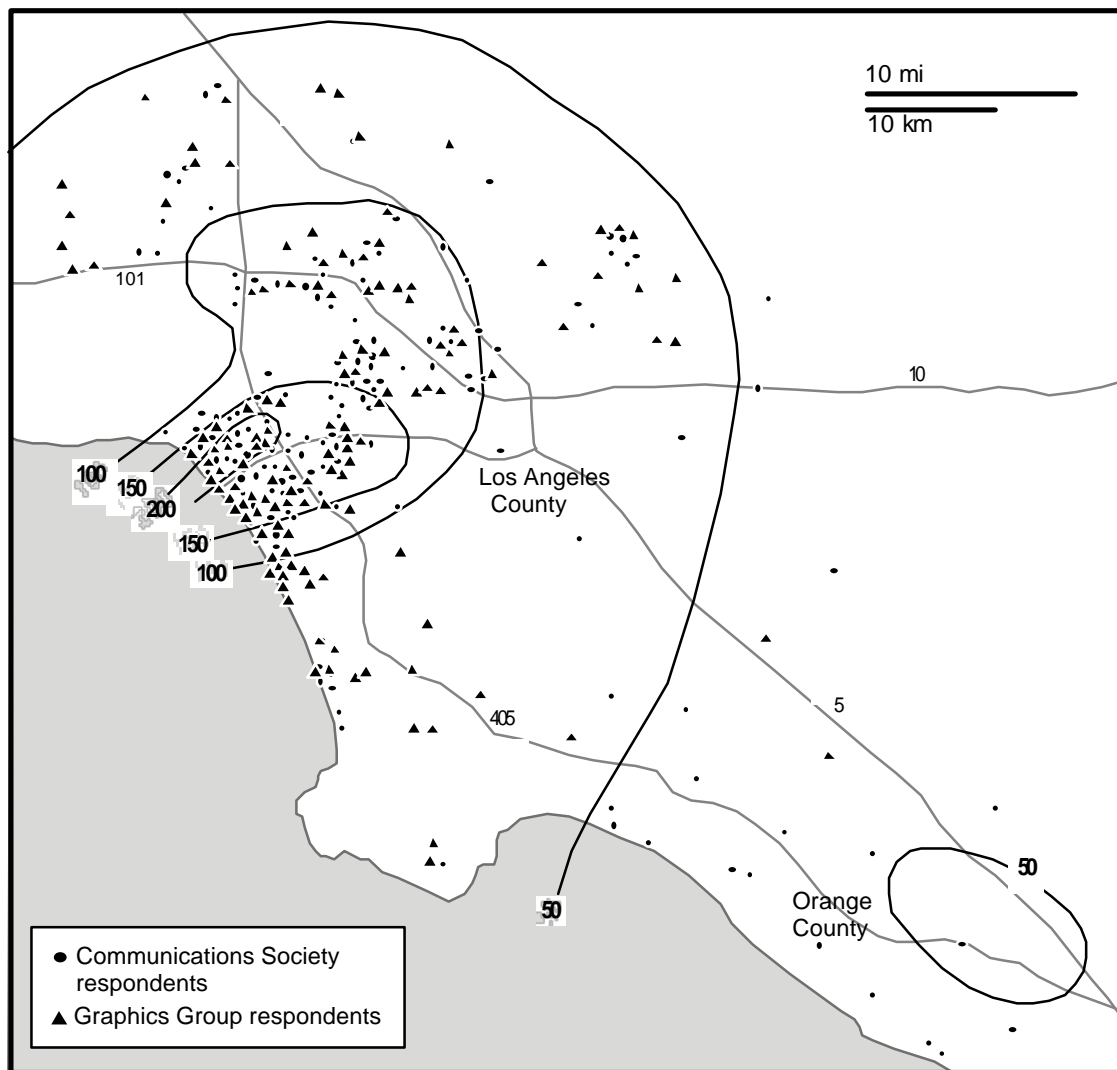
Only about a quarter of all respondents were actually born in southern California. The remaining three-quarters were, for the most part, born outside of the region or outside of the State. Of respondents from the Communications Society, 6.1 percent were born in a foreign country, compared with 21.2 percent for the Graphics Group. Most of the foreign born came from Asia, Canada, and Europe. The relatively high proportion of the foreign born in the work force is doubtless a reflection of the reported shortage of computer graphics skills in both California and in the country at large. (Mobility and job recruitment are discussed later.)

### Employment and recruitment patterns

*Employment by sector.* A clear majority (79.0 percent) of all the respondents is employed in a core group of sectors, with the balance being employed in sectors that are at best only marginally connected to the multimedia and digital visual effects industry. (See table 2.)

Core sectors are multimedia (in the narrow sense), motion pictures/TV/video, special effects, animation, and so on. Note that respondents from the Communications Society are heavily concentrated in the multimedia sector. By comparison, respondents from the Graphics Group tend to gravitate

**Exhibit 1.** Residential locations of questionnaire respondents and levels of accessibility to multimedia and digital visual effects establishments in southern California, 1996



more to sectors involving motion pictures, special effects, and animation, where their advanced levels of computer graphics skills are in particularly high demand at the present time. Noncore sectors of employment reported by respondents are education, the defense industry, legal services, health services, and miscellaneous industries. Even in these noncore sectors, however, respondents tend to occupy jobs that, in one way or another, involve multimedia skills and techniques.

There is some filtering of individuals from noncore sectors to core sectors, with education and the defense industry being the most common points of origin. Thus, (combining data for both the Communications Society and the Graphics Group), 30.8 percent of the 26 respondents who reported that their job, previous to the current one, was in education, shifted

into core multimedia and digital visual effects sectors, as defined. The corresponding figure for the 12 respondents whose previous job was in the defense industry is 25 percent. While these figures are small, they nevertheless suggest that the Los Angeles area as a whole probably has important reservoirs of experienced potential jobseekers ready to move into the multimedia and digital visual effects industry. The questionnaire data indicate that once individuals are employed in core sectors, any subsequent job shifts tend to be virtually entirely within the core.

*Employment status, occupations, and computer skills.* Almost all questionnaire respondents are currently employed in full-time jobs. (See table 3.) A very significant number (20.3

**Table 1. Age and racial/ethnic characteristics of respondents to the multimedia and digital visual effects industry questionnaire, southern California, 1996**

Category	Communications Society	Graphics Group
<b>Age</b>		
Usable responses		
Number .....	164	156
Percent:		
20-24 .....	.6	2.6
25-29 .....	8.5	14.1
30-34 .....	20.1	28.2
35-39 .....	22.6	18.6
40-44 .....	19.5	13.5
45-49 .....	16.5	9.6
50-54 .....	4.3	7.1
55-59 .....	4.9	2.6
60-64 .....	2.4	1.9
65 and older .....	.6	1.9
<b>Race and ethnicity</b>		
Usable responses		
Number .....	158	142
Percent:		
White .....	92.4	88.0
Asian .....	1.3	7.7
Hispanic .....	4.4	1.4
African American .....	1.9	2.8

percent) of respondents from the Communications Society are engaged in freelance activities, compared with only 7.3 percent of respondents from the Graphics Group. The much higher percentage of respondents from the Graphics Group in regular salaried employment probably results, in part, from the demand for firm-specific human capital in the motion picture, special effects, and animation industries (in which these respondents are mostly employed). Firms like Disney Interactive, Dreamworks, Sony Pictures, and Warner Digital insist upon high levels of intrafirm teamwork and product designs that are safeguarded by copyright and trademark provisions. Such firms are thus apt to prize a captive labor force that is more likely to be responsive to their special needs than freelance workers. For both respondent groups, the median length of current job tenure is 2 years. Respondents from the Communications Society claim to have been employed in the industry as a whole for 3.0 years, compared with 4.4 years for respondents from the Graphics Group. In addition, over their entire employment experience in the multimedia and digital visual effects industry, Communications Society respondents have worked for an average of 2.82 firms, and Graphics Group respondents, for an average of 3.4 firms. These figures suggest that there is some modest, but not excessive, employment instability in the industry.

The occupational characteristics of respondents are shown in table 4.<sup>9</sup> Production/direction refers to occupations (at various levels of seniority) in which the main responsibility for design, organization, and execution of multimedia and digital visual effects work (including website construction)

resides. Specialized programming and animation/graphic design occupations are broken out as distinctive categories in their own right in table 4. In practice, there are rarely sharp divisions of occupational function in the multimedia and digital visual effects industry, and the information in the table needs to be interpreted with a high degree of flexibility.

For the most part, the data arrayed in table 4 are unsurprising. Most workers in the industry are engaged in central production, direction, programming, animation, and graphics occupations. Communications Society respondents are patently more entrepreneurial and business oriented than those in the Graphics Group, in the sense that a relatively high proportion of them are owners, managers, and individuals in business/financial/sales occupations. The Graphics Group is much more focused on technical occupations involving programming, animation, and graphics. Another distinction between the two groups may be elaborated in terms of their command of computer skills. Almost two-thirds of all respondents indicated that they had some computer programming proficiency, with the two most commonly known languages for Communications Society respondents being HTML (39.2 percent) and Lingo (22.8 percent). For Graphics Group respondents, the two languages are c/c++ (40.1 percent) and HTML (37.0 percent). HTML is an easily learned and widely used language for building web pages; Lingo is a medium-level programming language with applications in the graphics and business areas; and c/c++ is a fundamental programming language involving significant technical expertise. Once again, the two groups emerge with significant overlap,

**Table 2. Employment sectors of respondents to the multimedia and digital visual effects industry questionnaire, southern California, 1996**

Sector	Communications Society	Graphics Group	Combined
Usable responses			
Number .....	144	143	287
Percent:			
Core sectors, total .....	80.0	77.6	79.0
Multimedia .....	42.4	12.6	27.6
Motion pictures/ TV/video .....	11.1	14.0	12.5
Special effects .....	.0	20.3	10.1
Animation .....	7.0	17.5	9.1
Software design .....	5.6	5.5	5.6
Multimedia consulting and training .....	6.9	1.4	4.2
Advertising .....	5.6	2.1	3.9
Telecommunications ..	2.8	2.1	2.5
Graphic design .....	2.1	2.1	2.1
Printing and publishing .....	2.8	.0	1.4
Noncore sectors, total .	20.2	22.4	21.3
Education .....	8.3	4.9	6.6
Defense industry .....	2.1	9.1	5.6
Legal services .....	2.8	.7	1.8
Health services .....	.7	2.8	1.7
Miscellaneous .....	6.3	4.9	5.6

**Table 3.** Selected employment characteristics of respondents to the multimedia and digital visual effects industry questionnaire, southern California, 1996

Variable	Communications Society		Graphics Group	
	Value of variable	Number of usable responses	Value of variable	Number of usable responses
Percent employed .....	94.7	168	98.0	158
Percent employed full time .....	85.8	163	96.6	146
Percent working freelance .....	20.3	157	7.3	155
Median length of time with current employer (years) .....	2.0	148	14.4	148
Median length of time engaged in multimedia work (years) .....	3.0	161	14.4	148

but with Communications Society members veering to the less technical, and the Graphics Group members to the more technical side of the industry.

*Mobility and job recruitment.* As previously mentioned, most of the questionnaire respondents were born outside of southern California. Even more significant, roughly half of all respondents received their highest level of education outside of the region and, for the most part, outside of the State. Furthermore, 3.8 percent of the respondents from the Communications Society and 6.1 percent of those from the Graphics Group were educated in a country other than the United States. These data signify, once again, that the multimedia and digital visual effects industry in southern California is highly dependent on persons who come from other areas. Nevertheless, once they enter the southern Californian labor market, workers in the industry tend to become quite rooted in the region. Thus, of all respondents (that is, the majority) who stated that their current job is not the first job they have ever held, as many as 83.0 percent indicated that the previous place of employment was located in southern California.

Job recruitment patterns in the multimedia and digital visual effects industry are displayed in table 5, and they are much alike for both groups of respondents. Observe that the data in the main body of the table are defined as percentages of employed workers only (that is, excluding founders of firms and the self-employed). By far, the greatest proportion of all workers in the industry is recruited either on the basis of information provided by friends or organizational contacts, or by means of direct communication between the prospective employer and the employee. This observation is consistent with other studies of recruitment patterns that conclude that most information about job openings travels, in one way

or another, by word of mouth.<sup>10</sup> Advertising also accounts for a modest share of actual recruitment in the industry, with a perhaps anomalously high frequency among Communications Society respondents.

## Education and training

The majority of respondents have attained to high levels of educational qualification. Most respondents have at least a 4-year college degree, with significant numbers also having acquired master's degrees. (See table 6.) About half of all respondents graduated with their highest degree in 1985 or later. The educational majors completed by questionnaire respondents are shown in table 7. Most of the respondents have received forms of education that are highly appropriate for careers in the multimedia and digital visual effects industry. Well over 50 percent of them majored in such fields as film, graphics, business, and computer science, while significant numbers of the rest majored in engineering, fine arts, social science, and liberal arts. Educational pathways into the industry are thus multiple, but nevertheless rather clearly focused on the artistic, business, or technical skills most in demand by employers.

There is also a remarkable wealth of relevant educational and training establishments in the region. (See table 7.) Of the respondents who earned their highest degree in southern California, as many as 34.0 percent graduated from the University of California-Los Angeles, followed by the University of Southern California (13.9 percent), California State University-Northridge (9.0 percent), and Art Center Pasadena (5.0 percent). The remainder graduated from some 24 different colleges and universities scattered throughout the region.

In addition, 70.2 percent of the respondents from the Communications Society and 55.3 of the respondents from the Graphics Group indicate that they have taken at least one part-time course in multimedia or computer techniques since graduation. The lower figure for graphics respondents is no

**Table 4.** Occupations of respondents to the multimedia and digital visual effects industry questionnaire, southern California, 1996

Occupation	Communications Society	Graphics Group
Usable responses		
Number .....	157	150
Percent:		
Owner/senior management ...	24.8	7.3
Business/financial/sales .....	18.5	4.7
Production/direction .....	26.1	20.7
Programming/technical support .....	12.1	25.3
Animator/graphic designer ...	7.0	38.0
Writer .....	5.1	.7
Other .....	6.4	3.3

**Table 5. Method of recruitment of respondents to their current jobs, multimedia and digital visual effects industry questionnaire, southern California, 1996**

Recruitment method	Communications Society	Graphics Group
Usable responses		
Number .....	138	145
Percent:		
Friends or organizational contacts .....	37.2	43.3
Contact initiated by employer .....	22.7	23.9
Contact initiated by employee .....	12.7	14.2
Advertisement .....	17.3	9.0
Job fair .....	1.8	5.2
Employment agency .....	8.2	2.2
School placement .....	.0	2.2
Number of cases for above variables .....	110	134
Number of founders of firms or self-employed .....	28	11

doubt a function of their relatively high level of technical expertise upon graduation. The institutions providing the part-time courses taken by respondents are exhibited in table 8. Respondents were asked to name these institutions in an open-ended fashion and the answers are arrayed simply by number of mentions. Some of the institutions noted in the table are conventional colleges and universities, others are private establishments providing in-house programs or vendors offering special training, and yet others are professional associations of different kinds (including unions and guilds). The miscellaneous category shown in the table represents the many institutions that received only one mention each. The information in table 8 indicates that there are many types of part-time training facilities that pertain to the multimedia and digital visual effects industry in southern California. And, the University of California at Los Angeles again leads the way.

The abundance of educational and training opportunities offered in the region for those seeking careers in the multimedia and digital visual effects industry suggests that there is a significant degree of institutional responsiveness to the current high demand for relevant skills and aptitudes in southern California. If there is a labor shortage in the industry at the present time, it is perhaps less a function of the absence of basic instructional infrastructures than it is a consequence of the sudden recent surge in the demand for appropriately trained labor. The danger in responding to this shortage by increasing the number of education and training programs in the region is that it is apt to result in a long-term over-supply of labor. The main objectives of policy in this regard should not be so much to expand the number of programs as to improve the quality of those that exist, while ensuring higher levels of entry by underrepresented groups.

## Professional organizations

Questionnaire respondents were asked to list in open-ended format all the professional associations, unions, and guilds to which they belong. The answers to this query are tabulated in table 9, which is arranged simply in terms of the number of times each organization was mentioned.

The data suggest that multimedia and digital visual effects workers are notably gregarious on the professional front. Respondents are joined together in webs of intersecting affiliations in a wide variety of formal organizations (including the Communications Society and the Graphics Group), as well as in many different informal support groups. Note that 18 Communications Society respondents claimed to be members of the Graphics Group, while 8 respondents from the Graphics Group claimed to be members of the Communications Society. Thus, while there is some redundancy in the survey data, it is also fairly limited. In general, the organizations noted in table 9 play an important role in the local labor market. They provide corporate representation of their members' interests; they offer training programs of various types; and they ensure that critical information about new technologies, skills, job opportunities, and so on, circulates rapidly through the local labor market. Recall from the earlier discussion that a significant proportion of respondents obtained their current jobs through organizational contacts.

## Local labor markets, economic development

The labor market for workers in the multimedia and digital visual effects industry in southern California is highly distinctive in its overall structure. It has emerged in its present form by way of individuals filtering through a series of geographic and institutional staging points. For the most part, the market is made up of rising young professionals of both sexes, but with a very low representation of minority ethnic and racial groups. Workers in the industry are well educated and trained, and they earn notably high incomes, on average. While it is always possible that the survey method used in this article might have yielded a very one-sided view of the

**Table 6. Highest level of education attained by respondents to the multimedia and digital visual effects industry questionnaire, southern California, 1996**

Level of education	Communications Society	Graphics Group
Usable responses		
Number .....	166	155
Percent:		
High school .....	.6	3.2
Two-year college .....	7.2	12.3
Four-year college .....	38.6	49.0
Master's degree .....	45.2	27.7
Doctoral degree .....	8.4	7.7

**Table 7. Educational majors of and institutions attended by respondents to the multimedia and digital visual effects industry questionnaire, southern California, 1996**

Category	Communications Society	Graphics Group	Combined
<b>Major</b>			
Usable responses			
Number .....	160	149	309
Percent:			
Film, theater, TV, broadcasting .....	27.5	13.4	20.7
Graphics, computer graphics, and animation ...	3.8	25.5	14.2
Business .....	20.6	6.7	13.9
Engineering, mathematics, and science .....	6.3	19.5	12.6
Computer science .....	5.0	14.1	9.4
Fine arts and architecture .....	6.3	12.1	9.1
Social sciences .....	10.0	4.0	7.1
Liberal arts and languages .....	9.4	3.4	6.5
Education .....	5.0	.7	2.9
Law .....	4.4	.0	2.3
Medicine and health care ..	1.9	.7	1.3
<b>Educational institution (southern California only)</b>			
Usable responses			
Number .....	78	66	144
Percent:			
University of California, Los Angeles .....	34.6	33.3	34.0
University of Southern California .....	15.4	12.1	13.9
California State University, Northridge .....	7.7	10.6	9.9
Art Center Pasadena .....	.0	12.1	5.6
California State University, Fullerton .....	1.3	6.1	3.5
Pepperdine University .....	6.4	.0	3.5
California State University, Los Angeles ....	3.8	1.5	2.8
University of California, Santa Barbara .....	3.8	1.5	2.8
Loyola Marymount University .....	3.8	1.5	2.8
California Institute of the Arts .....	1.3	4.5	2.8
University of California, Irvine .....	3.8	.0	2.1
California Polytechnical Institute, San Luis Obispo ...	1.3	3.0	2.1
California State University, Long Beach .....	3.8	.0	2.1
San Diego State University .....	2.6	.0	1.4
Santa Monica College .....	.0	3.0	2.1
Brooks Institute .....	1.3	1.5	1.4
University of Redlands .....	1.3	1.5	1.4
California State University, San Bernardino .....	1.3	.0	.7
University of California, San Diego .....	1.3	.0	.7
California State University, Dominguez Hills .....	.0	1.5	.7
Whittier School of Law .....	1.3	.0	.7
Antioch University (Los Angeles) .....	1.3	.0	.7
California Institute of Technology .....	.0	1.5	.7
Riverside Community College .....	1.3	.0	.7
Saddleback College .....	.0	1.5	.7
Mesa Community College .....	.0	1.5	.7
Claremont Graduate School .....	.0	1.5	.7
Southwestern University ....	1.3	.0	.7

**Table 8. Institutions (in southern California only) from which respondents to the multimedia and digital visual effects industry questionnaire have taken part-time courses in multimedia techniques, 1996**

Institution	Communications Society	Graphics Group	Combined
<b>Colleges, universities and professional schools</b>			
University of California, Los Angeles, extension .....	36	57	93
Learning Tree University ..	3	4	7
Art Center Pasadena .....	4	1	5
University of California, Irvine .....	3	2	5
New Horizons .....	2	2	4
California State University, Long Beach, extension .....	0	4	4
Santa Monica College ....	0	4	4
Orange Coast College ....	0	2	2
The Learning Annex .....	0	2	2
Mount Sierra College .....	0	2	2
California State University, Northridge .....	2	0	2
University of Southern California .....	0	2	2
West Coast University ....	2	0	2
Miscellaneous colleges, universities, and professional schools ...	21	18	39
<b>In-house training or product vendor programs</b>			
Silicon Studio .....	14	4	18
Alias .....	5	0	5
AVID .....	0	2	2
Microsoft .....	0	2	2
Miscellaneous in-house training or product vendor programs .....	15	13	28
<b>Professional associations (including user groups)</b>			
American Film Institute ...	12	23	35
Association of Computing Machinery's Special Interest Group on Computer Graphics (Graphics Group) .....	9	0	9
International Interactive Communications Society (Communications Society) .....	2	5	7
Los Angeles MacIntosh Users' Group .....	2	3	5
Society of Motion Picture and Television Engineers .....	0	2	2
Women in Film .....	0	2	2
Directors' Guild of America .....	0	2	2
Miscellaneous professional associations .....	3	9	12

NOTE: Data are arranged by number of mentions.



labor market's general make-up, more casual data collected in firm interviews fully corroborate the broad conclusions offered here.

The local labor market that has grown up around the multimedia and digital visual effects industry in southern California is endowed with rich institutional infrastructures, and workers themselves appear to be extremely involved in job-enhancing extra work activities, including part-time training. Above all, they are joined together in many different crisscrossing networks of association. These networks allow workers to collectivize their individual experiences, knowledge, information, contacts, and so on, thus generating organizational frameworks that supplement general processes of worker socialization and job mobility. Such networks have been found in other industries and other regions to be an important basis of worker expertise and innovative activity, no matter whether it be semiconductor engineers in Silicon Valley,<sup>11</sup> or international finance workers in the City of London,<sup>12</sup> or even visual artists in New York.<sup>13</sup> In fact, local labor markets typically function not only as simple adjuncts to specialized regional economies, but also as critical sources of the agglomeration economies that keep those economies functioning as dynamic and tightly organized spatial units. When regional labor markets and economies work well, they ensure that trained and habituated workers with specific, frequently updated skills are constantly supplied to employment places.

The multimedia and digital visual effects industry is almost certain to become one of the driving forces behind the continued growth of urban cultural economies in future years, and Los Angeles—with its highly developed entertainment complex—is already a major center of the industry. In light

**Table 9.** Affiliations of questionnaire respondents with professional associations, guilds, and unions, arranged by total number of mentions, southern California 1996

Association, guild, union	Communications Society	Graphics Group	Combined
Graphics Group .....	18	( <sup>1</sup> )	( <sup>1</sup> )
Communications Society .....	( <sup>1</sup> )	8	( <sup>1</sup> )
Society of Motion Picture and Television Engineers .....	10	9	19
International Alliance of Theatrical and Stage Employees (various locals) .....	0	14	14
Bar associations .....	10	0	10
Women in Film .....	7	0	7
Women in New Technologies .....	7	0	7
International Television Association .....	7	2	9
Institute of Electrical and Electronics Engineers ..	5	14	19
International Animated Film Society .....	2	6	8
Los Angeles MacIntosh Users' Group .....	2	3	5
Writers' Guild of America .....	5	0	5
Directors' Guild of America .....	3	0	3
Miscellaneous .....	130	155	285

<sup>1</sup> Not applicable.

of this, further research on specific forms of worker socialization and acculturation is needed, and nowhere more so than in the burgeoning cultural products industries, where subtle processes of habituation of the labor force are critical to overall economic success. □

**Footnotes**

ACKNOWLEDGMENT: This research was supported by a grant from the Office of the Vice-Chancellor for Research, University of California, Los Angeles. The author is grateful to Jeffrey Boggs, Howard Harrington, and Zack Lynch for valuable research assistance on this project. Thanks are also due to the Los Angeles chapters of the International Interactive Communications Society and the Association of Computing Machinery's Special Interest Group on Computer Graphics for their cooperation in making this research possible.

<sup>1</sup> Multimedia and digital visual effects is an emerging industry and is not officially designated under the Standard Industrial Classification system.

<sup>2</sup> *Making Digits Dance: Visual Effects and Animation Careers in the Entertainment Industry* (Los Angeles, The PMR Group, Inc., 1997).

<sup>3</sup> See Bureau of the Census, *County Business Patterns*, 1994 edition.

<sup>4</sup> A. J. Scott, "Territorial reproduction and transformation in a local labor market: the animated film workers of Los Angeles," *Environment and Planning D: Society and Space*, Vol. 2, 1984, pp. 277–307; A.J. Scott, "The spatial organization of a local labor market: employment and residential patterns in a cohort of engineering and scientific workers," *Growth and Change*, Vol. 23, 1992, pp. 94–115; and A. J. Scott, "Low-wage workers in a high technology manufacturing complex: the southern California electronics assembly industry," *Urban Studies*, Vol. 29, 1992, pp. 1231–46.

<sup>5</sup> A. J. Scott, *From Silicon Valley to Hollywood: Growth and Development of the Multimedia Industry in California*, Working Paper No. 13 (UCLA, Lewis Center for Regional Policy Studies, 1995); and A. J.

Scott "The cultural economy of cities," *International Journal of Urban and Regional Research*, Vol. 21, 1997, pp. 323–39.

<sup>6</sup> Scott, "The spatial organization."

<sup>7</sup> This approach has been used previously with some success. See Scott, "Territorial reproduction and transformation," and Scott, "The spatial organization."

<sup>8</sup> The address data for individual establishments are from the list presented in the appendix to Scott, "From Silicon Valley to Hollywood."

<sup>9</sup> Detailed descriptions of typical occupations in the multimedia and digital visual effects industry can be found in Regan and Associates, *A Labor Market Analysis of the Interactive Digital Media Industry: Opportunities in Multimedia* (San Francisco, Regan and Associates, 1997); and Vivid Studios, *Careers in Multimedia* (Emeryville, CA, Ziff-David Press, 1995).

<sup>10</sup> M. S. Granovetter, *Getting a Job: A Study of Contacts and Careers* (Cambridge, MA, Harvard University Press, 1974).

<sup>11</sup> A. Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, MA, Harvard University, 1994).

<sup>12</sup> N. J. Thrift, "On the social and cultural determinants of international financial centers," in S. Corbridge, N. J. Thrift, and R. L. Martin, eds., *Money, Power, and Space* (Oxford, Blackwell, 1994).

<sup>13</sup> S. S. Montgomery and M. D. Robinson, "Visual artists in New York: what's special about person and place?" *Journal of Cultural Economics*, Vol. 17, 1993, pp. 17–39.