# EduTech Cluster Report

Analysis, Report, and Recommendations Regarding
Secondary Education, Technical Services,
Information Technologies & Applied Social
Science in Eugene-Springfield MSA



City of Eugene
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July 4, 2012

"When an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the **advantages which people following the same skilled trade get from near neighbourhood to one another.** The mysteries of the trade become no mysteries; but are as it were in the air, and **children learn many of them unconsciously.** Good work is rightly appreciated; inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed: **if one man starts a new idea, it is taken up by others and combined with suggestions of their own;** and thus it becomes the source of further new ideas."

*Principles of Economics* by Alfred Marshall (1890)

# Table of Contents

## Body of Report

## Tables, Charts, and Graphs

## Purpose of the Report

The purpose of this report is to analyze the Regional Prosperity Economic Development Plan's list of key target industries from a cluster analysis perspective. It builds upon the identification of regionally specialized industries put forward by the Eugene Chamber of Commerce's consultant, Creative Class Group. In addition to their study, this report considered County Business Patterns, Bureau of Labor Statistics Location Quotients, and US Census Quarterly Workforce Indicators. Most importantly, the report takes in consideration the opinions, observations, and characterizations of nearly two dozen local educators and industry managers to arrive at a series of recommendations for policymakers seeking to strengthen these key industries.

The significance of the famous quote from economist Alfred Marshall shown above has increased as cities, at an accelerating rate, continued to grow larger and denser. Despite predictions that have accompanied each advance in communication or transportation technology that either the need or desire to live in close proximity to one another would obsolesce, the benefits of multiple supplier inputs, the ability firms have to "shop for workers" in cities, and other synergies referred to jointly as "agglomeration economies" continues to help explain why individuals and businesses choose to locate near one another and why urban areas function productively.

However naturally occurring agglomeration economies can appear, it remains true that children do not learn things unconsciously and will not become high-wage, software developing adults simply by playing at one of the many retro and contemporary video game arcades now scattered throughout Eugene. Therefore, this report and its recommendations consciously and deliberately examine not only what the potential benefits are for the sectors and related trades located in close neighborhood to one another, but how their skills, knowledge, and abilities might be passed more efficiently to upcoming generations who would like to live and work in Eugene.

## Executive Summary
*Thinking Big, Starting Small and Acting Fast*

Eugene's video game companies, social science research organizations, and academic computer science departments are undergoing internal changes that present opportunities to collaborate more effectively as a cluster **[Think Big]**. A small and important step towards this collaboration lies in amplifying a commonly shared asset: the local pool of available workers **[Start Small]**. Changing marketplace demands happen fast, so to keep up local government must initiate consultation with busy industry leaders often to identify areas where it might best provide support **[Act Fast].** While there are a variety of public funding sources for this report's proposed recommendations, regional industry must act in concert. The significance of their direct investment to each recommendation's success cannot be understated for strengthening the cluster's tie.

In the summer of 2012, both the University of Oregon Computer Science Department and Lane Community College Game Development Program are revising their curriculums. Education research organizations, partly in response to perceived opportunities and partly in response to declining federal and other public resources, are looking to commercialize their research content and find new private clientele to supplement and sustain their operations. In a similar circumstance of changing revenue sources, video game companies are on the constant outlook for new ways to exercise their coding capacity.

Meanwhile, qualifications to participate in the game industry are transforming once more. Gaming firms are pulling closer to "mainstream" software as well as diversifying and specializing in surprising ways. Hiring English literature majors to help with storytelling is nothing new for a video game company, but hiring behavioral economists is a more recent phenomenon. The traditional console gaming market is sloughing off, and users of social gaming are reported to be declining. Mobile device games are considered a growth area, as is "serious gaming"—or the development of games for

uses other than pure entertainment.

Furthermore, other local ventures that heavily rely on the blended expertise of social scientists and computer

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coders are finding success in businesses that sell teaching, training, or testing software applications. An education textbook publisher in Eugene, viewing the trend away from traditional print media into digital devices for education, has just built its first audio-visual filming studio in a renovated downtown office building. Mobile application and other backend custom software publishers contract with education research organizations and video game companies to develop code.

In sum, all of these above-listed activities and changes point to agglomeration growth economies, or "clustering," at work in these listed industries and occupations. They share qualities of high-wage occupations, innovation, small entrepreneurial activity and dynamic reinvention to changes in the market. Virtually all industry value originates from the abilities and experiences of their workforce. This report recommends improved facilitation in the training and experience of the next generation of workers and the creation of collaborative teaching and networking spaces as the best support for this cluster.

## Education Technology Definition

The Northwest Education Cluster industry association, founded in 2003 and headquartered in Portland, counts over forty member firms representing nearly 2,000 individuals. Several firms have office locations in both Eugene and Portland. They define their cluster as including companies in e-learning businesses, content providers, testing and evaluation services, and learning management system authors. The education technology sector, as defined by the New York City Economic Development Corporation (NYCEDC), is "an emerging industry sector aimed at improving educational and learning outcomes through innovative technology applications that provide or enable teachers to deliver learner-centric, personalized approaches with the potential to be more effective, efficient and scalable than traditional methods...It sits at the intersection of education, media, design, development and other high-technology innovations—encompassing a wide range of technologies and applications."

Education Technology, or "EduTech," blurs distinction between the US Commerce Department's national definitions for the Education and Knowledge Creation cluster and the Information Technology and Telecommunications cluster. Indeed, several software publishing firms are already members of the Northwest Education Cluster, including some located in Eugene. Education technology companies often require blends of skills in their workforces and in their individual employees. Individuals who come from varied backgrounds or possess skills in areas seemingly as diverse as geography, linguistics, and computer coding are highly valuable. Although sometimes found in individuals, not all of these characteristics are found in every firm, necessitating complementary partnerships with software companies. For instance, Eugene-based Dynamic Measuring Group, authors of DIEBELS early learning education test, partners with the software developer Wireless Generation, Inc. in Brooklyn, NYC (although they have discussed moving to Portland, OR) for creating their custom applications.

In 2008 the total US EduTech market was $38.2 billion, of which the institutional market for early childhood, primary, secondary, and post-secondary education contributed $25.1 billion. After post-secondary education, corporate e-learning is the second largest segment and is estimated to grow at a rate of 9% (source: NYCEDC). Local video game companies, too,

in recent years executed contracts to produce "serious games"—or games that teach—for corporations. Other Eugene education technology research organizations are more rooted in serving public sector clients like schools, but are interested in exploring avenues to private sector clients. EduTech is an important traded sector and source of outside income for the region.

The NYCEDC study highlighted the importance of ancillary industries, such as New York City's rich heritage in traditional publishing, to the continuing development of its "EduTech" sector. Plugging Eugene's education and training research organizations into the exceptional capabilities of its software publishers, including game developers, should likewise serve as a competitive advantage for this region's EduTech sector. Data substantiates that these complementary industries of software publishing and social science, technical and professional services are uniquely present in Eugene-Springfield as compared to many regions of

similar size, or even greater scale. Raising awareness of their significant profile, locally as well as nationally,

> **Two of the most prominent, historic firms included game developers Dynamix and Broderbund, a company known for its educational computer games like** *Where in the World is Carmen Sandiego* **and** *Reader Rabbit.*

is the stated goal of many managers of EduTech organizations and businesses. Video game developers and software companies, too, are looking for higher visibility in this region of Oregon.

## Video Game Studios and Education Research in Eugene

The local Video Game and Software Publishing industries provide some of the highest wages in the

### Table 1: Comparing Metropolitan Areas by Software Publishing Industry Payroll in 2009

| Metropolitan Area | Annual Payroll (in $1,000s) | Total Establishments | 2010 MSA Population |
|---|---|---|---|
| Corvallis, OR | $7,252 | 8 | 78,153 |
| Birmingham-Hoover, AL | $44,961 | 26 | 1.12 million |
| Rochester, NY | $69,985 | 28 | 1 million |
| Eugene-Springfield, OR | $70,293 | 23 | 351,000 |
| Providence-New Bedford-Fall River, RI | $73,321 | 30 | 1.1 million |
| Ann Arbor, MI | $84,145 | 28 | 344,000 |
| Tucson, AZ | $90,147 | 30 | 1 million |
| Bridgeport-Stamford-Newark, CT | $93,986 | 51 | 912,000 |
| Cleveland-Elyria-Mentor, OH | $117, 131 | 43 | 2 million |
| Boulder, CO | $120,638 | 42 | 280,000  (*Denver) |
| Milwaukee-Waukesha-West Allis, WI | $120,861 | 45 | 2 million |
| Hartford, CT | $137,367 | 41 | 1.19 million |
| Colorado Springs, CO | $170,954 | 31 | 416,000 (*Denver) |
| Salt Lake City, UT | $204,367 | 64 | 2.2 million |
| Pittsburgh, PA | $236,041 | 41 | 2.35 million |
| San Diego-Carlsbad-San Marcos, CA | $937,090 | 142 | 2.8 million |
| Chicago-Naperville-Joliet, IL-IN-WI | $1,145,981 | 259 | 8 million |
| Boston-Cambridge-Quincy, MA | $3,091,474 | 408 | 4.41 million |
| Seattle-Tacoma-Bellevue, WA | $7,359,906 | 279 | 3.344 million |

*Source: 2009 US Census County Business Patterns*

Eugene-Springfield Metropolitan Area, requiring workers with high levels of expertise. The history of the industry's presence in Eugene dates back to the early 1980's and several pioneering individuals who built successful, nationally renowned software companies. Two of the most prominent, historic firms included game developers Dynamix and Broderbund, a company known for its educational computer games like Where in the *World is Carmen Sandiego* and *Reader Rabbit.* Near a decade ago these companies were bought and folded into bigger firms headquartered in larger metros, but a core nucleus of skilled workers recruited to these companies, and other software publishers like Symantech, remained in this area. Start-ups and ventures spun-off from these companies and their progeny still compose an important part of this vital sector of the Eugene economy.

Another class of occupation which requires a high degree of training, pays above-average wages, and is counted separately from Software Publishing is what the US Census counts as "Professional, Scientific, and Technical Services." In Eugene, this particularly

> **Eugene-Springfield's status as extraordinary place not just to meet and hire qualified social science and humanities researchers, but to begin a software business becomes clear.**

means social science and humanities researchers and education technology companies. A variety of private, non-profit research centers begun by University of Oregon faculty in the 1960s and 1970s continue today to bring hundreds of millions of federal grant dollars to the region, and enjoy a synergistic relationship with the University of Oregon's College of Education. Prestigious and prominent research organizations like ORI, OSLC, IRIS, ISTE, EPIC, DMG and ORCAS are just a sampling of the span of acronyms and subfields of social science research covered by Eugene based operations. When taken together with the diverse array of education technology companies like AvantAssessment, Pacific

Northwest Publishing, or the IT trainers at CBT Nuggets, the numerous employment opportunities for individuals with advanced degrees in education, social sciences and related fields of humanities are demonstrated. Indeed, many of these research centers, education, testing or training firms also employ workers knowledgeable about computer coding and experienced in developing software needed to create and convey their researched content to government or non-profit clients.

## Scale of Local Software Publishing Industry and Firms

Software publishing is a subsector of the national Information Technology cluster where the city performs remarkably well by several measures. Employment in software publishing is growing faster in Lane County than in Oregon or in the United States, despite the recession. Indeed, the US Cluster Mapping project at the institute of Strategy and Competitiveness at Harvard Business School ranked Eugene's software subcluster of Information Technology and Telecommunications cluster 44th nationally out of 366 metropolitan statistical areas—a significant feat for a metropolitan area of its size. As shown in Figure 2, software publishing consistently created high-wage jobs even in years where state and national economic performance was poor. Indeed, employment in software publishing is growing at a faster rate in the Eugene-Springfield region than either Oregon or the nation.

Several of the largest Eugene-Springfield software publishing employers are themselves studio arms performing portions of work secured by companies based in the Bay Area or the East Coast. For instance, Symantec's office in Springfield is part of an international company with global offices. Likewise, console video game development is a mature field dominated by a handful of international publishers headquartered outside Eugene. The local game studio Pipeworks and its merger with Bay Area group Foundation 9 is a premier example of a studio attached to a larger network of companies and studios, achieving game console contracts through intermediaries. Education technology companies, like AvantAssessment, keep large offices in Portland and work with an

international network of smaller offices and individual telecommuters. Smaller firms and entrepreneurial software developers in this region are on the constant lookout for new product types, whether on social network platforms, mobile devices, or in the "serious gaming" education niche. Acquisitions of game firms started by Eugene entrepreneurs, or just located here, by bigger companies from larger metropolitan areas are a reoccurring phenomenon for this sector (in just the past year, Zynga bought independent game studio Buzz Monkey and Disney purchased social media game maker Playdom). Still, the workforce remains in Eugene, and employment is often added to after the purchases and mergers.

Other customized software companies service a wide range of clients from both inside or outside the region. Questioning custom software publishers about their business portfolios reveals a significant percentage of their contracts can be traced to either education companies spun-off from the University of Oregon, or

backend code support for other game studio products. Research organizations and education technology companies also speak of the convenience of tapping into other locally based software expertise to program computer devices, websites, or other applications to teach, train, or educate in contrast to difficulties experienced contracting at a distance.

One indicator of a region's workforce aptitude and specialization in a given profession is a location quotient. Typically, location quotient scores above 1.25 show an unusual regional specialization, indicate whether the majority of product is for export, and hint that a city has comparative advantages in that profession's industry (i.e., Seattle, home to Amazon and Microsoft, possesses an employment LQ of 14.99 in software publishing compared to Eugene-Springfield's LQ of 6.17). While Eugene-Springfield has an employment location quotient that indicates specialization in software publishing (an employee in Eugene is 6.17 times more likely to work for a software publisher than

## Table 2: LQ's Selected Metropolitan Areas in Professional, Scientific, and Technical Services

| Metropolitan Area | Social sciences and humanities research LQ | R&D in Biotechnology LQ | Scientific research and development services LQ | Environmental consulting services LQ | 2010 MSA Estimated Population |
|---|---|---|---|---|---|
| Ann Arbor, MI | 3.26 | 2.48 | 4.19 | 2.03 | 344,000 |
| Eugene-Springfield, OR | 8.99 | 0.29 | 1.09 | 0.47 | 351,000 |
| Trenton-Ewing, NJ | 5.01 | 8.07 | 5.33 | 3.24 | 367,000 |
| Santa Barbara-Santa Maria-Goleta, CA | 1.53 | 0.5 | 1.54 | 1.44 | 423,895 |
| New Haven-Milford, CT | 0.84 | 1.76 | 0.88 | 0.58 | 861,000 |
| Boulder, CO | 0.76 | 5.59 | 6.98 | 4.94 | 280,000* (Denver) |
| Madison, WI | 0.77 | 2.36 | ND | 1.47 | 576,000 |
| Oxnard-Thousand Oaks-Ventura, CA | 0.55 | 1.01 | 0.65 | 1.51 | 832,000 |
| Pittsburgh, PA | 0.71 | 0.39 | 1.10 | 0.95 | 2.35 million |
| Portland, OR | 0.82 | 0.68 | 0.69 | Not Disclosable | 1.1 million |
| Washington-Arlington-Alexandria, DC-VA-MD-WV | 11.10 | 2.49 | 2.35 | Not Disclosable | 5.582 million |

*Source: US Department of Labor, Bureau of Labor Statistics, 2010 Location Quotient Calculator*

any employee randomly sampled from the nation as a whole), Table 1 compares the magnitude of the local

industry to other cities by annual payroll and number of firms. Eugene-Springfield in annual payroll size and number of establishments compares favorably to several regions with much larger populations. If Corvallis were included with Eugene-Springfield, the impressiveness of industry's regional presence increases.

Table 2 makes a comparison of location quotients for several metropolitan areas on the presence of "social sciences and humanities research." Location Quotients indicate the relative specialization of a workforce, but when the payroll size and firm counts are viewed alongside Table 2's location quotient, Eugene-Springfield's status as an extraordinary place to meet, learn from, and hire qualified social science and humanities researchers on the way to launch a software business with a social science bent becomes apparent. An entrepreneur in the region could tap into a deep bench of local contracting firms and workers with the skills, knowledge, and abilities for developing custom software with social sciences and humanity researched content.

While there are many exciting opportunities for technology commercialization related to other academic fields at the University of Oregon, such as nanotechnology or biotechnology, that attract venture capital and branch offices of larger national and multi-national corporations, Eugene-Springfield's workforce is—comparative to other regions—highly proficient in social sciences and humanities research, congruous to the University of Oregon's national and international reputation for excellence at the College of Education.

Eugene's workforce capacity to commercialize and market the results of University of Oregon primary research in the field of education is presumably greater because of the numerous private education research organizations and customized software developers present in the community. This is not meant to imply the possibility that research in other fields is not leading to new locally-based firms in biotech or nanotech materials, but the technical proficiency of the workforce in social sciences and humanities points to an increased likelihood of innovation from education and related fields, as much as the progression of industries in New York City went from related areas of textiles to fashion to media, or from the stockyards of Kansas City to veterinary science. Regional development often sequentially proceeds up a ladder, but it rarely makes

**Table 3: Comparing Metropolitan Area's Number of Employees Occupied in Social Science and Humanities Research and Development Professions**

| Metropolitan Area | # of Employees | Total Establishments | 2010 MSA Population (Approximate) |
|---|---|---|---|
| Boston-Cambridge-Quincy, MA-NH | 1,718 | 100 | 4.41 million |
| Washington-Arlington-Alexandria, DC | 12,521 | 246 | 5.58 million |
| Eugene-Springfield, OR | 474 | 16 | 351,000 |
| Pittsburgh, PA | 416 | 10 | 2.35 million |
| San Francisco-Oakland-Fremont, CA | 1,226 | 77 | 4.34 million |
| Portland-Vancouver-Beaverton, OR-WA | 294 | 29 | 1.1 million |
| Seattle-Tacoma-Bellevue, WA | 282 | 43 | 3.344 million |
| New York-Northern NJ, NY-NJ-PA | 8,900 | 145 | 18.9 million |

*Source: Censtats 2009*

## Table 4: SWOT Analysis for Subclusters Software Publishers and Education Research Centers

| Strengths | Weaknesses | Opportunities | Threats |
|---|---|---|---|
| Legacy and reputation of foundational software firms and prestigious research centers | Mid-level management recruitment/retention difficulties | "Serious gaming," or "Edutech" is an emerging market forming in Eugene's skill sets' "wheelhouse" | Most talented students recruited on-campus by firms from outside region far before graduation—local firms presence far less palpable |
| Commitment of many senior managers, executive directors to remaining within the region | Marketing and local awareness of industries' presence | Several software businesses interested in mentoring students | Job creation in entry-level positions less than could be— overseas competition for quality assurance, testing work has increased |
| Skilled workforce in software publishing, humanities and social science research | U of O students insufficiently cognizant of local software career opportunities | Social science researchers from local institutes, centers, and UO can supply clientele, product content, contracts to software coders | Industry's short-term needs to focus on product development may hamper long-term in-house talent development |
| LCC and UO resources (faculty, research, instruction programs) | Console and social gaming markets undergoing transitions | Recruitment from unrelated fields with overlapping skill sets (health care, planning, applied social sciences) may lead to unexpected, bankable innovations | An aging, experienced workforce might become more interested in lucrative management pay in other metro areas |
| UO students who wish to found "e-biz" computer science entrepreneurial organizations | Public funds and grant resources for education researchers are drying up | Complementarity of software custom developers with education companies and spin-offs from UO | Many students at higher education institutions do not practice coding enough to be immediately employable locally |
| Lower production costs than Bay Area or Seattle for comparable quality and creative talent | Some businesses feel access to students and influence over curriculums too limited | Computer science degree programs and intense research into digital or immersive education at OSU & UO | Missed opportunities for local software publishers to do business with local research organizations due to lack of awareness; vice versa. |
| Social Science researchers are nationally and internationally renowned leaders of their fields | Local employers uncomfortable with short-term risks of temporary intern employees | A cohort of workers "ripening" to highest average monthly earnings | Distance to larger employment and client networks cumbersome for managers— leads to satellite offices in Portland, elsewhere |
| Video game studios have connections to large industry players, including: Disney, Foundation9, and Zynga | Transit connectivity (air, rail) to larger labor and capital markets | "Ground floor" chances for young workers in "serious gaming" or other emerging realms in industry | Acquisition of smaller firms by larger, outside ones may weaken connections to Eugene |
| Firms practiced serving education technology or gaming clients | Broadband prices high, speed slower than other areas | LCC & UO are rebuilding curriculums in summer '12; interest among faculty/ instructors in extending reach to industry, other disciplines | |
| South Eugene High School has talented coders | Many independent software contractors complain there is not enough Wi-Fi connections | Motion capture labs, virtual education immersion rooms at UofO potentially available for industry use | |
| Discrete set of attractive quality-of-life attributes: natural resources, food, and small city life draws a subset of workers | Perception that Eugene as a location disadvantaged for talent interested in big metro lifestyles | | |

Sources: One-on-one conversations conducted with area educators, software businesses, and research organizations & data analysis

dramatic leaps over intermediate steps.

Social science research organizations, who already have spurred extensive employment in an above-average wage profession by virtue of strong reputation and high success rates in securing large federal grants, are now looking for entry into private sector markets to sell their services in response to declining public research funds. For instance, Eugene-based ORCAS is a healthcare technology company that creates behavior and self-management programs and recently released a video game called "Lungtropolis" to teach young asthma sufferers to manage their symptoms. Likewise, video game companies may now look to diversify from console gaming into education gaming, or so-called serious games.  Indeed, some local studios have performed contracts for Fortune 500 companies to create games to train corporate employees to manage factories or fly airplanes. Given Eugene's historic strengths in both these sectors, their current trajectories, and the pressing necessities of change, an intriguing projection can be made. If individuals at

these firms or organizations steered their businesses into a highly specialized, but as yet unformed, niche market of education technology, then smaller firms from a smaller metro might use their "first comer" position to become field leaders and outcompete larger regions.

## Strengths and Weaknesses



Fig. 1: Oregon Software Publishers Average Monthly Earnings by Age Cohort 2011
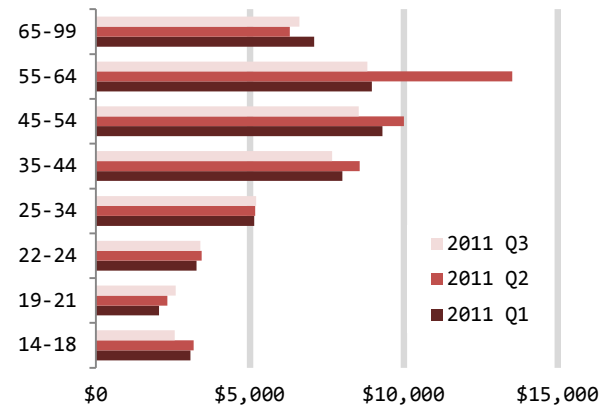
Source: U.S. Census Bureau Center for Economic Studies, Quarterly Workforce Indicators

The continued success and presence of the software publishing industry in Eugene can be attributed to several factors, among which are: 1) a local repository of talent with experience inherited from foundational firms who are fixed to Eugene,  2) a lower cost for

Table 5: Workforce Indicators for Software Publishers by Age Cohort, State of Oregon; 2010 Q4

| Indicators | 14-18 | 19-21 | 22-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65-99 |
|---|---|---|---|---|---|---|---|---|
| Avg Monthly Earnings | $2,956 | $2,091 | $3,544 | $5,390 | $8,058 | $10,054 | $12,425 | $6,776 |
| Avg New Hire Earnings | $1,775 | $2,858 | $3,543 | $4,337 | $6,108 | $6,776 | $5,902 | $5,096 |
| Job Creation | 3 | 7 | 46 | 133 | 140 | 71 | 39 | 4 |
| Net Job Flows | 1 | -1 | 26 | 40 | 66 | 20 | 5 | 1 |
| New Hires | 3 | 12 | 53 | 203 | 214 | 101 | 43 | 7 |
| Separations | 3 | 12 | 28 | 180 | 168 | 100 | 51 | 9 |
| Total Employment | 16 | 51 | 218 | 2460 | 3316 | 2131 | 943 | 91 |
| Turnover | 20% | 12% | 18% | 7% | 5% | 4% | 4% | 4% |

Source: QWI Online [NAICS] US Census. Accessed 3/27/12

similar quality production as compared to the Bay Area or Seattle (lower rents and lower wages for workers), 3) an appreciation and affinity by senior managers and skilled employees for natural recreation opportunities and the region's overall quality of life, and 4) a base of clientele in venture businesses started at the University of Oregon who seek personalized software developer services. The S.W.O.T. (Strengths, Weaknesses, Opportunities, Threats) Analysis in Table 4 are a distillation of wide-ranging comments and findings drawn from nearly twenty conversations with Eugene-area computer science educators, managers of software publishing firms, research organizations and education technology directors. While many agreed they sensed opportunities and synergies between local software companies, education companies, and research organizations, there remained questions as to what would constitute effective action in response. All expressed interest in having more facilitated meetings to explore the subject in greater depth.

Consistent challenges expressed by firms and research centers from across the cluster, as described by management and entrepreneurs, was 1) talent recruitment (especially of highly qualified mid-level managers), 2) a need to constantly innovate either in product type or client, 3) difficulties in making airplane

travel arrangements to, or bringing in visitors from, cities like San Francisco, Los Angeles, Seattle, and Boston where their most important clients and business partners are headquartered, and 4) inefficiencies

> **Eugene firms and research centers can first look to better their prospects for long-term talent development by deepening their local relationships with educational institutions and their student bodies.**

associated with current internship programs. When told of the similar work or relevant research being done either by firms or faculty in the areas of "serious gaming" or education technology within a mile of their offices (or sometimes within mere blocks), many individuals expressed surprise and interest in meeting to learn more about the activities of other University educators and other sectors of this cluster.

## Workforce Analysis

Eugene software publishers and education technology companies are operating against a national and global skills crunch for computer scientists. In 2008, only



Fig. 2 Oregon Software Publishing Industry
Job Creation by Quarter: 1991 to 2011
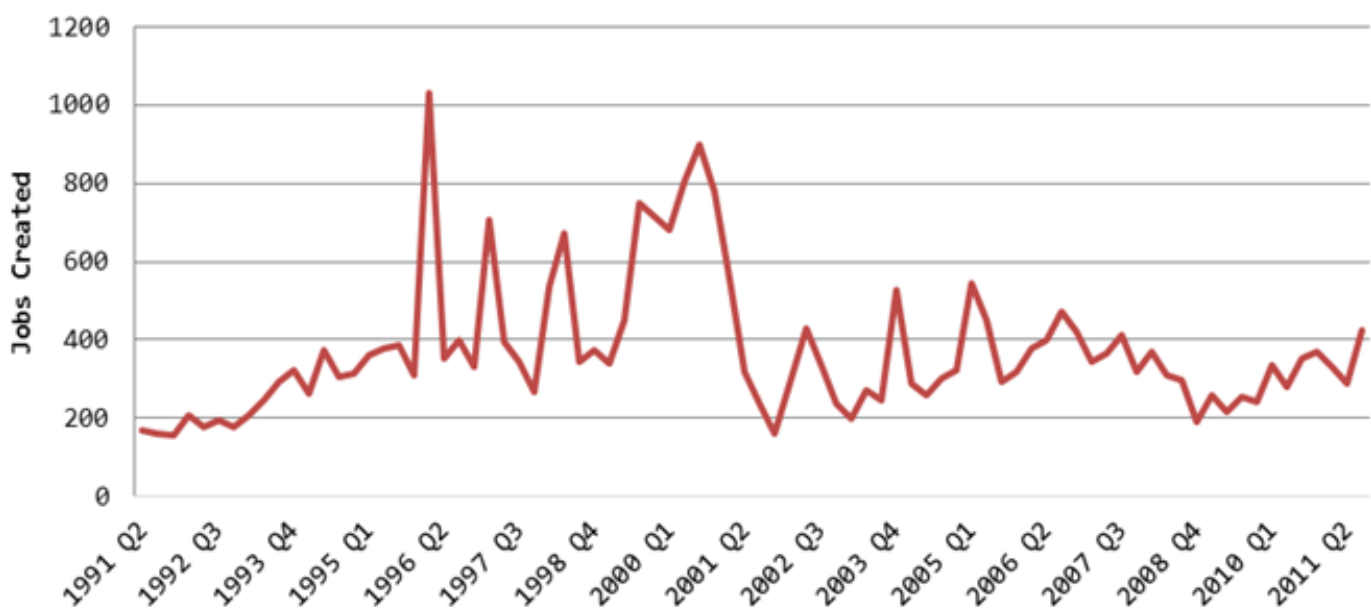
Source: U.S. Census Bureau, LEHD QWI 11/2/12

14 percent of United States college graduates earned degrees in science, technology, engineering and mathematics, or STEM skills. Jobs in the United States requiring these skills will grow at 1.6 percent annually in the 2008-18 decade, but overall job growth is projected to grow only an average 1.0 percent (Source: McKinsey Global Institute Research). According to McKinsey, to fill the gap, the United States would need to increase its share of STEM graduates to 30% by 2018.

Software publishing employment in Eugene in 2010 scores a 6.17 location quotient (LQ) as compared to national averages. This indicates specialization in the local workforce and underscores software industry's key status in the Regional Prosperity Economic Development Plan. Study of Bureau of Labor Statistics' LQs also reveals a strong concentration of freelance workers with computer software and other information technology skills like "Computer Systems Design and related Services" in the Eugene-Springfield MSA, but a relatively lower concentration captured in federal statistics tracking electrical hardware fabrication jobs.

Within Lane County, the number of workers in software publishing between the ages of 19 - 24 accounted for about 3% of the software publishing workforce, a percentage roughly mirroring the state average. For

comparison to other metros, within the Seattle metro the percentage measured 3.5% in this age cohort, but an extraordinary 10.8% of Salt Lake City's software publishing workforce were listed in this age group. The Quarterly Workforce Indicator (QWI) data from the US Census Bureau in 2011 QI counted only 278 workers in Oregon under the age of 24 employed in software publishing—the third smallest age cohort in the industry and only ahead of the 105 persons grouped in the 65-99 cohort.

The age cohort with the highest percentage of total employment in software publishing (35-44 year-olds) will, in the next ten years, transition into the grouping with the second largest average monthly earnings for the industry (45-54 year olds in software publishing average $9,333 in earnings per month). This demographic change has several important implications for job turnover and competitiveness in Eugene's software publishing industries.

Even if the statistics shown in Table 5 undercounts a multitude of young software publishers who are self-employed, the figures still indicate a never-ending challenge for Oregon (and by extension Lane County) software publishers to replenish their ranks of skilled 25-34 year old workers. The most experienced and



**Fig. 3: Software publishing growing faster in Lane County than in Oregon and US**
(Indexed to 2001 Software Publishing Covered Employment in Lane County)
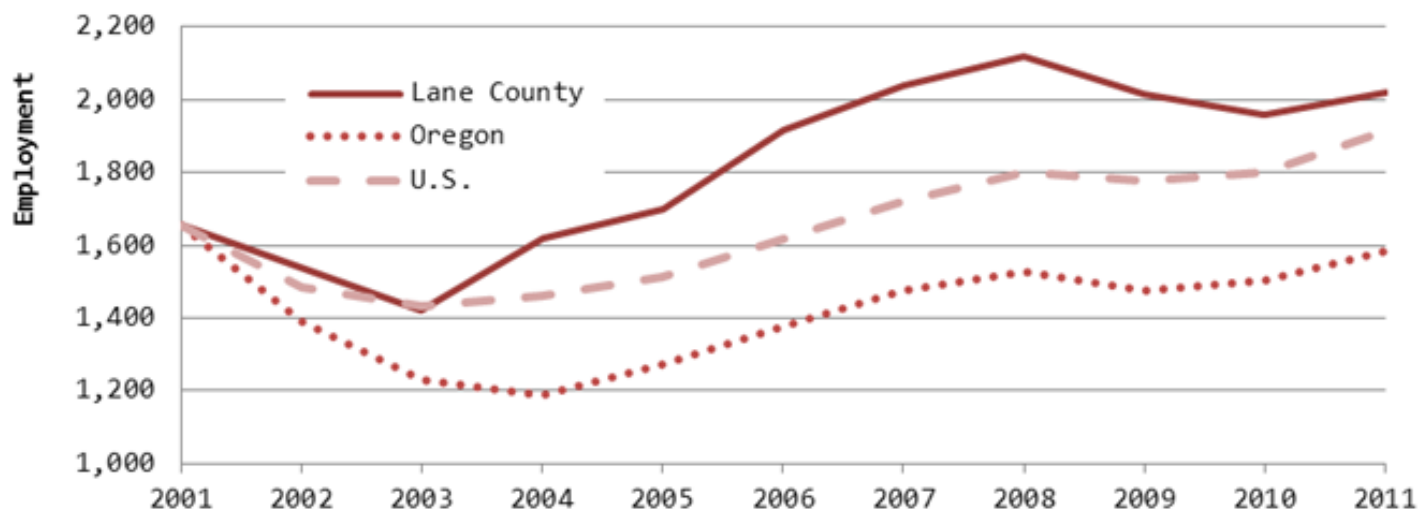
Source: Lane Workforce Partnership and Oregon Employment Department 8/1/12

productive workers will be entering years of their life where their earnings are projected to greatly increase. Local employers will then have to choose to pay more to retain their services, or rely on their workers strong appreciation for Eugene's low-cost, but high quality of life to compensate—a locally sourced "2nd paycheck." A third option is they will attempt to start ventures of their own, in which case they will generate greater demand for local business services, financial capitalization, and more workers. No matter the mixture of these possible outcomes, this demographic projection underscores the criticality of an oft-repeated claim by employers in interviews: it is especially difficult to recruit and keep mid-level management in Eugene as compared to larger metropolitan areas that both pay more and offer comparable qualities of life for high earning residents.

While talented, young programming engineers are

One possibility is to capture the imaginations and talents of not just young engineers, but future managers and entrepreneurs with the idea that Eugene as a place situates them for greater success because of its near peerless resources and distinctive synergies within the locally-based EduTech cluster. As individuals and firms network and cooperate, the cluster's members could also work together to help Eugene's young people find that local software development work is "no mystery" and involve them early and often in coding their products. Once involved and aware of the local cluster, they are more likely to consider both a career in Eugene and see value in this region as a superior location for developing their particular career interests.

Public actors like the City and the University may help businesses move towards a longer-term strategy in workforce development. However, it will take

**Table 6: Software Publishers Employees and Earnings by Education Level Lane County 2011 Q1**

| Education Level | Number of Employees | Average Monthly Earnings |
|---|---|---|
| High School or Equivalent | 312 | $4,118 |
| Some college or associate degree | 479 | $4,703 |
| Bachelor's degree or above | 659 | $6,954 |

*Note: Tabulations by education are for workers aged 25 and over only*

*Source: QWI Online [NAICS] US Census. Accessed 6/29/12*

most frequently discussed in news publications (and even among some managers) as magnetically drawn to the large metropolitan areas where city lifestyle choices can be more appealing and wages higher, there is still another threat to the mid-sized metros: the retention of the best workers as they hone their practical work skills and mature into management roles. Despite its lower wage disadvantage, there remains a hand for smaller regions like Eugene-Springfield to play—besides marketing the region's distinctive quality of life. To become more competitive in the search and retention of tomorrow's veteran mid-level managers, Eugene firms and research centers can first look to better their prospects for long-term talent development by deepening their local relationships with educational institutions and their student bodies.

cooperation between public actors like the city and educational institutions to reach out to industry and strike the partnerships that address the identified short-term downsides and risks to business associated with hiring temporary interns. In the course of conversations some creative solutions have come forward on ways to collaborate and cover financing.

## Postsecondary Education in Computer Science

In 2000, there were fewer than a dozen video game design related degrees offered at North American universities, and by 2005 there were more than 100 programs in the U.S. and Canada, and dozens more overseas. However, in 2012 there were no colleges or universities in Oregon that made the Princeton Review's rankings of schools for game design in

either the undergraduate or graduate lists. One important criterion used by the Princeton Review in

their University rankings in both computer science or game development programs was whether students worked on "products that later shipped." For the Pacific Northwest, two schools from Vancouver made top ten lists for game development, as did DigiPen Institute of Technology in Redmond, WA.

Notable video game developer clusters outside of Seattle, Boston and the Bay Area include Baltimore, Salt Lake City and Raleigh, as well as Vancouver, BC. These locations all include top ranked game design programs. For a metropolitan region of its size, the fact that Eugene has even made some bloggers' short-list of the top twenty locations in the United States to find a job in video games is remarkable, but currently none of the major universities in Oregon are ranked or known for video game design programs. The presence of a well-ranked video game design school is no guarantee of a sizeable local video game industry, or vice-versa, for reasons discussed prior in this report, but greater cooperation and improvement is an excellent idea for taking advantage of the opportunities and tackling threats to the EduTech cluster. A higher ranking of a degree or certificate program could also be helpful for school recruitment efforts.

Both Oregon State University (OSU) in Corvallis and University of Oregon (UO) in Eugene offer degrees in Computer Science, but they differ slightly in education strengths. OSU is more often characterized as an engineering school in contrast to UO's reputation for liberal arts curriculum and a holistic approach to

training its students for lifelong learning and research. Oregon State University, Lane Community College and the University of Oregon, are all identified by employers as sources of labor with internship program relationships, but their functioning as recruitment centers are expressed with caveats, reservations, and stories of missed connections by the local software business community and educators alike. Lane Community College (LCC) offers a certificate as well as an Associate's Degree targeted towards Simulation and Gaming Design students.

While Lane Community College has the largest video game development education program in the state of Oregon, many of that program's students are described as having to split their time between study with working menial, low-pay jobs that do not provide additional skill development (such as pumping gas) to afford tuition. Instead, students simulate "real world" work experiences as teams building projects of their own design. Students in LCC's cooperative work program do often find work locally to supplement their studies, but instructors believe their program could benefit from increasing, enhancing, and diversifying their current relationships with members of local industry.

The fierce national competition for talent is known to educators and businesses—it was noted that the best local University of Oregon students may be recruited sometimes up to nine months before they even graduate. This talent competition may extend to faculty members who also desire that the best graduate students stay to assist them in their research. The University has a long-term interest in attracting better student applicants to their programs through the increase of prestige and reputation that could accompany better partnership with industry or accentuating their reputation for a niche or emerging field—as is the case with serious gaming or education technology. However, there are internal organizational difficulties for the University to surmount in order for there to be follow-through on ideas that range from new minors or certificates offered jointly between the colleges, or research laboratories with corporate memberships dedicated to the study of serious gaming.

The strength of education research centers in Eugene is more entwined with the University of Oregon—historically, their presence and lineage in Eugene traces directly to the University and its colleges more than software publishers. Software companies certainly benefit enormously from the presence of the University, but both as a matter of history and present reality their resources and talent recruitment are reputedly less connected to UO than the research organizations. There remain unexamined opportunities for local software businesses in access to students, equipment and research—not only with the Computer Science Department, but within the College of Education's work with virtual environments, "immersive education" and especially with the many non-profit social science research organizations related to the University who are sitting on non-commercialized intellectual property and without the capacity to turn it into product.

## Game Education and Research Centers at NYU and NCSU

New York University's Game Center and its recently inaugurated Masters of Fine Arts for Game Development and North Carolina State University's Digital Game Research Center offer interesting contrasts for how a University and its local industry can come together. In the case of the former, a game center founded with the explicit mission of creating a new generation of game workers relied on its strengths in the liberal arts as a distinguishing characteristic, while in the latter, industry and faculty work more closely on research projects that may result in innovative intellectual property with commercial applications.

New York University's Game Center, established in 2008, is supported by game companies like Arkadium, but the curriculum and both its Master's degree and Game Design Minor emphasize the liberal arts strengths of the University. Although housed at the Tisch School of Arts in the Skirball Center for New Media, it collaborates with other NYU schools and departments, including their Courant Institute of Mathematical Sciences, Steinhardt School of Culture, Education, and Development, and

NYU Poly. Students are given instruction in software coding, but are also encouraged to spend time with

> ...feel staying is precluded as a viable option because local industry simply does not exist, or not in significant quantity.

colleagues in the game testing lounge and take mandatory courses from humanities or social science professors who teach storytelling, drawing, and theoretical aspects of games. The explicit mission of the Center is "to graduate the next generation of game designers, developers, entrepreneurs and critics, and to advance the art, science and culture of gaming by creating a context for advanced study and innovative work." The Center's students, "both undergraduates and graduates, will be drawn from diverse disciplines including computer programming, visual art, sound and audio, animation, writing, and joined together by the central discipline of game design." NYU followed this Center with selective hires of faculty with experience creating games for teaching, such as Eric Zimmerman, the founder of Gamelab, which spun off two successful companies: Gamestar Mechanic, an online site funded by the MacArthur Foundation that lets kids create their own games, and the Institute of Play, a nonprofit initiative at the intersection of games and learning.

North Carolina State University's Digital Game Research Center, founded in May 2007, is more straightforward in its linkages to industry. Large studios like Epic Games, based in Raleigh, are corporate benefactors of the Digital Game Research Center, and have agreements to receive access to the primary research of students and faculty. There, too, the center is conceived as multi-disciplinary where the focus investigates the "scientific, engineering, artistic, social and educational challenges of digital entertainment." Although officially within the Department of Computer Science, the "center's faculty include colleagues from the colleges of Education, Engineering, Design, Management, and Humanities and Social Sciences that collaborate on a wide range of research and educational initiatives which focus on

new modes of entertainment and interaction in digital worlds." Activities at the Center include hosting events, seminars on game related topics, and group and team projects. Interestingly, all three research projects currently highlighted by the Center are on topics related to teaching elementary grade students and learning through games. For instance, "faculty member James Lester is collaborating with colleagues in the College of Education to build a narrative centered learning environment to teach students basics of microbiology," a project funded by the National Science Foundation.

Eugene and the University of Oregon have parallel resources in its local colleges in the expertise of their faculty members, its own recently completed National Science Foundation research projects into "immersive education," and even the added benefit of an extended, locally-based workforce that specializes in social science research, software development, and game design. Glaringly absent is a place to focus the collective talents and abilities of schools and industry, a location where the next generation of "serious game" or education technology talent can learn cutting edge research

| Table 7: High Wage, High-Demand Occupations in Software Publishing | | | | | | | |
|---|---|---|---|---|---|---|---|
| Occupations paying more than region's 2011 median wage and more than median number of total 2010-20 openings in the region (Lane County Median Wage: $15.98) | | | | | | | |
| | Employment | | 2010-2020 Openings | | | Median Wage | |
| Job Title | 2010 | 2020 | *Due to Growth | Due to Replacement | Total | 2011 | Minimum Educational Requirement |
| Computer and Information Systems Managers | 225 | 273 | 48 | 38 | 86 | $40.10 | Bachelor's |
| Managers, All Other | 446 | 542 | 96 | 110 | 206 | $36.84 | Bachelor's |
| Business Operations Specialists, All Other | 1,009 | 1,163 | 154 | 208 | 362 | $22.79 | Bachelor's |
| Computer Programmers | 238 | 285 | 47 | 61 | 108 | $28.95 | Bachelor's |
| Computer Software Engineers, Applications | 259 | 333 | 74 | 31 | 105 | $35.36 | Bachelor's |
| Computer Support Specialists | 842 | 1,059 | 217 | 250 | 467 | $24.45 | Postsecondary training |
| Network and Computer Systems Administrators | 318 | 379 | 61 | 59 | 120 | $29.94 | Bachelor's |
| Network Systems and Data Communications Analysts | 185 | 221 | 36 | 30 | 66 | NA | Bachelor's |
| Computer Specialists, All Other | 327 | 400 | 73 | 68 | 141 | $28.48 | Postsecondary training |
| Graphic Designers | 204 | 241 | 37 | 69 | 106 | $17.98 | Associate |
| Technical Writers | 68 | 90 | 22 | 16 | 38 | $38.21 | Bachelor's |
| Wholesale and Manufacturing Sales Representatives | 1,230 | 1,470 | 240 | 318 | 558 | $24.26 | Related work experience |
| Source: Lane Workforce Partnership and Oregon Employment Department | | | | | | | |

from faculty as well as the professional expertise of private business. Even in these resource constrained times, the public financial resources for concepts like this exist at the state and federal level, but could best be realized in partnership with private sources or corporate sponsorship.

## Internships

Today, there are several routes from either University of Oregon's Computer Science Department or the Game Development Cooperative Program at Lane Community College to become interns. However, interviews with local educators, instructors, software companies, and education research centers identified numerous challenges and highlighted areas for improvement.

Local businesses and research organizations (especially those comprised of very small operations of less than ten people) often express discomfort with the temporary, short-term nature of internships. The risks can be deemed as too high for bringing in a person at such a green state knowing they will most likely leave after a summer for either more coursework or another company. Indeed, some businesses felt that even recent graduates presented grave risks in the first six-months to a year as they transitioned from an academic setting to professional work. In those cases where the risks of internship are accepted, managers spoke of quality assurance or testing work that could be given to interns. However, the nature of this kind of work meant tasks could spike for a period of time and require the assistance of multiple interns before fading and leaving managers burdened to find meaningful engagement for the students. In the past this was not as much an issue for video game companies that could have interns play and test games, but times have changed.

For instance, contract deadline pressures do not allow the long, leisurely transition from game tester to program coder as more the norm twenty-years ago. Often work of a level once done by student interns can instead be sent overseas in Vietnam, Mexico or India to be completed at a cheap rate by full-time professionals with completed graduate degrees. The time spent managing and teaching the students on the job is valuable to all employers of all sizes, but the larger software businesses or education organizations are better resourced to take a chance on interns with the foreknowledge that only a certain subset will pay dividends as their future employees. Small and mid-size employers, especially start-ups, are less willing or even sometimes unable to take those chances.

Students at the University of Oregon Computer Science Department, for their part, sometimes tell administrators they feel forced to take classes in the summer to make up for the lack of local internships. Reputedly, there is a pervasive attitude—if not acceptance and expectation—that once they graduate their best options for software employment are outside Eugene and in larger metropolitan areas. Many students may want to stay in Eugene, either because of family or they are still working on their degree, but feel staying is precluded as a viable option because local industry simply does not exist, or not in significant quantity.

Some leaders of local software publishing firms stress that gaining the skills necessary for their businesses is best learned on your own or through a period of hard-nosed apprenticeship, and not through degree programs. A recurring observation is that simply too little time is spent practicing coding at University by students. Some are not satisfied with the gap they observe in basic skills when they meet and test prospective entry-level local colleges and university students. Instead, conversations with software business owners reveal recruitment might come from diverse fields besides computer science, which including experienced employees from bioscience, health care, or geography. Some speak of an innate talent for expert coding. For their part, some educators emphasize that teaching a student self-learning and research skills are the way to gain those intrinsic abilities to become better employees over a lifetime and learn once in a business. A key challenge for the cluster is to find a ways for students to become more connected to local industry and develop both immediate and life-long skills.

## Why National Cluster Definitions Don't Fit Locally

The current definitions of these clusters at the national levels do not precisely fit observations of this region's firms and occupations. Indeed, a "cluster" is a purposefully vague term meant to resist the false sense of policy precision that sometimes accompanied past economic development theories. Industrial clusters are best understood as combinations of industries with a new theoretical spin on the agglomerative economies described by urban economists and analyzed by generations of location theorists and regional scientists.

Clusters are not self-contained sectors of entirely similar, directly connected businesses or merely a supply chain. As Michael Porter himself has pointed out numerous times in his writings and associated publications, cluster boundaries need to be adapted to observed local circumstances. In the case of Eugene, there are several reasons why segments of Porter's Harvard School of Business Mapping project's Information Technology Cluster and the Education & Knowledge Creation cluster should be considered together when analyzing local competitiveness.

First, software publishers and so-called "EduTech" companies, or research centers, are frequently looking for workers with similar or overlapping sets of knowledge, skills, and abilities in the creation of programs meant to influence, test, train, or teach human behavior. The ability to code software is increasingly another level of required literacy for workers in many professional services, much as basic ability to interface with computers is commonplace requirement in many unrelated professions. Local software publishers will provide in conversation anecdotes that some of their best employees now come from backgrounds other than what the federal government would classify as "professional technical services." Workers with degrees in geography or even with experience in managing databases for health care service providers can shift to employment in software publishing the same, or easier, than graduates with computer science degrees might. Indeed, the private non-profit education research groups are now observed hiring individuals whose

primary work experience are from Eugene game studios. This is not only because they can code software that is necessary to make their intellectual property useful or commercialized, but because game developers can bring their own methods of incentivizing interaction in the programs they develop for education or training. This is a manifestation of the skill matching advantages present in "agglomerative economies."

Secondly, education centers, professional and technical service providers, and software publishers all share a basic definitional trait in common: they rely almost entirely on the creative input of their workers expertise. Computer chip fabrications, and data centers for that matter, have many material inputs that can figure importantly; such as water cooling systems or cheap electricity. Social science and humanities researchers are included in the US Commerce Department's definitions of an Information Technology and Telecommunications cluster, but are more entwined and rooted to the local universities than software publishers, who may either locate near "the heart of the Bay Area or just as well be in Vietnam or any other location" as one interviewee facetiously described the situation.

The reasons for software publishers to be in Eugene are not as explicitly tied to regional educators, but there are compelling reasons to be close to researchers and graduates with degrees from fields other than computer science. One is the plethora of skilled individuals from backgrounds with transferrable knowledge, but another is the complementarity of education research institutes and related companies to custom software publishers. A local company that can create tablet applications or program backend internet connectivity for a language testing company is like the importance of excellent advertising or marketing firms to major food producers—they are a reason for a company to place its headquarters in close proximity. There is choice in software service-providers.

Finally, the data does not support the view that software publishers are highly linked, at least within this geographic region, to other forms of computer product fabrication that make up the definition of Information

Technology and Telecommunication as defined by the US Chamber of Commerce's Innovative Regions initiative. Figure 4 illustrates the point. Software publishing employment increased greatly even as computer chip fabrication at the Eugene Hynix plant closed and laid off hundreds of workers—nearly twice the number of jobs was lost in electronic component manufacture than expected given the national benchmarks. In fact, national benchmarks predicted the region create 126 software jobs in this time period, when instead it created 860. There is little correlation between manufacturing computer and electronic wiring and the development of software publishing industries within the Eugene-Springfield region, but every reason to believe from interviews with managers that software publishers and education technology companies together present a gathering specialization and potent area of competitive strength for the Eugene-Springfield MSA.

In the first quarter of 2011, total employment in educational services in Lane County was 16,941, or about 13% of the local workforce. Educational services include local schools, colleges, universities, technical or trade schools, and educational support services. All of these workers could be theoretically included into the EduTech cluster on the grounds of their skills in teaching, but that undermines the utility in applying cluster theory if the definition were overly broad and

**Fig. 4: Job Creation in Eugene-Springfield by Information Technology Subcluster '98-'09**
Blue Diamond shows National Benchmark Prediction
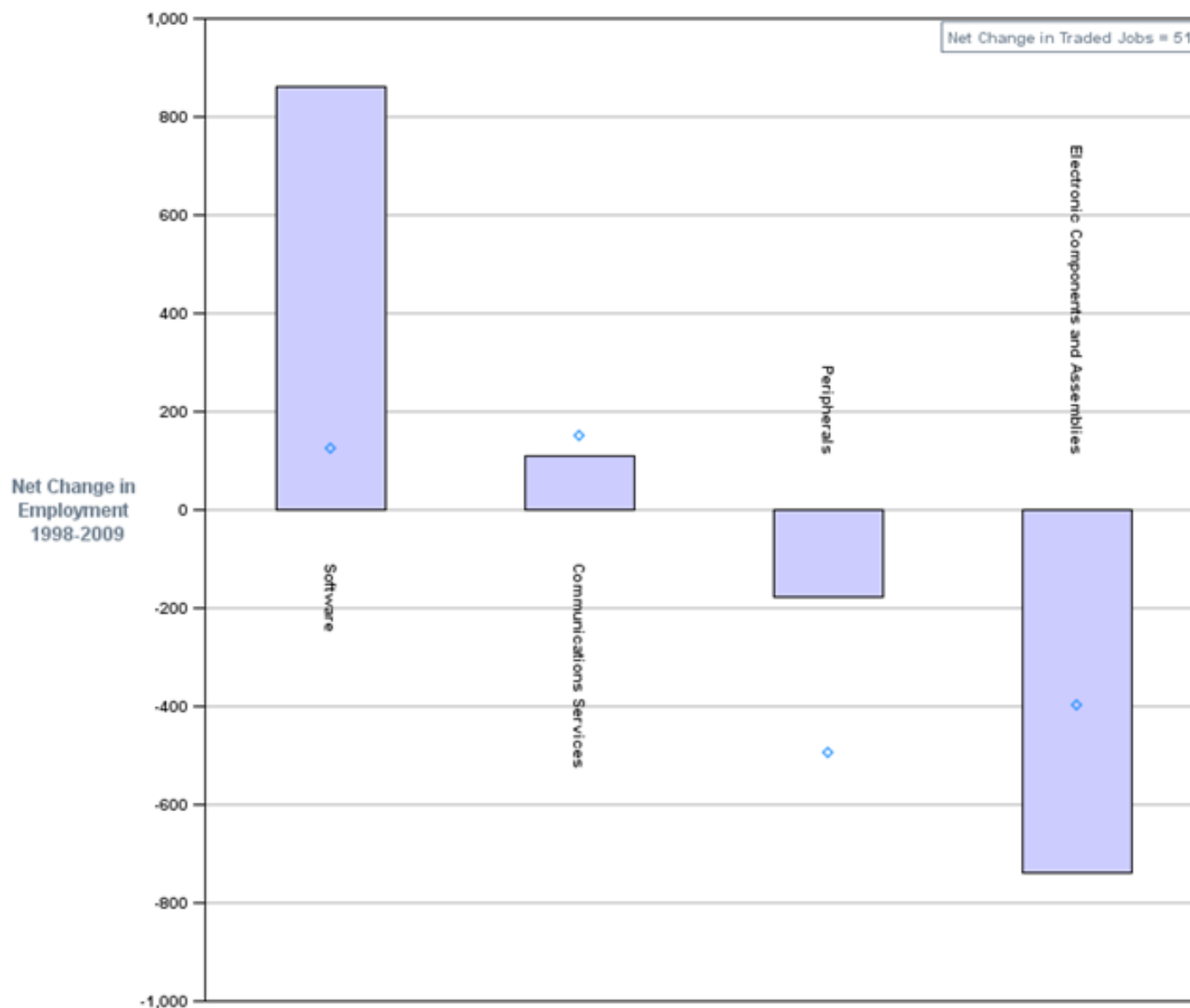


Source: Prof. Michael E. Porter, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director.

all encompassing. Instead, this report encourages independent judgment and discretion in observing these purposefully fuzzy boundaries.

## Why it Matters

As two of the greatest areas of expertise and presumable strength, and given their basic definitional characteristics as professions, a natural presumption is that software publishers and social science "knowledge creators," given the near neighborhood of workers and offices, could find certain competitive advantages against out-of-region firms through enhanced cooperation and collaboration; either consciously pursued by individual managers at the companies or unconsciously as firms hired local talent—no matter what their original sector. This is already the case at some firms and research centers that hire individuals from one another's field. The difference is other regions have spent the past few years pursuing tangible support for the phenomenon, as described earlier in the form of Gaming Education Labs and Master of Fine Arts programs for game development. Eugene-Springfield firms and institutions, on the other hand, may often be unaware of possible synergies between their own activities and those of other firms on the same street. Improperly defined, individuals from relevant professions might accidently

**Fig. 5 Job Creation in Eugene-Springfield by Education & Knowledge Creation Subcluster '98 – '09**
Blue Diamond shoows Nationl Benchmark Prediction
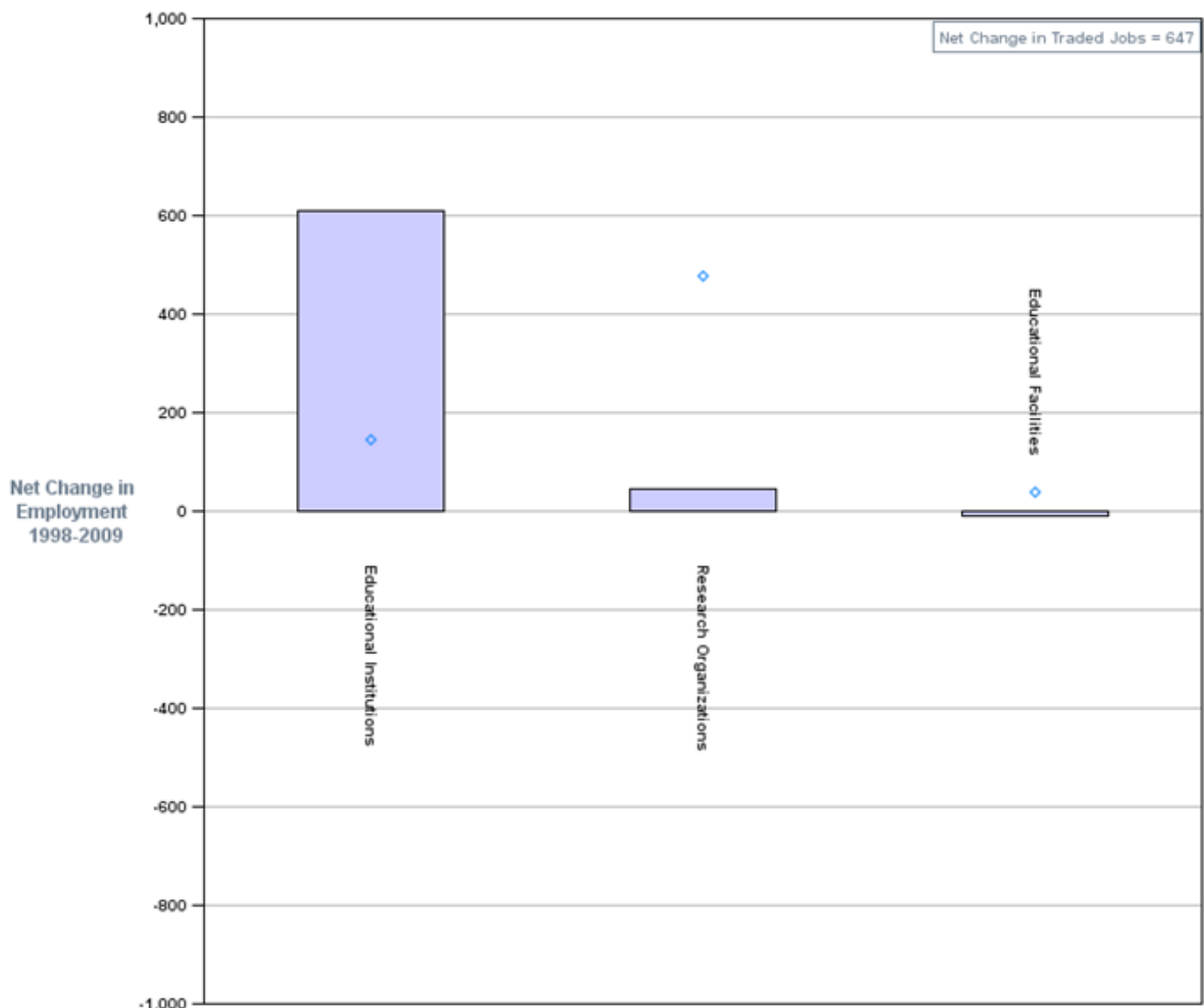


*Source: Prof. Michael E. Porter, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director.*

be excluded from networking events, or not immediately perceive their own interests in attending.

While software companies created jobs at a rate faster than expected if looking at national figures, research organizations' job creation–considered by the "Cluster Mapping Project" a subcluster of the "Education and Knowledge Creation" cluster—disconcertingly underperformed their expected mark; these results are shown in Figure 5. If Eugene's research organizations experienced job creation at the same percentage change increases from 1998 to 2009 as predicted by national figures, then there would be hundreds of additional employees in above-average wage research organization jobs—as marked by the blue diamond. Instead, educational institutions in Eugene-Springfield more than tripled the job creation figure as predicted by national benchmarks.

## Recommendations

What does a cluster theory based strategy look like? Cluster theorists and economic development practitioners who use cluster theory stress the importance of government's role to help convene, facilitate, or co-finance cluster initiatives, but also emphasize that industry needs should be advanced and described foremost by private sector consortiums. Therefore, when the Athletic and Outdoors cluster group at the Portland Development Corporation built a materials library for local designers in the Portland to access, they were investing into an ecosystem of designers for smaller companies that larger industry giants like Nike and Adidas could look to as an extended talent pool. Likewise, the following list of recommendations is drawn from conversation with businesses or educators and hypothesizes actions that either local government or institutions might support. The list should not be considered as the full array of possible outcomes or tasks for government or institutions to take on their own, nor is it the end to fostering greater connections between constituent elements of the cluster. Additional proofing or development of concepts would need to take place in facilitated meetings with businesses and educators.

## Downtown Quality Assurance & Compatibility Testing Work and Meeting Space for Student Coders

**Purposes:** Increase University student bodies' awareness of local industry, provide them with more exposure to coding work and access to the mentorship of business professionals while augmenting the agglomerative economies that accompany easier connections to skilled labor and cross-sector collaboration.

**How:** Student teams, supervised by a program manager or administrator, funded collaboratively by businesses and schools, could take on contract quality assurance, testing, and hardware compatibility tasks for either an hourly or project-based rate. Area software publishers or education research organizations could, as need arise, come to the workspace to meet with students, purchase hours, or assign tasks. The hope is the lab would be run both during the school year and in the summer months for those students looking for greater experience.

**Who:** Students from all backgrounds—undergraduate, graduate, computer science, or miscellaneous—could participate, but their assigned role on projects would be under the supervision of a hired program manager/instructor. Student organizations from the schools could use the lab as an informal meeting space to meet fellow interested students and potential industry mentors in addition to honing skills and practicing professional work.

**Narrative Description:**

This concept emerged over the course of conversations and interviews with individuals within the cluster. The outline of the vision is to create a programmed space managed by one or two of the major educational institutions where students from different backgrounds (undergraduate or graduate, computer science or miscellaneous) can come to work either individually or as teams on aspects of software products that are intended to ship. Generally, the work could be characterized as

entry level, routine quality assurance or compatibility testing that businesses would feel comfortable sharing outside of their office place, although optional arrangements for securing of intellectual property rights has not—yet—been fully explored.

Students would need to be paid for the work produced in the lab supervised by a professional program manager. Student organizations like "e-Biz" from the University of Oregon would be encouraged to come and use the equipment and space that might be provided with the assistance of the City of Eugene in the downtown Central Business District. Sponsoring business owners who sat on a supervising board could come by to visit with students, provide mentorship on their independent projects, and share information and ideas in a relaxed, informal atmosphere. Students, in essence, could gain valuable coding insights from performing contracts on real product rather than simulating a professional working experience. They may practice being independent, quality assurance contractors on different projects as they arose from throughout town or at various firms.

The risks and unsteady nature of the work could be overcome if spread amongst the many software publishers and education research organizations in the form of this internship pool, easily reached at a downtown location and ready to be called upon to execute "QA contracts". Furthermore, education research organizations, software publishers, and educators through the process of cooperating on setting up and running the space would, if the project proved fruitful, make additional networking and personal connections to one another, preventing some of the opportunity costs observed in the course of interviews for this report.

Issues of intellectual property could be handled a number of ways. Some hypothetical solutions included the neutral siting of the lab off campus property, contractual arrangements between the lab and businesses, and companies choosing to only send non-confidential work for quality assurance or compatibility testing.

The uniqueness of the operation could garner state and hopefully national attention. Start-up software publishers could see a workforce resource and recruitment method special to Eugene and a region that innovates not just in applications, but in cooperative organization. If a pilot project proved successful, additional curriculum and programming could be added to the working space through the addition of talks, lectures, or coursework in relevant subjects by the University of Oregon or Lane Community College.

**Next Steps:** Identify leaders and champions of the concept from the private business and non-profit community before convening them in a facilitated setting to flesh out details of a pilot project. Then review a detailed proposal with supportive educators. Funding for a pilot project could come from a number of sources, but besides government funding, the fiscal commitments of industry is necessary to ensure their on-going participation in the managing and operations board. The responsibility of this hypothetic board, which should include members of industry and education, may include hiring a program manager/administrating instructor, writing lab rules, and guidance that code testing performed is useful and meaningful experience for students towards employment.

## Marketing Eugene's Distinctive Advantages

**Purpose:** Raise local and national awareness of education research organizations, video game studios, and other software publishers so that some organizations are, to paraphrase one education technology manager, "as well-known in Eugene as they are in Boston's Back Bay or certain small cities of Norway."

**How:** Companies, working through their industry representatives in the Eugene Area Chamber of Commerce, EduTech Cluster and Oregon's Software Association hire marketers to spread the heritage, advantages, and future opportunities of doing business in Eugene in both these sectors.

**Who:** Eugene Chamber of Commerce, Education

Technology & Research Cluster, City of Eugene and local firms (like Concentric Sky, who has already begun a "Silicon Shire" campaign).

**Narrative Description:** Brand Eugene nationally as a place where education technology happens, so that potential investors, companies, and future workers from outside the fields of education who are interested in participating in the growing education services sector know Eugene's history and expertise is more than University of Oregon, but extends to a cluster of knowledgeable software developers. Since almost 94% of the state's EduTech combined revenue comes from out of state, many people in Oregon are unaware of the industry. Indeed, although the non-for-profit International Society for Technology in Education has nearly a 100,000 affiliates, most Oregon teachers have never heard of them.

**Next Steps:** The City of Eugene and the Chamber of Commerce work in cooperation with local industry associations create or build into existing websites statistics and other material that advertise the presence, size, and competitiveness of the cluster as compared to other regions. This information could then be filtered to industry blogs, message boards, and e-newsletters.

## Regional Cooperation with Corvallis Businesses and Institutions

**Purpose:** Present the strengths and size of the cluster as more nationally significant to investors, clients, and entrepreneurs by presenting a much larger, statistically significant region with two university assets as fertile ground for innovation in software and education technology products, but with greater lifestyle opportunities than viewed in isolation.

**How:** Re-think the geographic boundaries of the economic area from a perspective that sums the talents and abilities of the three metropolitan areas, rather than viewing them as rivals. Bringing the University of Oregon and Oregon State University together to collaborate on a Research Center in concert with industry is an example; the inclusion of Hewlett Packard from Corvallis or Intel

from Portland to help invest in a hypothetical "Southern Willamette Education Technology Research Center" is another.

**Who:** University of Oregon, Oregon State University, Eugene Chamber of Commerce, Lane County, City of Corvallis, City of Springfield, City of Eugene, Benton County.

**Narrative Description:** Federal grants, like the Innovation Challenge grants from the US Commerce Department, now reflect this emphasis on regions as the appropriate competitive scale for a globalized economy in their urging greater integration between cities and their regional governments. The Willamette Angel Conference is a tangible example of this expanded geography used in practice of economic development activities. If a software business begins in Eugene or Corvallis, and it can be shown that the region constitutes a single labor market full of creative knowledge professionals, that adds to the competitiveness of the region to recruit talent and firms.

## Enhance Local Software Publishers' Access to University of Oregon Research in Education

**Purpose:** To further the long-term strategic vision of linking the research taking place at College of Education and College of Arts and Sciences into digital education, computer interface, and virtual environments for the purpose of supporting the potential emergence of new industries.

**How:** The education program would need to come from faculty, but the University of Oregon's technology transfer office and the Eugene Area Chamber of Commerce are well-positioned to make links between researchers and local industry.

**Who:** Researchers at the University of Oregon in the Computer Science Department, and Researchers at the College of Education's Center for Advanced Technology in Education, Center for Learning in Virtual Environments,

and interested non-profit research organizations.

**Narrative Description:** A strategic partnership with regional industry would help grant writing for on-going research. There have been many candidate grants in recent years for this type of activity, including the Economic Development Administration's innovation challenge grants.

**Examples:** The Gaming for Education Lab at Michigan State University and the Digital Games Research Center at North Carolina State University are prime examples from the United States, although others exist in Europe.

## Formalize Collaborations Between Local School Systems and Education Technology Businesses and Research Organizations

**Purpose:** Employ the Regional Prosperity Economic Development Plan's tactic of "buying local" by encouraging local school system to allow education technology industry to both test and demonstrate the efficacy of their products. Explore the US Department of Education's Office of Education Technology's concepts of an "Education Innovation Center."

**How:** Education research organizations that are members of the Eugene EduTech cluster work together to produce a whitepaper for local systems explaining the benefits for teachers and students to have a free evaluation, proof of concept, testing procedure. The schools can then be asked to help formalize a process for education technology companies to test new evaluation or education techniques in real classroom settings.

Another opportunity to explore connections between EduTech firms and organizations is with a strategic broadband plan funded by the state of Oregon's broadband planning project. If Eugene is selected as one of eight communities for a strategic community broadband plan aimed at boosting levels of technology adoption by young people, then there will be an opportunity for companies to come together in a

facilitated process with schools to reimagine or redesign either how teachers are trained or how decisions for purchasing and deploying broadband applications are made.

**Who:** School District 4J, Lane Community College, Eugene Chamber of Commerce, EduTech Cluster

**Narrative Description:** Over ninety percent of Oregon EduTech companies revenues come from out-of-state, so testing products with the local school system is not just about a narrow sales opportunity. An established and guaranteed route to field testing products in real classroom situations should be of benefit in marketing, innovating, and fine-tuning regionally innovated products. The predictability of a local testing process would also allow education technology businesses located in Eugene a comparative advantage rooted to their location and give incentive for companies looking to relocate (like Wireless Generation) to choose Eugene instead of Portland, Boston or Washington, DC. Lastly, if the school system does ultimately decide to purchase a tested product, this could lead to other Oregon communities purchasing Eugene developed products.

**Example:** In New York City Economic Development Corporation's Edutech NYC 2020 report released in April 2012 (http://www.nycedc.com/blog-entry/edutechnyc2020), a key strength cited for the city's industry was the size of the local school system as a test market for products. However, this recommendation goes one further in proposing that the City of Eugene be the first to formalize a relationship between its local industry and its school system for a proof of concept process.

| NAICS Code | INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS | |
|---|---|---|
| | | |
| 238210 | | Electrical contractors |
| 333613 | Mechanical power transmission equipment manufacturing | |
| 333295 | Semiconductor machinery manufacturing | |
| 334111 | Electronic computer manufacturing | |
| 334112 | Computer storage device manufacturing | |
| 334113 | | Computer terminal manufacturing |
| 334119 | Other computer peripheral equipment manufacturing | |
| 334210 | Telephone apparatus manufacturing | |
| 334220 | Broadcast and wireless communications equip. | |
| 334290 | Other communications equipment manufacturing | |
| 334310 | Audio and video equipment manufacturing | |
| 334411 | | Electron tube manufacturing |
| 334412 | Bare printed circuit board manufacturing | |
| 334413 | Semiconductors and related device manufacturing | |
| 334414 | Electronic capacitor manufacturing | |
| 334415 | | Electronic resistor manufacturing |
| 334416 | Electronic coils, transformers, and inductors | |
| 334417 | Electronic connector manufacturing | |
| 334418 | Printed circuit assembly manufacturing | |
| 334419 | Other electronic component manufacturing | |
| 334512 | Automatic environmental control manufacturing | |
| 334513 | Industrial process variable instruments | |
| 334515 | Electricity and signal testing instruments | |
| 334516 | Analytical laboratory instrument manufacturing | |
| 334518 | Watch, clock, and part manufacturing | |
| 334611 | | Software reproducing |
| 334612 | Audio and video media reproduction | |
| 334613 | Magnetic and optical recording media manufacturing | |
| 335311 | Electric power and specialty transformer manufacturing | |
| 335312 | Motor and generator manufacturing | |
| 335313 | Switchgear and switchboard apparatus manufacturing | |
| 335314 | Relay and industrial control manufacturing | |
| 335911 | | Storage battery manufacturing |
| 335912 | | Primary battery manufacturing |
| 335921 | | Fiber optic cable manufacturing |
| 335929 | Other communication and energy wire manufacturing | |
| 335931 | Current-carrying wiring device manufacturing | |
| 335932 | Noncurrent-carrying wiring device manufacturing | |
| 335991 | Carbon and graphite product manufacturing | |
| 335999 | Miscellaneous electrical equipment manufacturing | |
| 423430 | Computer and peripheral equip and software wholesale | |
| 423690 | Other electronic parts and equipment wholesale | |
| 511210 | | Software publishers |
| 517110 | Wired telecommunications carriers | |
| 517211 | | Paging |

| NAICS Code | | |
|---|---|---|
| 517212 | | Cellular and other wireless carriers |
| 517310 | | Telecommunications resellers |
| 517410 | | Satellite telecommunications |
| 517910 | | Other telecommunications |
| 518111 | | Internet service providers (ISPs) |
| 518112 | | Web search portals |
| 518210 | Data processing and related services | |
| 541511 | Custom computer programming services | |
| 541512 | | Computer systems design services |
| 541513 | Computer facilities management services | |
| 541519 | | Other computer related services |
| 541618 | Other management consulting services | |
| 541710 | Physical, engineering and biological research | |
| 541720 | Social science and humanities research | |
| 926130 | Regulation and administration of communications, electric, gas, and other utilities | |
| NAICS Code | EDUCATION AND KNOWLEDGE CREATION | |
| 611210 | | Junior colleges |
| 611310 | Colleges, universities and professional schools | |
| 611410 | | Business and secretarial schools |
| 611420 | | Computer training |
| 611430 | | Management training |
| 611511 | | Cosmetology and barber schools |
| 611512 | | Flight training |
| 611513 | | Apprenticeship training |
| 611519 | | Other technical and trade schools |
| 611610 | | Fine arts schools |
| 611620 | | Sports and recreation instruction |
| 611630 | | Language schools |
| 611691 | | Exam preparation and tutoring |
| 611692 | | Automobile driving schools |
| 611699 | Miscellaneous schools and instruction | |
| 611710 | | Educational support services |
| 511110 | | Newspaper publishers |
| 511120 | | Periodical publishers |
| 511130 | | Book publishers |
| 516110 | Internet publishing and broadcasting | |
| 519110 | | News syndicates |
| 519120 | | Libraries and archive |