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MID-PACIFIC INFORMATION AND COMMUNICATIONS TECHNOLOGIES CENTER
MPICT

2010 ENVIRONMENTAL SCAN

ICT

Information & Communications Technologies

in California

Phase Two: Industry & Employment Outlook

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- Josh Williams and Jaime Barrah with BW Research Partnership designed and conducted the primary research study of California businesses. The research provides data from over 600 businesses, representing a broad array of industries that mirror the California economy, on their use of and opinions about ICT and the ICT Workforce in their organizations.

The Centers of Excellence and MPICT would also like to thank the more than 600 employers across California who took the time to complete the survey. These results have provided critical information about the ICT workforce needs and requirements of both ICT and non-ICT companies. This information is vital for California's community colleges to use as they develop and strengthen training and education programs for all the businesses in California's economy.

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Information and Communications Technologies (ICT) firms in California anticipate 8.5% employment growth over the next two years — despite flat to negative employment growth anticipated by non-ICT firms.

— Centers of Excellence Employer Survey

Executive Summary

The Information and Communications Technologies (ICT) sector encompasses all rapidly emerging, evolving, and converging computer, software, networking, telecommunications, Internet, programming, and information systems technologies. ICT is a comprehensive framework for organizing these inter-related, interdependent and rapidly changing high-tech fields and industries - and the ICT workforce that spans across organizations of all sizes, kinds and industries. The ICT term is widely used outside the U.S., for example, by the United Nations, European Union, World Bank, and International Telecommunications Union.

Studying their economies through the ICT framework has allowed many countries' policymaking, education and investment communities to grasp the size and strategic importance of: 1) ICT as industry and employment sectors; 2) high quality ICT infrastructure; 3) ICT technologies as enablers of efficiency, productivity and rapid advancement and growth for all kinds of organizations and individuals.

In contrast, the United States and California tend to view many ICT industries as separate, and do not typically consider the inter-dependent nature of these fields. Fragmenting ICT research into subsectors has the effect of reducing the visibility of the importance of ICT to U.S., California, regional and local economies. This, in turn, may lead to ICT receiving less attention from policy makers, educational planners and workforce development efforts, which could be contributing to the consistently and rapidly falling U.S. positions in international rankings of ICT infrastructure implementations, adoptions and performance, and in educational system outcomes.

The importance of a comprehensive framework to categorize and classify these strategically interrelated technologies, industries and occupations is particularly important in ICT fields, because of their rapid pace of change and innovation, and because productivity and efficiency improvements of ICT are realized by all kinds of organizations and individuals.

Because the U.S. and California do not use the global ICT framework, the California Community Colleges Center of Excellence Initiative and the Mid-Pacific Information and Communications Technologies (MPICT) Center have partnered on this project to develop a crosswalk from the existing, limited classifications of industries and occupations currently in use to the ICT framework. This crosswalk allows for accurate and relevant collection of ICT economic and labor market information for California. Hundreds of research hours were allocated to the collection and analysis of secondary data, including public and private data sources, and of primary data from a survey of more than 600 employers.

The primary research question asked by this study is "What is the size, growth potential, and strategic importance of ICT in the California economy?" Research was conducted in 3 areas: 1) secondary research on the size, revenue, and growth potential of ICT industries in the U.S. and California; 2) secondary research on the size, growth potential, and median wages of ICT occupations across all industries in the U.S. and California economies; and 3) primary research conducted with employers on employment growth, ICT workforce roles, hiring trends, and education and training needs.

ICT Industries Secondary Research

The ICT sector is a major industry cluster in California, accounting for:

- About 46,000 companies, 4% of all companies (1 in 28 companies), which ranks 12th among California industries by firm counts.
- Almost $172 billion, or 6% of total California private sector revenues (1 in every $17.50 in private sector revenues), which ranks 6th among California industries by revenues.
- About a million California workers, 4% of the total state workforce (1 in 17 jobs), which ranks 12th among California industries by employee counts.
- About $76 billion, or 12% of private sector wages ($1 of every $8.61 in private sector wages), which ranks 2nd among California private industries by total wages paid. Wages per employee about twice the state average.
- Significant job growth approaching 20% for ICT industries from 2006 to 2016, outpacing the nation.
- Higher concentrations of ICT firms and employment in Los Angeles and Silicon Valley/San Francisco Bay regions, as well as Orange and San Diego Counties.

ICT Occupations Secondary Research

The ICT sector is a major occupational cluster in the United States and in California, across all geographies, industries and organization types and sizes, accounting for:

- In the U.S., about 7.6 million workers, 5% of all private sector jobs (1 in 20 jobs) in 2008
- U.S. employment growth of 14% between 2008-2018, representing over one million new positions and 275,000 annual new and replacement jobs.
- In California, about 1 million jobs, 5% of all jobs (1 in 20 jobs) in 2010.
- In California, projections of 12% employment growth, or 130,000 new jobs between 2006 and 2016. This represents 46,000 annual new and replacement jobs in California over the period.
- In California, the median ICT Workforce hourly wage is about twice the median wage for all jobs across the state.
- In California, the 8th largest occupational cluster by job count.

Primary Research Surveys of California Companies

The Centers of Excellence conducted a survey of more than 600 California employers. The data collection employed a stratified sampling plan to ensure a sample of respondents that mirror the California economy. The survey was administered online and by telephone in the spring of 2010. The findings in this section are drawn from the survey responses.

Regarding ICT's Strategic Importance and Employment Growth:

- 88% of California firms providing ICT goods and/or services and 80% of California companies that do not provide ICT goods and/or services either agree or strongly agree that information and communications technologies are important to the productivity of their organizations. ICT is generally more important to the productivity of larger than smaller organizations.
- California companies anticipate 3.8% overall employment growth over the next two years. However, companies providing ICT goods and/or services expect 8.5% employment growth, and those that do not provide ICT goods and/or services expect overall employment to shrink by .4% over the next two years.

To simplify responses, "ICT Workforce" was defined as employees and contractors with more advanced ICT knowledge and skill sets who enable the productivity of "ICT Users" (which includes most employees, customers, suppliers and citizens today). Questions were asked regarding ICT Workforce job roles, because there is such disparity in ICT job titles, and because ICT Workforce roles are so frequently held by people with other workforce roles also.

Regarding simplified categories of ICT workforce roles:

- The following three, broad ICT workforce roles are important or very important (67-71%) to California companies, and were generally more important to tech companies, larger companies and Bay Area companies:
    - Roles supporting ICT end user devices, operating systems and applications, like desktop support, help desk, computer support specialists and computer repair (67% report important or very important).
    - Roles supporting Enterprise-wide and data center ICT systems, like phone, server, data storage, telecommunications and networking systems (67% report important or very important).
    - Roles supporting Internet, Intranet and other online or web based systems and services, such as web design and development, online commerce and webmaster (71% report important or very important).
- Less universally important are the following three broad ICT workforce roles, which were primarily important to companies providing ICT goods and/or services, larger companies and Bay Area companies:
    - ICT management roles, such as system and business process design, vendor selection and management, and ICT strategic planning (58% report important or very important).
    - Hardware and software development roles, including hardware engineer, software engineer and programmer (51% report important or very important).
    - Roles supporting marketing and sales of ICT related products and services (40% report important or very important).
- 85% of companies require at least some employees to fill some of these ICT workforce roles, and for half of the companies at least 25% of employees fill at least some of these described ICT roles.
- 74% of firms either agree or strongly agree that these roles and skill sets will grow in importance for their employees.

Regarding ICT Workforce Employment Growth:

- Overall, 36% of respondents expect to have more people, and only 2% expected fewer, employed in ICT-related job functions in 2 years.
- California companies anticipate 7% overall ICT workforce employment growth over the next two years, significantly higher than the 3.8% overall employment growth estimates.
    - Companies providing ICT goods and/or services expect 11.2% growth in ICT workforce employment in the next two years, compared with overall employment growth expectations of 8.5%.
    - Companies that do not provide ICT goods and/or services expect -.4% overall employment growth, but expect 3.7% growth in ICT workforce employment.

Regarding ICT Workforce Hiring and Recruitment:

- More than 50% of firms report difficulty recruiting employees with appropriate ICT workforce training. This finding is especially significant in light of a saturated general labor pool due to historically high rates of unemployment.
- Overall, more ICT workforce is hired from outside companies than developed and promoted from within them.
- For ICT workforce hiring, technical skills are most important; however, they are very closely followed by interpersonal communications skills, creative problem-solving skills and an ability to work with different groups or departments. It is frequently not enough to just have technical knowledge and skills to be hired as part of most companies' ICT workforce.
- Companies are very roughly about as likely as not to hire temporary employees, consultants and contractor to support ICT needs.

Regarding ICT Workforce Education and Training:

- Firms differ on the level of education that they require for their workforce. Non-ICT and smaller firms are less likely to require a bachelor degree for an ICT workforce role.
- More than half of California companies don't know or have no opinion about whether California community colleges are doing a good job developing the ICT workforce, suggesting an awareness problem. Of those with opinions, many more agree than disagree that California's community colleges are doing a good job in this regard, especially in larger companies.
- Approximately half of all firms and 58% of ICT firms indicated desire for a digital literacy, or ICT end-user knowledge and skills credential. Across geographies, for ICT and non-ICT companies, firms are 2 to 7 times more likely to value than not to value a credential certifying basic ICT user knowledge and skills (digital literacy).

These findings illustrate that by using the ICT framework to collect economic and labor market data, ICT is larger and more strategically important to California than previously realized. Though most people intuitively know that ICT is an important driver of the state's economy, the data indicate that ICT is a top-ten sector for its industries' sales revenue, wages, and employment. ICT is also a top-ten sector for its occupational employment counts and wages paid across most industry sectors in the state. Employers noted the current and growing strategic importance of ICT to the productivity of all types of organizations and the desire for more structure in ICT strategic planning, education, training and workforce development efforts.

California community colleges and other educator audiences should be aware of ICT employment's high job counts, high compensation and rapid anticipated growth rates, in California and the U.S – and the fact that many of those jobs do not require baccalaureate degrees. They should also take note of the large percentage of employers with no opinion about whether California community colleges are doing a good job developing the ICT workforce, and that about half of all firms expressed that they would value a structure aligning ICT job requirements and educational credentials, as well as for a credential certifying ICT User, or digital literacy, competency.

Policy makers and investors throughout California should look to inform and organize their strategic planning around the comprehensive ICT framework and make plans and take actions to strengthen and expand strategic ICT infrastructure, industries, employment and adoption.

Overall, companies are 3 times more likely to value a credential certifying basic ICT User knowledge and skills (digital literacy). Companies with more than 100 employees are 7 times more likely to value digital literacy.

— Centers of Excellence Employer Survey

Introduction

Information and Communications Technologies (ICT)

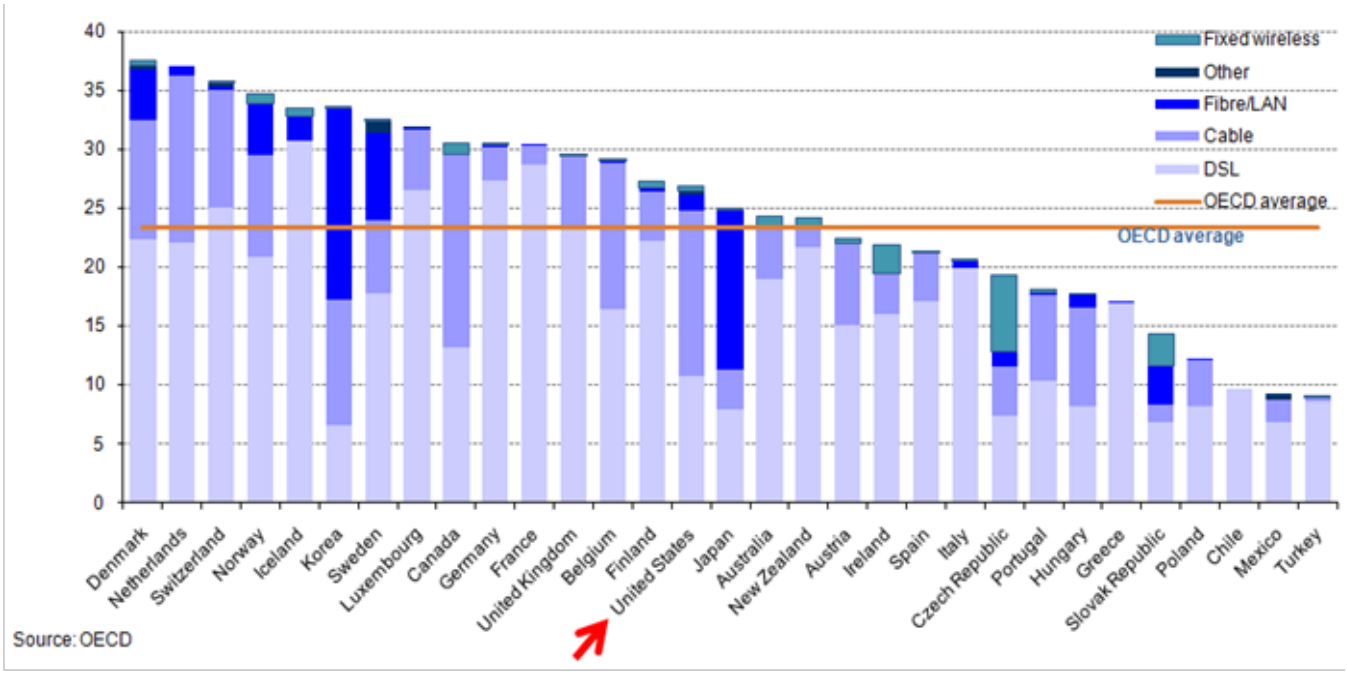
Information and Communications Technologies (ICT) encompasses all rapidly emerging, evolving, and converging computer, software, networking, telecommunications, Internet, programming, and information systems technologies. It is an umbrella term that encompasses many different competing subset terminologies. ICT is a comprehensive framework for organizing these inter-related, interdependent, and rapidly changing high-tech fields - and for organizing the ICT workforce, which spans across organizations of all sizes and in all industries. The ICT framework is widely used outside the U.S., by institutions including the United Nations, European Union, World Bank, and International Telecommunications Union, and others. ICT is recognized in many global economies as a strategically important industry and employment sector that is a major driver of economic growth.

Despite its size and importance, ICT has not received sufficient attention from policy makers and planners in the U.S. Current frameworks for study, developed by federal and state governments, do not consider the convergence of ICT technologies into one cluster that can be researched effectively. This has resulted in fragmented reporting of ICT related information that does not accurately reflect the true breadth and depth of ICT, because it either includes its companies and workers with other sectors, or it reports on smaller components only (such as computers). As a result, industry and occupational research reporting in the U.S. does not draw as much attention to this strategic sector as research reporting abroad, which likely affects U.S. policy and planning.

Global ICT Trends

The U.S. is rapidly losing ground to many international competitors with regard to ICT infrastructure development and user adoption. According to the Organisation of Economic Co-Operation and Development (OECD), the U.S. has fallen to 15th in the world in per-capita broadband subscriptions.[1]

Figure 1: Broadband Subscribers per 100 Inhabitants, December 2009



[1]The Organisation for Economic Co-Operation and Development Broadband Portal, online at: www.oecd.org/dataoecd/21/35/39574709.xls

In a 2010 study by the International Telecommunications Union, the United States was reported to have dropped to 19th in ICT Development in 2008 (from 17th in 2007 and 12th in 2002), behind many European nations, Korea, Japan, Singapore, and New Zealand.[2]

Figure 2: ITU Ranking of Broadband Development

Economy	Rank 2008	IDI	Rank 2007	IDI 2007
Sweden	1	7.85	1	7.27
Luxembourg	2	7.71	6	6.98
Korea (Rep.)	3	7.68	2	7.23
Denmark	4	7.53	3	7.18
Netherlands	5	7.37	5	7.06
Iceland	6	7.23	4	7.06
Switzerland	7	7.19	8	6.83
Japan	8	7.12	7	6.89
Norway	9	7.11	9	6.78
United Kingdom	10	7.07	12	6.70
Hong Kong, China	11	7.04	10	6.78
Finland	12	7.02	11	6.70
Germany	13	6.95	13	6.60
Singapore	14	6.95	15	6.47
Australia	15	6.90	14	6.51
New Zealand	16	6.81	16	6.38
Austria	17	6.72	19	6.25
France	18	6.55	22	6.09
United States	**19**	**6.54**	**17**	**6.33**
Ireland	20	6.52	20	6.14

Source: The International Telecommunications Union, 2010.

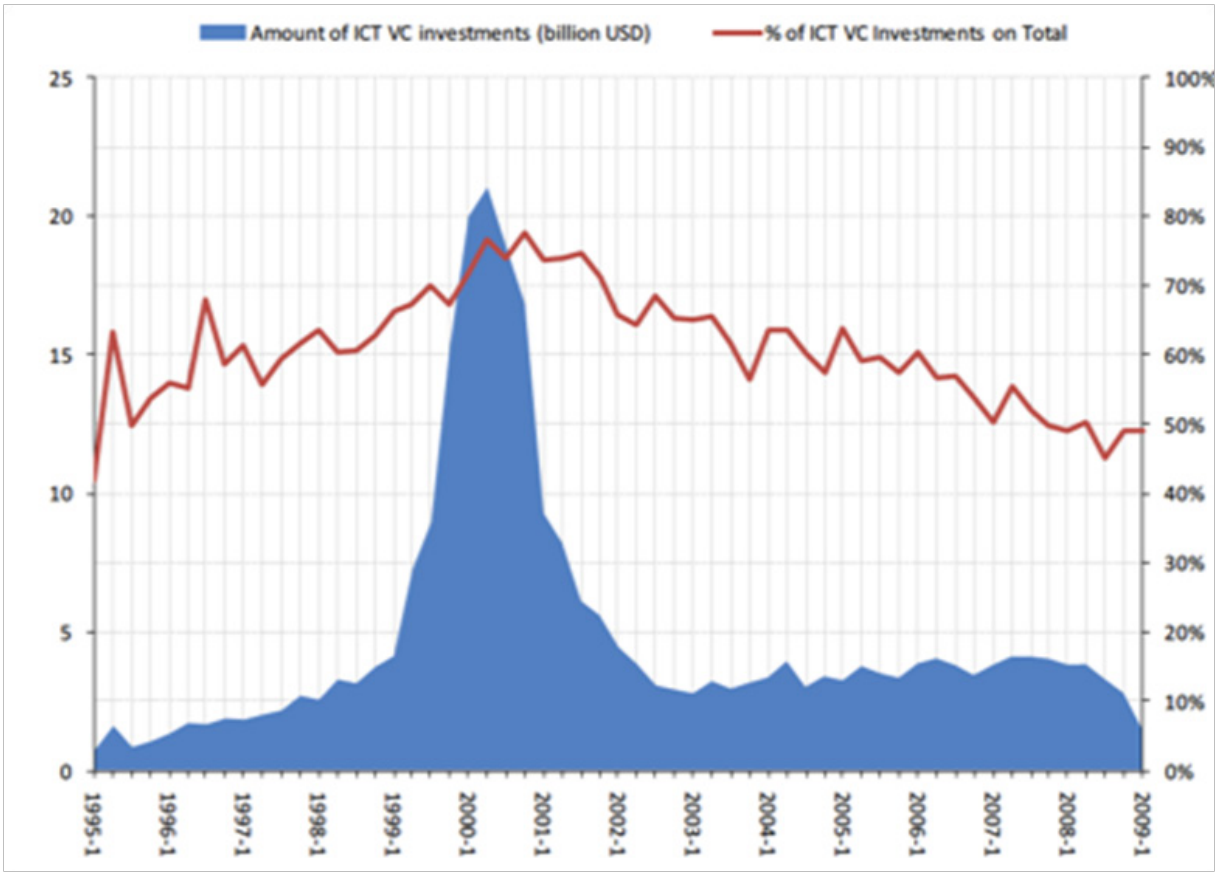
The OECD ranks the U.S. at 25th in the world in median broadband pricing per megabit per second and also ranks the U.S. 23rd in the world in average advertised download speed.[3] (See Appendix C for more detailed rankings.)

Recent data show ICT venture capital in the U.S. have held up moderately well, and the share of ICT in total venture capital remains stable at around 50% (down from over 75% at its peak in the dot-com bubble). However, "US ICT venture capital declined substantially in current terms to around USD 1.5 billion in the first quarter of 2009 from close to USD 3 billion in the last quarter 2008. The current level of ICTs in venture capital investments is almost as low as it was in 1996."[4]

[2]The International Telecommunications Union, "Measuring the Information Society – The ICT Development Index," 2010 Edition.
[3]The Organisation for Economic Co-Operation and Development Broadband Portal, online at: www.oecd.org/dataoecd/22/43/39574979.xls and www.oecd.org/dataoecd/10/53/39/575086.xls.
[4]The Organisation for Economic Co-Operation and Development, "The Impact of the Crisis on ICTs and their Role in the Recovery," August 2009.

According to OECD, these venture capital investments indicate the continuing importance of ICT as a promising source of innovation and growth despite the downturn, and this importance is expected to continue, although with some shifts, particularly towards ICT-intensive clean technologies.[5]

Figure 5: Venture Capital Investments (ITU)



The global community has also surpassed the United States in its ability to understand and respond to changes in the ICT workforce. For example, Australia and New Zealand have been collaborating for several years to classify ICT occupations in each country appropriately. This approach, led by the Australian Bureau of Labor Statistics, has created new standard occupational classifications for ANZSCO, the official workforce reporting mechanism of Australia and New Zealand and the equivalent to our Bureau of Labor Statistics.[6] Armed with these classifications, other nations and their investment communities are able to quantify their ICT industries and workforce to a degree of accuracy not available in the United States.

Recognizing their size and strategic importance, these nations focus policy making attention and educational system efforts to improve ICT infrastructure, industry performance, and workforce knowledge and skills.

This study explores the size and strategic importance of Information and Communications Technologies (ICT) industries, employment and implementations to the California economy.

[5]The Organisation for Economic Co-Operation and Development, "The Impact of the Crisis on ICTs and their Role in the Recovery," August 2009.

[6] Hunter, David. "The Classification of ICT Occupations: The Approach Proposed for the Australian and New Zealand Standard Classification of Occupations (ANZSCO)," Australian Bureau of Statistics, 2004.

Research Methodology

The California Community Colleges System has charged its Economic and Workforce Development (EWD) Network to identify industries and occupations with unmet employee development needs and introduce partnering potential for the college's programs. In September 2009, the California Community Colleges' Center of Excellence initiative produced a Phase One overview report of the sector and how it is organized.

The Centers of Excellence (COE) (Appendix A) have partnered with the Mid-Pacific Information and Communications Technologies Center (MPICT) (Appendix B) on this Phase Two study that is focused on quantifying the size and scope of ICT in California across industries and firms in the state by collecting primary and secondary data from employers.

There are two major components of this research study. The first is secondary research and analysis mapping existing industry and employment data to the global ICT framework. The second is primary research on California companies' use of and opinions about ICT in their organizations.[7]

Secondary Research

Despite limitations of available industry and occupational data currently collected in the United States, general trends and patterns become evident upon their review. For this report, MPICT and COE have analyzed secondary data from the California Employment Development Department Labor Market Information Division (EDD), Economic Modeling Specialists, Inc. (EMSI), the Bureau of Labor Statistics (BLS), the U.S. Census Bureau, and InfoUSA.

Industry and Occupational Crosswalks

Classification systems allow for standardization of data. However, as previously noted, neither the United States nor California have organized or aggregated industry or job classification data to the global ICT framework. As a result, decision-makers studying this data do not easily recognize the size or importance of ICT in the U.S. or California economies. This report provides a crosswalk from existing U.S. industry NAICS and employment SOC codes to the ICT framework, providing an opportunity to scope the size and importance of ICT industries and occupations in the California economy.

The first step in developing a crosswalk to the ICT framework was to identify all of the potential industries (using existing NAICS codes) that are related to ICT. The next step was to further delineate the industry list into two categories to differentiate those that are only partially ICT related. The first category, labeled "Primary Industries," includes those industries where 100% of the firms are presumed to be directly involved with producing ICT goods or services. The second category, "Secondary Industries," includes those where some percentage of the companies is ICT related, but because of the classification scheme, it is impossible to determine the percentage directly related to ICT.

This process was repeated for occupations (using existing SOC codes), again attempting to delineate occupational codes in which every worker is engaged in ICT functions ("Primary Occupations") and those where only some portion of the workers work in ICT ("Secondary Occupations").

These initial crosswalk drafts were then reviewed by an advisory group comprised of experts from industry, academia, nonprofit organizations, and government. This group includes human resource professionals, labor market analysts, college administrators and faculty, and small business owners. This validation process resulted in the Industry and Occupational Crosswalks included in Appendices D and E.

These sets of NAICS and SOC codes were then used to query existing U.S. and California industry and employment databases. The results of those queries are summarized by NAICS code in Appendix F and by SOC code in Appendix G. Because it is not possible to know how much of secondary NAICS industries and secondary SOC occupations are attributable to ICT, a conservative estimate of 25% of secondary

[7] A detailed description of the research methodology utilized in this report in included in Appendix I.

industries and occupations are added to primary industry and occupation findings to arrive at total or "Combined" estimates. This conservative estimate was also validated with the industry advisory group.

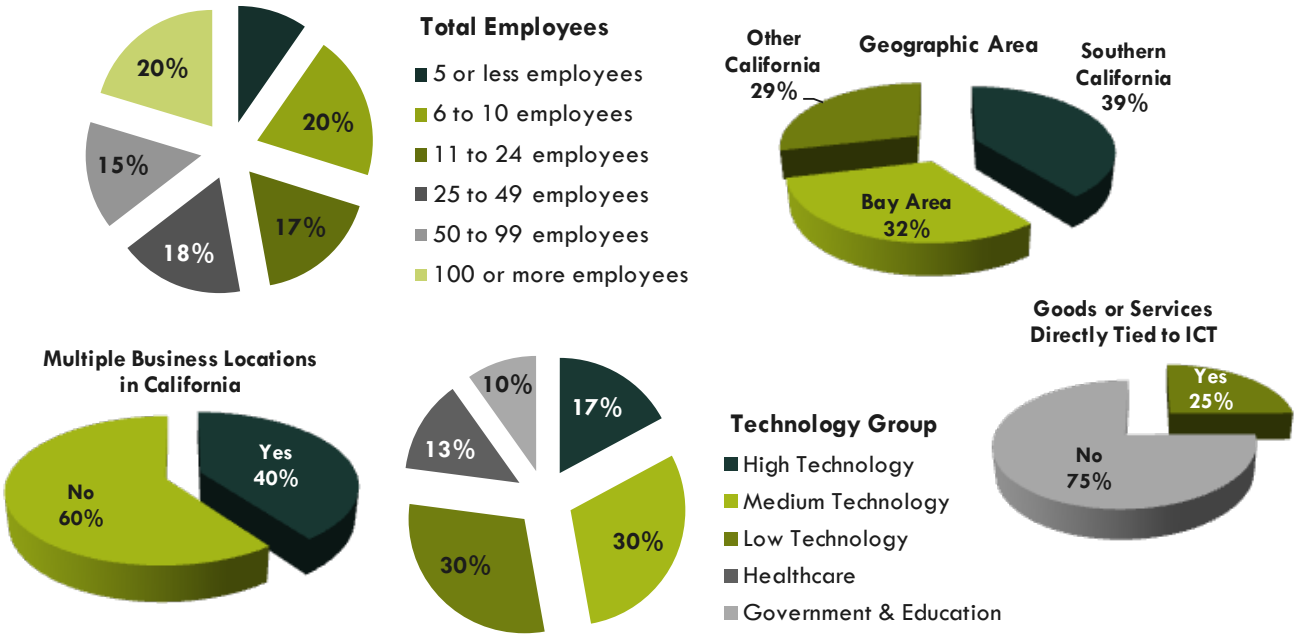
Primary Research

The Centers of Excellence conducted mixed-method data collection from over 600 California companies. The mixed-method data collection was comprised of both an online survey (312 completes) followed by a telephone survey (290 completes) of employers. The data collection employed a stratified and clustered sampling plan to ensure a diverse and representative universe of respondents from different sized employers as well as employers from a broad array of industries that mirror the California economy. Of the firms surveyed:

- 24% reported that they provide goods and services directly tied to ICT, and 71% do not.
- 40% are from Southern California, 32% from the Bay Area and 29% from other areas in California.
- 60% have only one business location in California, and 40% have multiple locations.
- 29% have 10 or fewer employees, 34% have 11-49 employees, 15% have 50-99 employees, and 20% have 100+ employees.
- Subgroupings of responses were also created for: high technology companies, medium technology companies, low technology companies, healthcare organizations, and government and education organizations.

The survey is large enough to be statistically significant, and it is diverse enough to represent ICT and non-ICT companies, the geographic diversity of California, single and multi-location companies and various company sizes.

Figure 6: Survey Response Demographics



Survey responses are included in Appendix J.

ICT Industry Overview

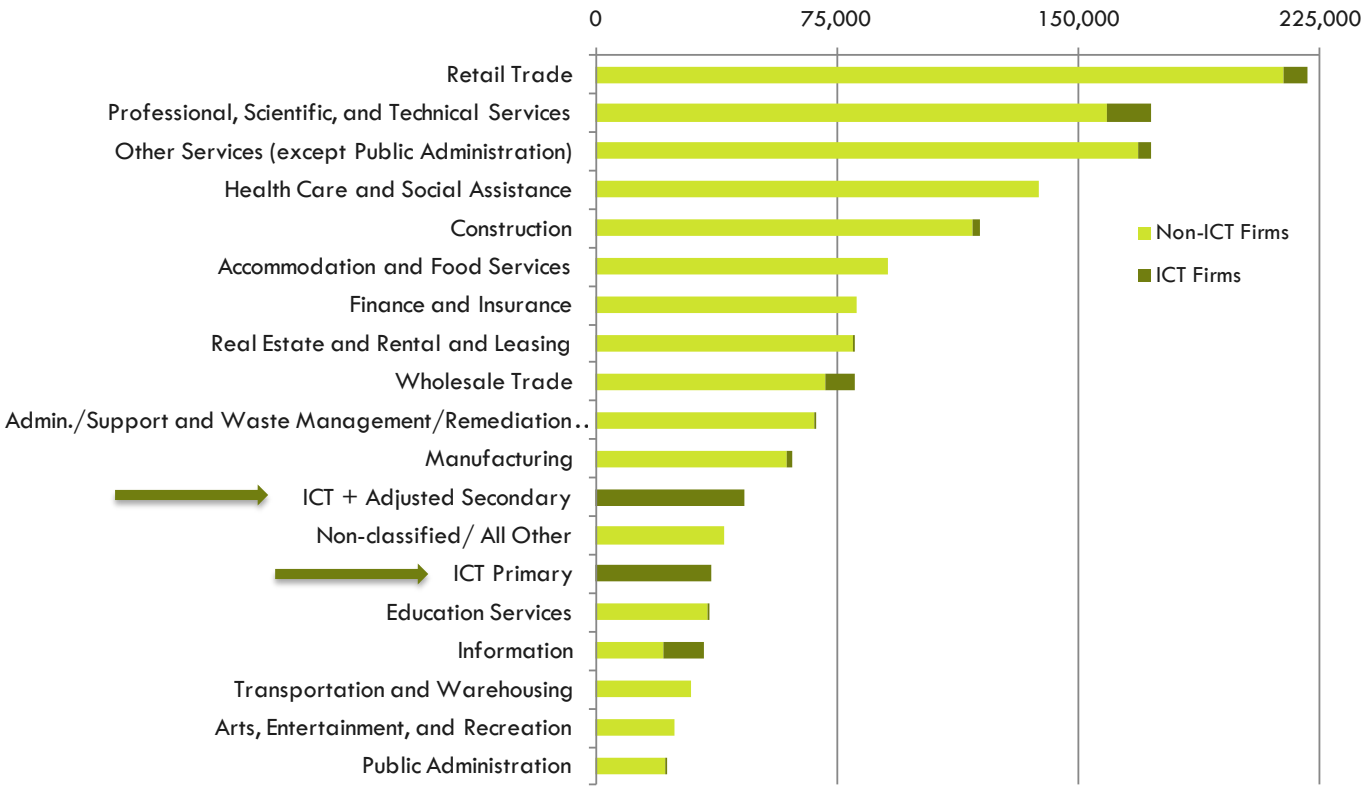
The ICT industry sector in California is significant. ICT represents a large number of businesses, a considerable percentage of relatively high private sector wages, substantial sales revenue, and is a vital sector for employment in the state with strong anticipated growth.[8]

ICT Firms in California

According to the California Employment Development Department (EDD) data, Primary ICT Industries represent approximately 34,000 companies, or 3% of all companies in California.[9] Secondary ICT industries represent at least 46,000 additional companies in the state. Because this report conservatively allocates only 25% of secondary firms to ICT, the total estimated aggregate of ICT firms in California is about 46,000, or about one in every 28 companies in California.[10]

Comparing the data with other industries in California illustrates the importance of ICT to the state's economic development. Primary ICT companies rank 13th and Combined Primary plus 25% of Secondary ranks 12th among California industries by firm counts.[11]

Figure 8: Industry Rankings



*not including industries with less than 10,000 firms

Source: InfoUSA, 2008. See Appendix F for detailed information.

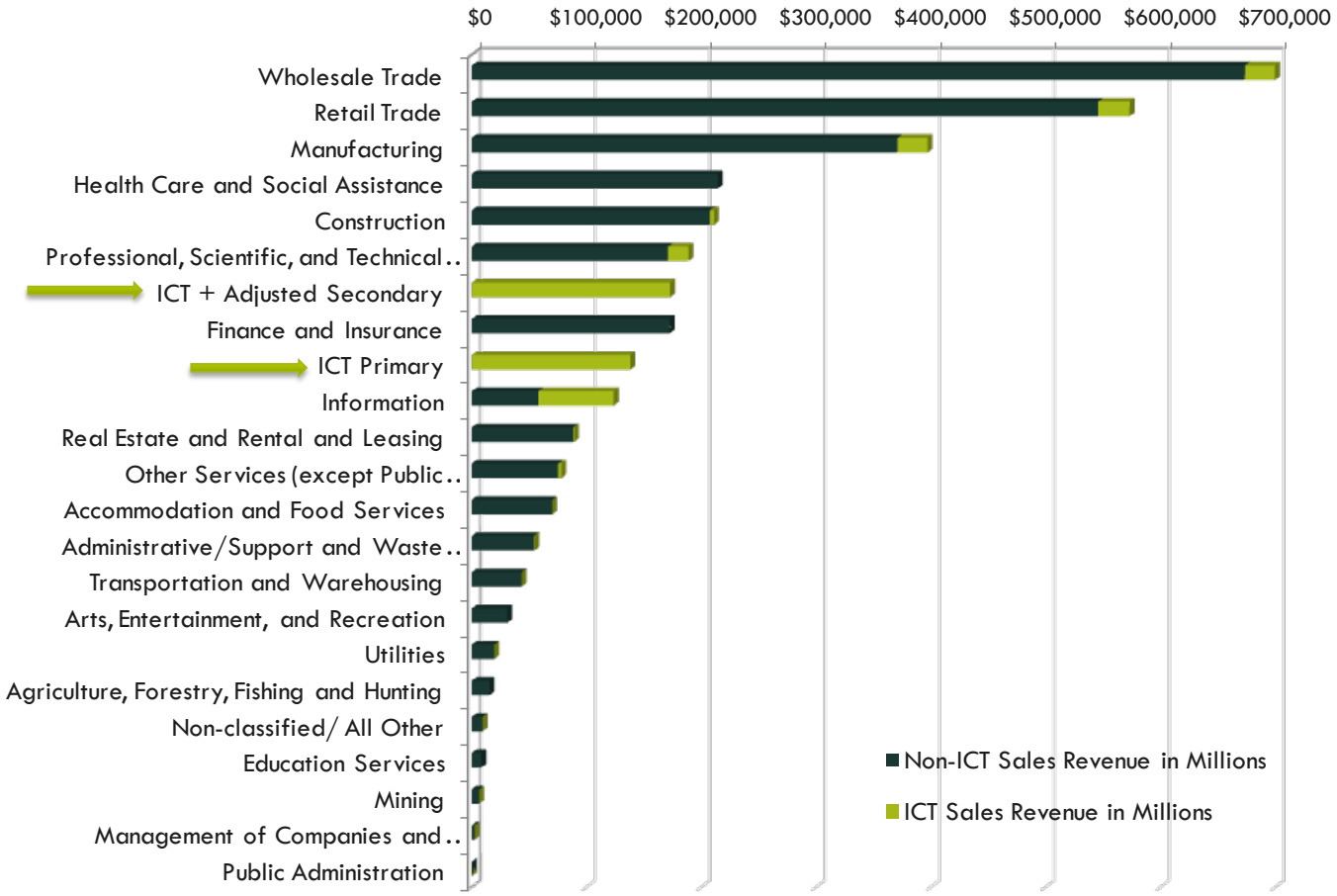
[8]Please refer to Appendix F for complete data sets and analysis for ICT industries.
[9]This contrasts with 24% of firms surveyed in the primary research that self-identified as ICT firms.
[10]California Employment Development Department, Labor Market Information Division, online at www.labormarketinfo.edd.ca.gov.
[11]InfoUSA, 2008; see Appendix F.

These data can be compared to traditional research reporting for a category called "Information," which includes many ICT firms, but also includes print, standard broadcasting, and other non-ICT firms. As illustrated in Figure 8 above, though ICT makes up a large percentage of "Information" companies, ICT is a larger and more relevant category of firm counts than Information alone. (Dark green shading indicates ICT companies included in business counts).

ICT Industry Sales Revenue

According to InfoUSA data, Primary ICT industries reported nearly $138 billion in Sales Revenue in 2008, or about 5% of roughly $3 trillion in total California revenue. Secondary ICT firms added $139 billion, another 5%. Again employing a 25% factor for Secondary firms, the aggregate estimated sales revenue for ICT in California is nearly $173 Billion, about 6% of the total sales revenue in the state. Using this report's consolidated approach, ICT roughly ties as the sixth largest industry sector in the state by sales revenue (with Professional, Scientific, and Technical Services).[12]

Figure 9: Industry Rankings by Sales Revenue



Source: InfoUSA, 2008. See Appendix F for detailed information. Numbers in millions of Dollars

Figure 9 shows that by sales revenue, adjusted ICT is also about 40% larger than the Information industry (the traditional category closest to ICT).[13]

[12] Id.
[13] Id.

ICT Industry Employment

According to California EDD data, Primary ICT firms employed over 596,000 workers in 2008, Secondary ICT firms employ over 550,000 workers, and combined total employment of California ICT industries is 734,700, or 1 in 26 jobs. Industry employment figures include many occupations and are not limited to those that require ICT skills.

EMSI reports even more robust hiring in ICT fields, reporting 2010 employment in Primary ICT occupations at over 632,500 positions and over 1,680,500 positions in Secondary occupations for an estimated aggregate of approximately 1,052,625 workers. EMSI reports an expected growth to 1,183,380 (720,831 primary occupations), with over 46,600 new and replacement jobs annually through 2016.

Figure 10: ICT Industry Employment

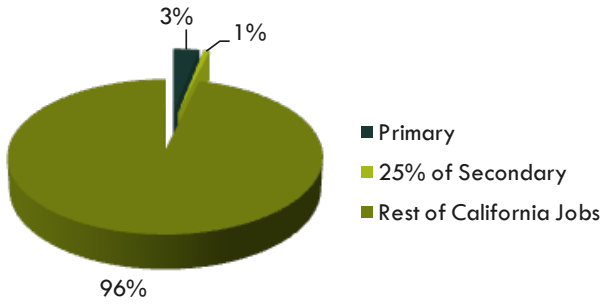
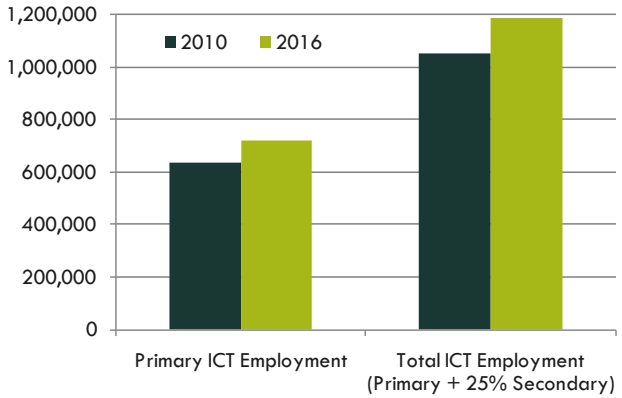
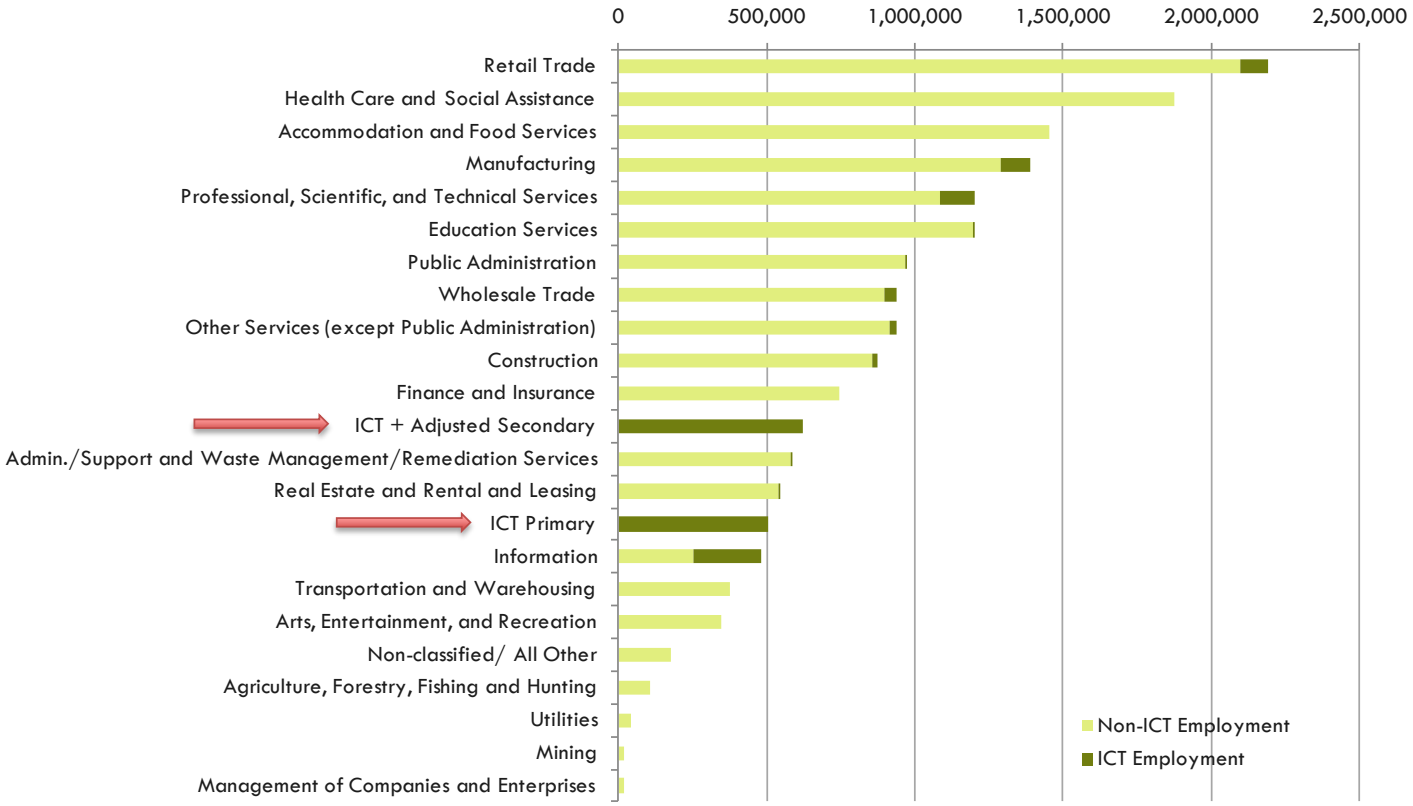


Figure 11: ICT Employment (EMSI)



Combined ICT industry ranks 12th in the state by 2008 numbers of employees.

Figure 12: Industry Employment Ranking



ICT Industry Wages

According to EDD, Primary ICT firms paid over $65 billion, Secondary ICT firms paid nearly $45 billion, and "combined" California ICT industries paid more than $76 billion in wages in 2008. That is about 12% of all private sector wages paid in California, or $1 out of every $8.61 spent on private sector wages. Wages per employee are about twice the state average wage.

Combined ICT wages paid are the third largest cluster in the state according to EDD data, behind Manufacturing and Professional, Scientific, and Technical Services. When the ICT data is removed from those categories, however, ICT jumps to the second position according to industry wages paid.

Figure: 13: ICT Industry % of California Wages

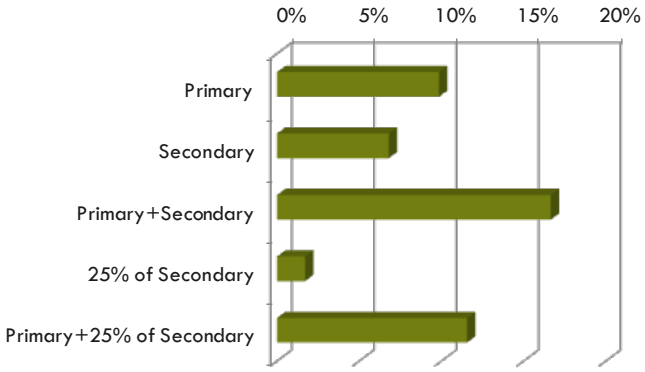
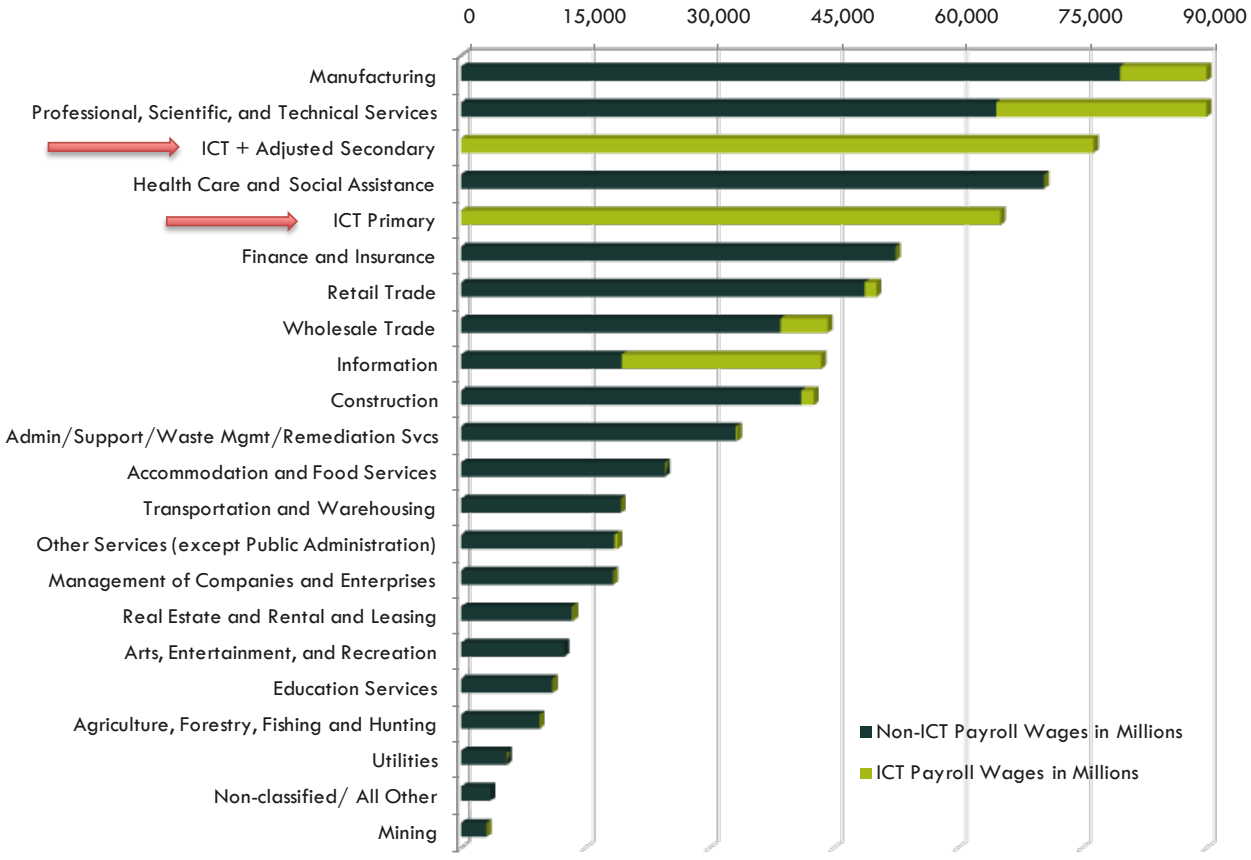


Figure 14: Industry Ranking of California Wages



ICT firms can be found in most of California; however, there are several regions with heavy concentrations of ICT firms and employment. Specifically, Los Angeles and the Silicon Valley/San Francisco Bay region, as well as Orange and San Diego Counties, have higher concentrations of ICT firms, employees, and sales than other regions. Figures 15 and 16 below illustrate the regional distribution of Primary ICT industry firms and employees.[14]

[14]InfoUSA, 2008.

Figure 15: Primary ICT Industry Firm Concentrations

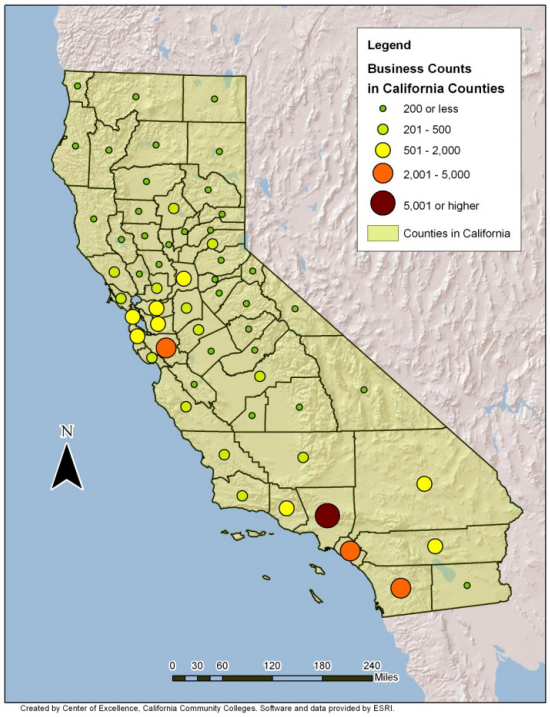
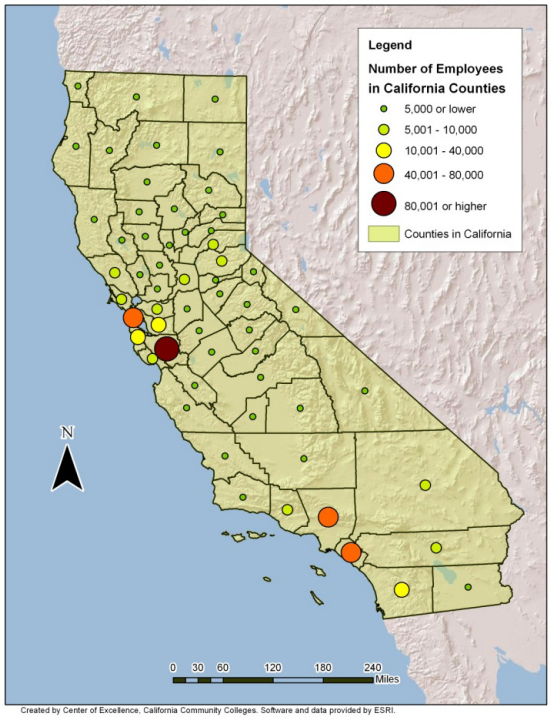


Figure 16: Primary ICT Industry Employee Concentrations

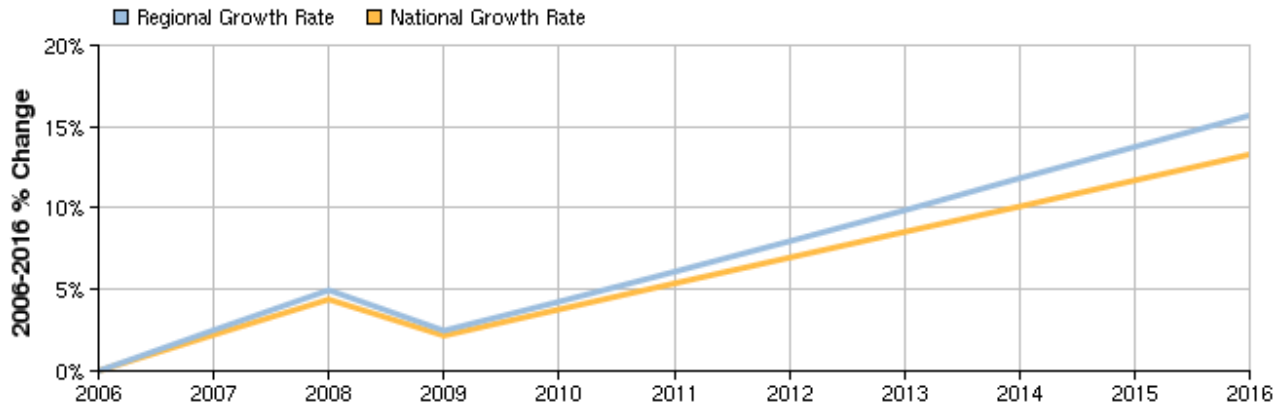


ICT Industry Employment Growth

EMSI 2006-2016 estimates show that both primary and secondary ICT industries provide ample, high paying jobs in the state, ICT job growth is expected to be strong, and California's ICT industry and job growth is outpacing the nation. Job growth is expected to be 19% for primary and 21% for secondary ICT industries between 2006 and 2016. California employment growth is expected to outpace national averages of 15% for primary and 17% for secondary ICT industries, and California earning per ICT industry worker exceed the national average by 27% for primary ICT occupations and by 17% for secondary ICT occupations.

Strong job growth of 20% is expected for Combined ICT industry employment over the 10 year period ending 2016, outpacing the expected national growth rate of 15% for employment in these industries. California earnings per combined ICT worker exceed the national average by 25%.

Figure 17: Primary ICT Industry Job Growth

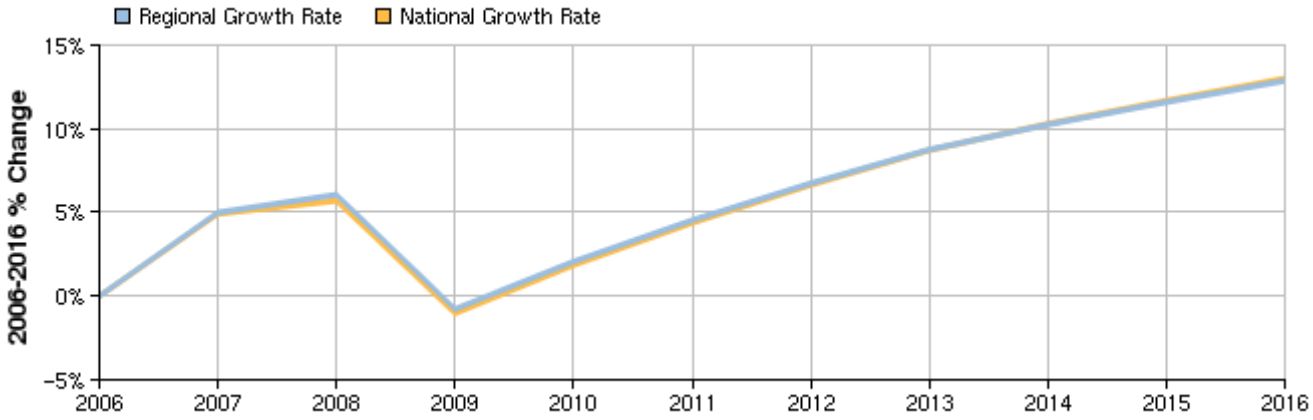


Primary ICT Industries Job Change Summary

Primary ICT	2006 Jobs	2016 Jobs	Change	% Change	Current EPW	2008 Establishments
Regional Total	649,223	774,510	125,287	19%	$116,090	36,831
National Total	4,400,647	5,068,545	667,898	15%	$91,344	324,061

Source: EMSI Complete Employment - 1st Quarter 2010; EPW – Earnings per Worker

Figure 18: Secondary ICT Industry Job Growth



Secondary ICT Industries Job Change Summary

Secondary ICT	2006 Jobs	2016 Jobs	Change	% Change	Current EPW	2008 Establishments
Regional Total	718,573	869,374	150,801	21%	$86,224	50,619
National Total	4,661,373	5,434,900	773,527	17%	$73,631	344,938

Source: EMSI Complete Employment - 1st Quarter 2010

Combined ICT Industry Job Growth

Combined ICT	2006 Jobs	2016 Jobs	Change	% Change	Current EPW	2008 Establishments
Regional Total	828,866	991,854	162,987	20%	$109,617	49,486
National Total	5,565,990	6,427,270	861,280	15%	$87,635	410,296

Source: EMSI Complete Employment - 1st Quarter 2010

ICT Occupational Overview

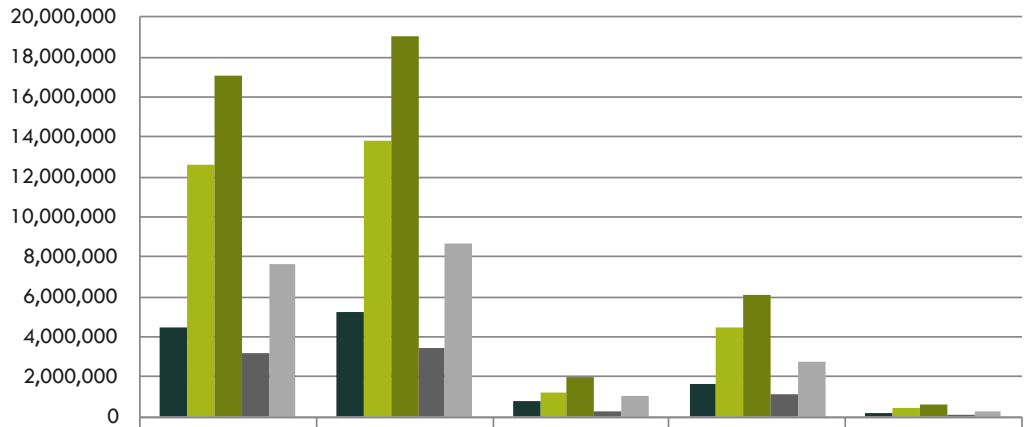
ICT industries are clearly a major driver of the California economy, representing a significant percentage of its businesses, revenue, employment, and total wages. However, because literature suggests that as much as 80% of ICT employment occurs outside of ICT industries, data on ICT firms only show one dimension of ICT's impacts on California's economy and workforce.[15]

In the 21st century, most companies rely on ICT in their day-to-day operations. Therefore, it is not surprising that the majority of ICT employment occurs in non-ICT firms, nor that ICT workers represent a significant piece of California's (and the United States') labor market. Unlike the occupational figures presented in the industry overview, the data presented in this section are not specific to any given industries, but focus only on those workers that work directly with Information and Communications Technologies.

National Employment Statistics

Bureau of Labor Statistics ("BLS") data indicate that there were about 4.5 million workers in Primary ICT occupations (3% of all jobs) and 12.6 million workers in Secondary ICT occupations (8% of all jobs) in the U.S. in 2008. Estimated aggregate U.S. ICT employment—again attributing 25% of Secondary ICT occupations to the total—was 7.6 million ICT workers in 2008 (5% of all jobs). ICT occupations are expected to grow by 1,067,100 jobs across the country, representing nearly 14% growth and 275,000 annual new and replacement jobs from 2008 to 2018. These impressive statistics are especially relevant because California expects to benefit from a disproportional share of this growth.[16]

Figure 19: National ICT Occupations Employment



	2008 Estimated Employment	2018 Estimated Employment	2008-2018 Numeric Change	2008-2018 New & Repl. Jobs	2008-2018 Annual New & Repl. Jobs
Primary	4,484,000	5,255,400	771,600	1,621,200	162,120
Secondary	12,596,000	13,778,400	1,182,300	4,483,700	448,370
Primary + Secondary	17,080,000	19,033,800	1,953,900	6,104,900	610,490
25% of Secondary	3,149,000	3,444,600	295,575	1,120,925	112,093
Primary + 25% of Secondary	7,633,000	8,700,000	1,067,175	2,742,125	274,213

Source: Bureau of Labor Statistics, 2008-2018 estimates.

[15] "Occupational Overview," *Information and Communications Technologies: Phase One Report*, Centers of Excellence, September 2009 (p. 10); online at www.coeccc.net.
[16] Economic Modeling Specialists, Inc. (EMSI) Complete Employment, 1st Quarter 2010.

California Employment Statistics

According to the California EDD data, there were 546,700 Primary ICT workers (3% of all workers) and 1,417,900 Secondary ICT workers (8% of all workers) in the state in 2006, yielding an estimated aggregate of over 900,000 ICT workers in California (5% of the total workforce). EDD data show this number swelling to 1,088,000 from 2006 to 2016. This nearly 21% growth does not include the replacement of existing workers. EDD data therefore project a need for over 40,200 new and replacement workers each year in combined ICT occupations throughout the state.

Figure 20: California ICT Occupations % of Occupational Employment

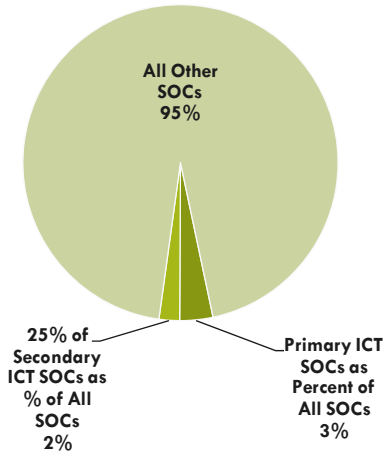
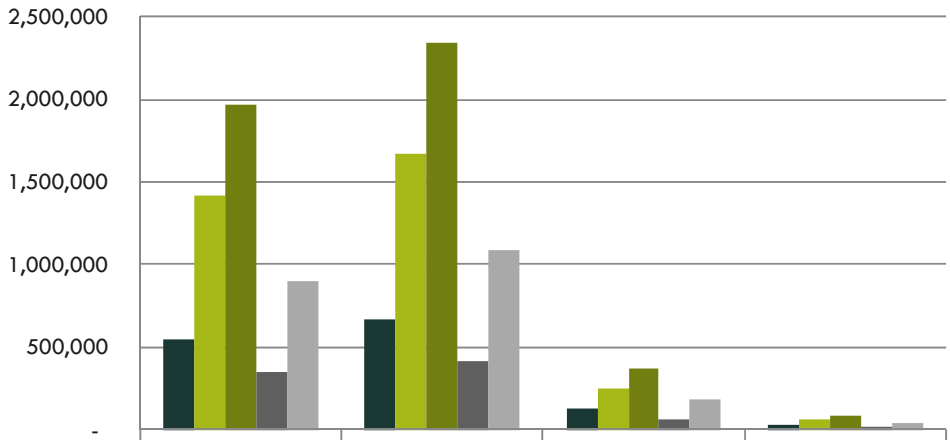


Figure 21: California EDD ICT Occupations Information

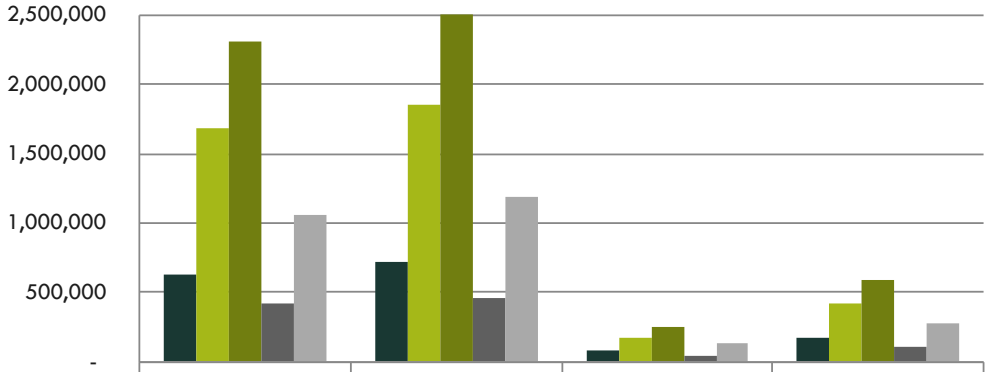


	Estimated 2006 Employment	Estimated 2016 Employment	2006-2016 Numeric Change	Annual New and Repl. Jobs
Primary	546,700	671,700	125,000	24,960
Secondary	1,417,900	1,665,200	247,300	61,080
Primary + Secondary	1,964,600	2,336,900	372,300	86,040
25% of Secondary	354,475	416,300	61,825	15,270
Primary + 25% of Secondary	901,175	1,088,000	186,825	40,230

Source for Figures 20 and 21: California EDD Labor Market Information Division

EMSI data shows even more robust hiring in ICT fields, reporting 2010 employment in Primary ICT occupations at over 632,500 positions (3% of all jobs) and over 1,680,500 positions in Secondary occupations (8% of all jobs) for an estimated aggregate of approximately 1,052,625 workers (5% of all jobs) in California. EMSI data show an expected growth to 1,183,380 (720,831 primary occupations), with over 46,600 new and replacement jobs annually through 2016.

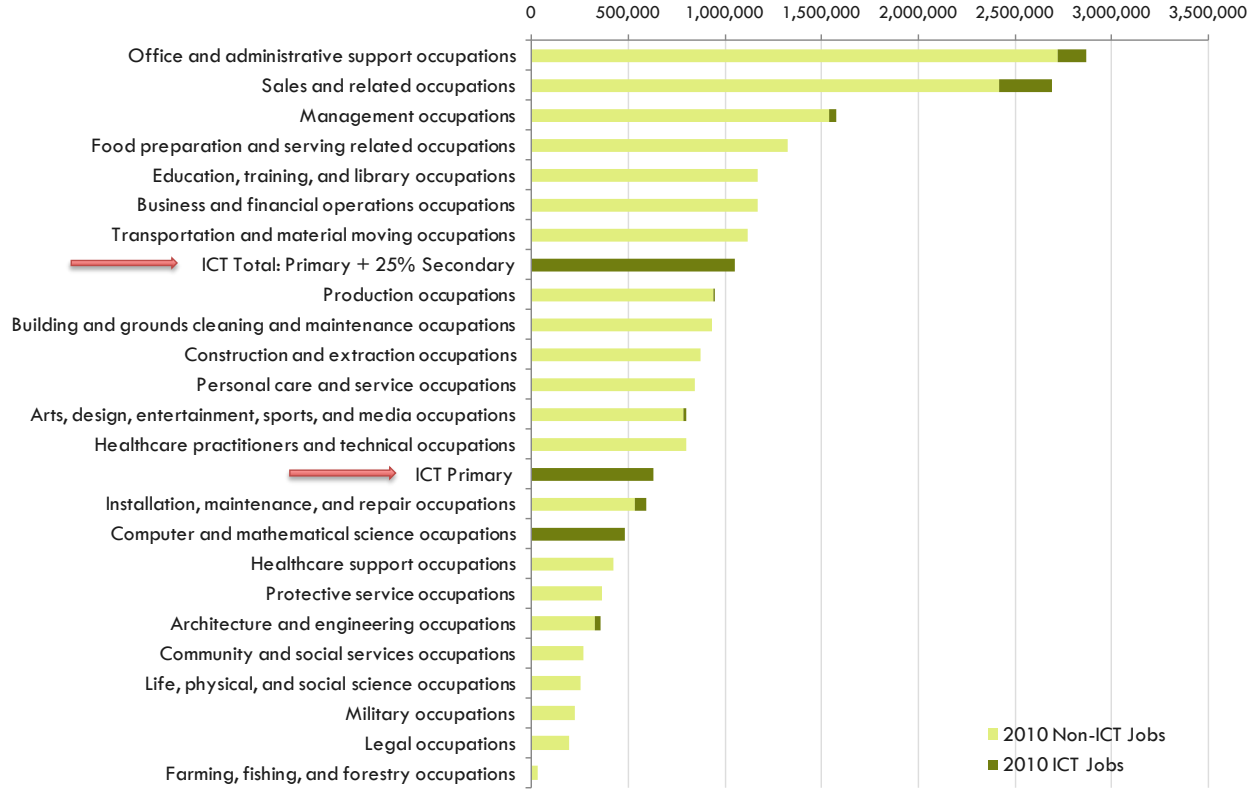
Figure 22: California EMSI ICT Occupations Estimates



	Estimated 2010 Employment	Estimated 2016 Employment	2010-2016 Numeric Change	Annual New and Repl. Jobs
Primary	632,508	720,831	88,323	174,710
Secondary	1,680,562	1,850,194	169,632	419,770
Primary + Secondary	2,313,070	2,571,025	257,955	594,480
25% of Secondary	420,141	462,549	42,408	104,943
Primary + 25% of Secondary	1,052,649	1,183,380	130,731	279,653

Traditional U.S. research focuses on "Computer and Mathematical Science Occupations" as a job cluster like ICT, but as Figure 23 illustrates below, ICT occupations represent double that employment. That means there are more workers in ICT related occupations outside that traditional category than within it. In fact, ICT occupations rank 8th in the state by 2010 employment, where Computer and Mathematical occupations rank 15th (if there is no ICT category).

Figure 23: California EMSI Occupation Cluster Rankings

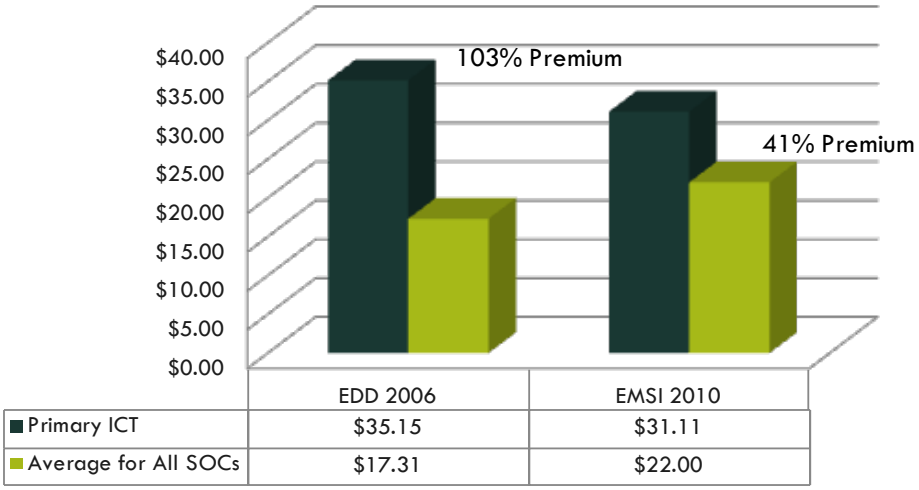


Source: EMSI Complete Employment 2010. See Appendix G for detailed information.

California ICT Occupation Wages

Primary ICT 2006 median hourly wages are estimated at $35.15 using California EDD data, more than twice the median of $17.31 for all occupations in the State. EMSI data show Primary ICT median hourly wages in 2010 at $31.11, 41% higher than the $22 per hour median for all jobs in the State.

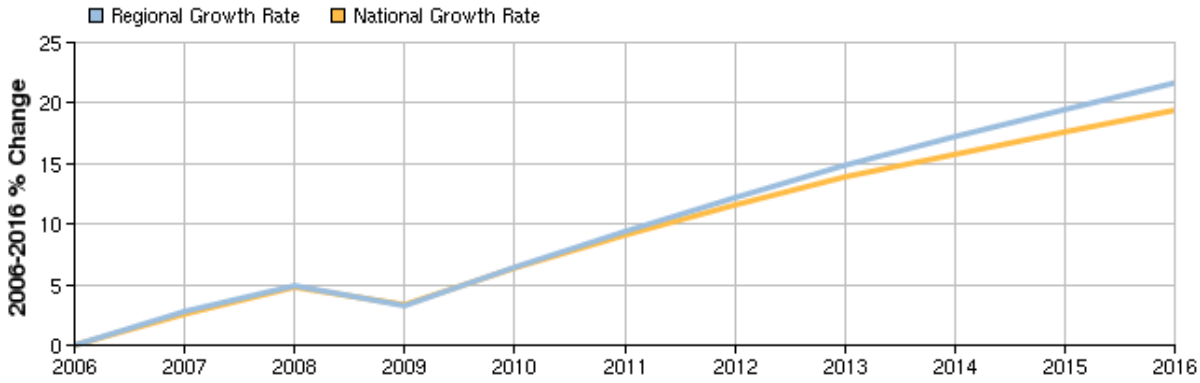
Figure 24: California ICT Occupation Median Wages



California ICT Occupation Job Growth

EMSI data projections illustrate that between 2006 and 2016, California will add more than 95,000 ICT Primary ICT Occupation jobs (of 233,722 ICT job openings that include replacements), a net 16% increase. EMSI data predict a similar 15% net increase in Primary ICT Occupation jobs nationally, yielding an increase of 680,000 jobs and 1.8 million new and replacement jobs.

Figure 25: Primary ICT Occupation Job Growth



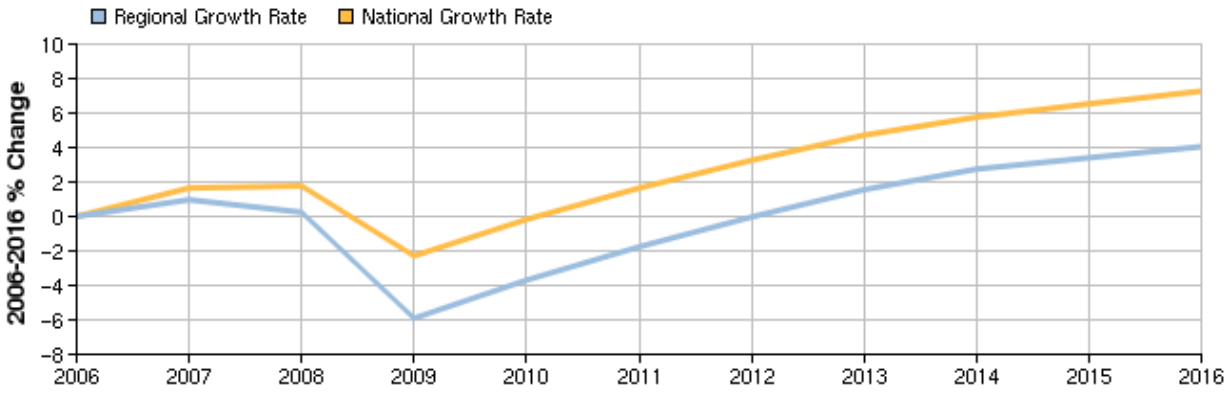
Primary ICT Occupational Job Change Summary

Primary ICT	2006 Jobs	2016 Jobs	Change	% Change	Openings	Median Hourly Earnings
Regional Total	608,898	704,852	95,954	16%	233,722	$35.61
National Total	4,585,679	5,265,263	679,584	15%	1,804,896	$31.44

Source: EMSI Complete Employment - 1st Quarter 2010

EMSI figures show that between 2006 and 2016, California will add a net 68,000 ICT Secondary ICT Occupation jobs of 610,000 new and replacement jobs, a net 4% increase. EMSI data further illustrate 7% net increase in Secondary ICT Occupation jobs nationally, a net increase of more than a million jobs through 5.5 million total job openings when replacement positions are included.

Figure 26: Secondary ICT Occupation Job Growth



Secondary ICT Occupational Job Change Summary

Secondary ICT	2006 Jobs	2016 Jobs	Change	% Change	Openings	Median Hourly Earnings
Regional Total	1,693,527	1,762,113	68,586	4%	610,042	$17.91
National Total	14,238,999	15,274,638	1,035,639	7%	5,541,138	$15.50

Source: EMSI Complete Employment - 1st Quarter 2010

For combined Primary plus 25% of Secondary ICT Occupations, EMSI data show that between 2006 and 2016, California will add a net 113K ICT Occupation jobs through 386K job openings, a net 11% increase. EMSI data predict a similar 12% net increase in Combined ICT Occupation jobs nationally, a net increase of more than 938K jobs through 3.1 million job openings.

Combined ICT Occupational Job Change Summary

Combined ICT	2006 Jobs	2016 Jobs	Change	% Change	Openings	Median Hourly Earnings
Regional Total	1,032,280	1,145,380	113,101	11%	386,233	$28.35
National Total	8,145,429	9,083,923	938,494	12%	3,190,181	$24.47

Source: EMSI Complete Employment - 1st Quarter 2010

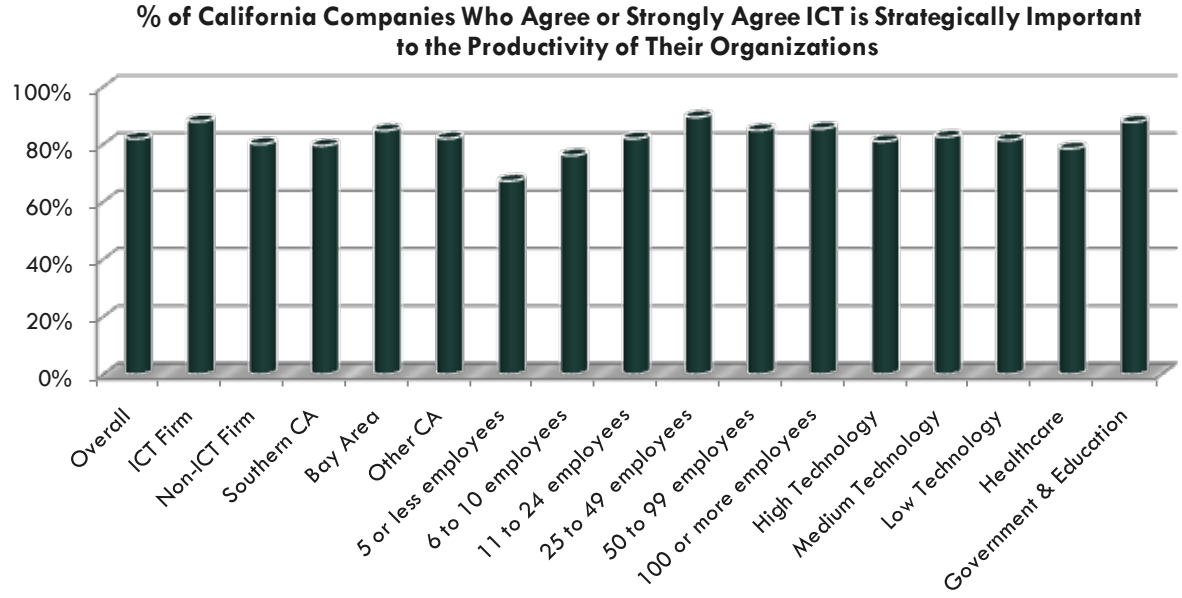
Primary Research on Employer Needs and Challenges

The more than 600 employers surveyed by the Centers of Excellence provided detailed feedback regarding their preferences, difficulties, requirements, and attitudes about ICT in the workplace. For purposes of this study, respondents were asked to consider as their "ICT Workforce" only their employees who have more advanced ICT knowledge and skills. These "ICT Enablers," enable and support "ICT users," which comprise most employees in many organizations today.

Strategic Importance of ICT

Employers were asked about the strategic importance of ICT to the productivity of their organizations. Approximately 80% of firms either agree or strongly agree that information and communications technologies are important to the productivity of their organizations. ICT is generally more important to larger than smaller firms in the productivity of their organizations.

Figure 27: Strategic Importance of ICT

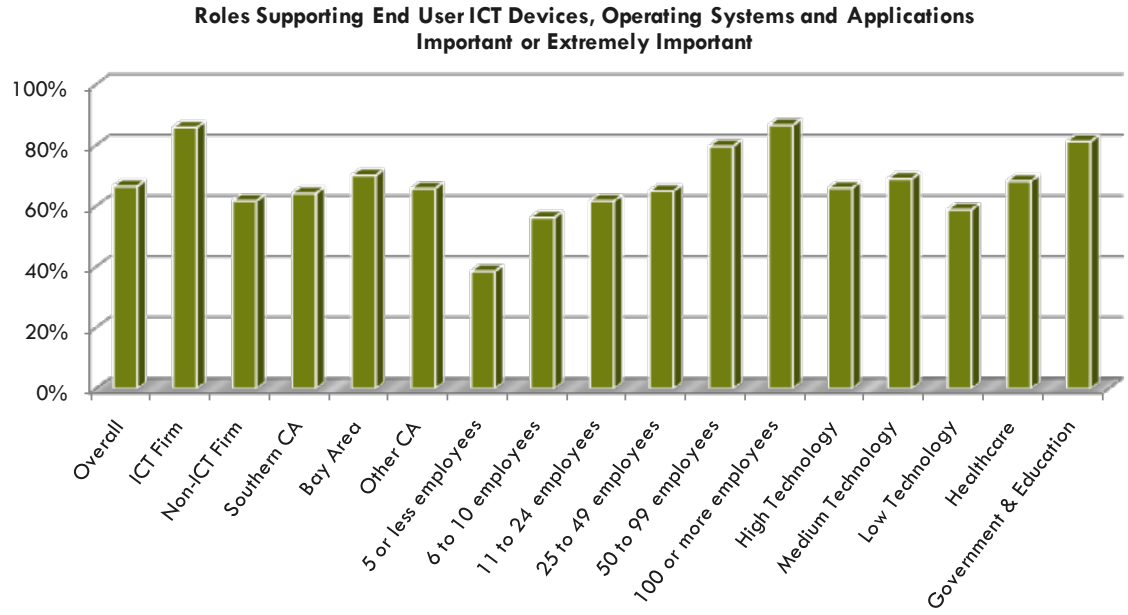


Current ICT Workforce Skills Demand

Employers were asked about the ICT skills required by their "ICT Workforce," those with specialized ICT knowledge and skills beyond typical "ICT Users," those who enable and support ICT Users. To simplify responses, ICT workforce roles were consolidated into the following number categories:

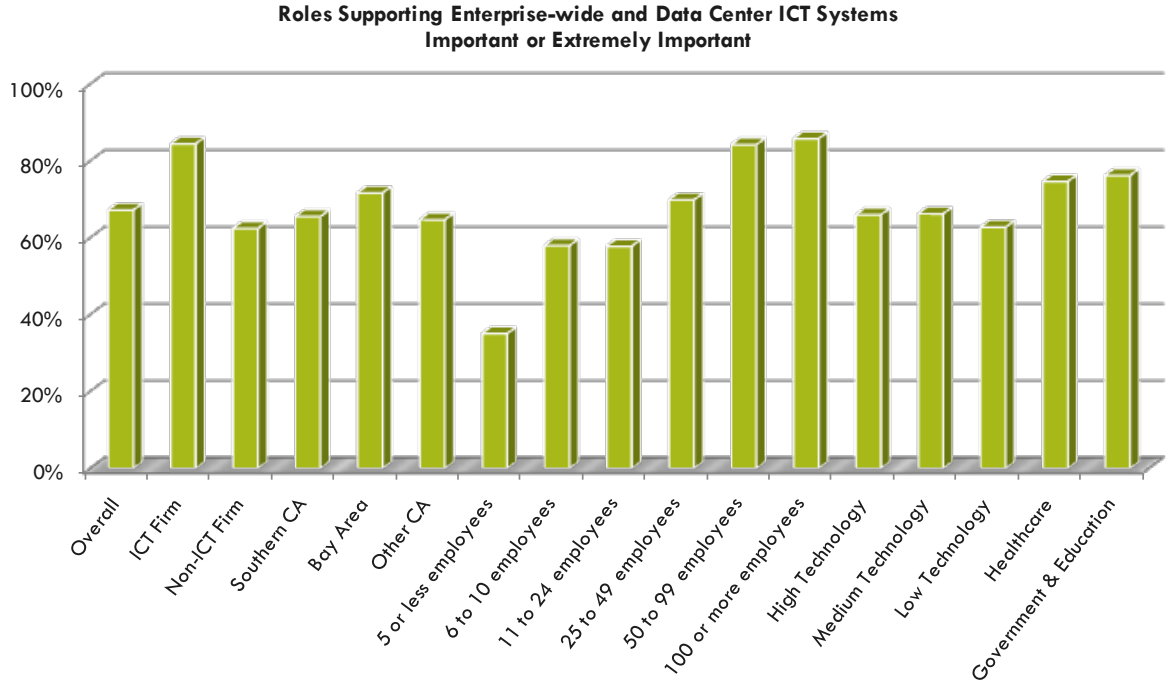
1. Roles supporting ICT end user devices, operating systems, and applications, like desktop support, help desk, computer support specialists, and computer repair.
    - 86% of ICT firms think roles supporting ICT end user devices, operating systems, and applications are important or extremely important.
    - 62% of non-ICT firms think roles supporting ICT end user devices, operating systems, and applications are important or extremely important.
    - Overall, two-thirds of firms think roles supporting ICT end user devices, operating systems, and applications are important or extremely important.
    - Roles supporting ICT end user devices, operating systems, and applications are more important as firms get larger, and for companies in the Bay Area.

Figure 28: Importance of ICT End User Support Roles



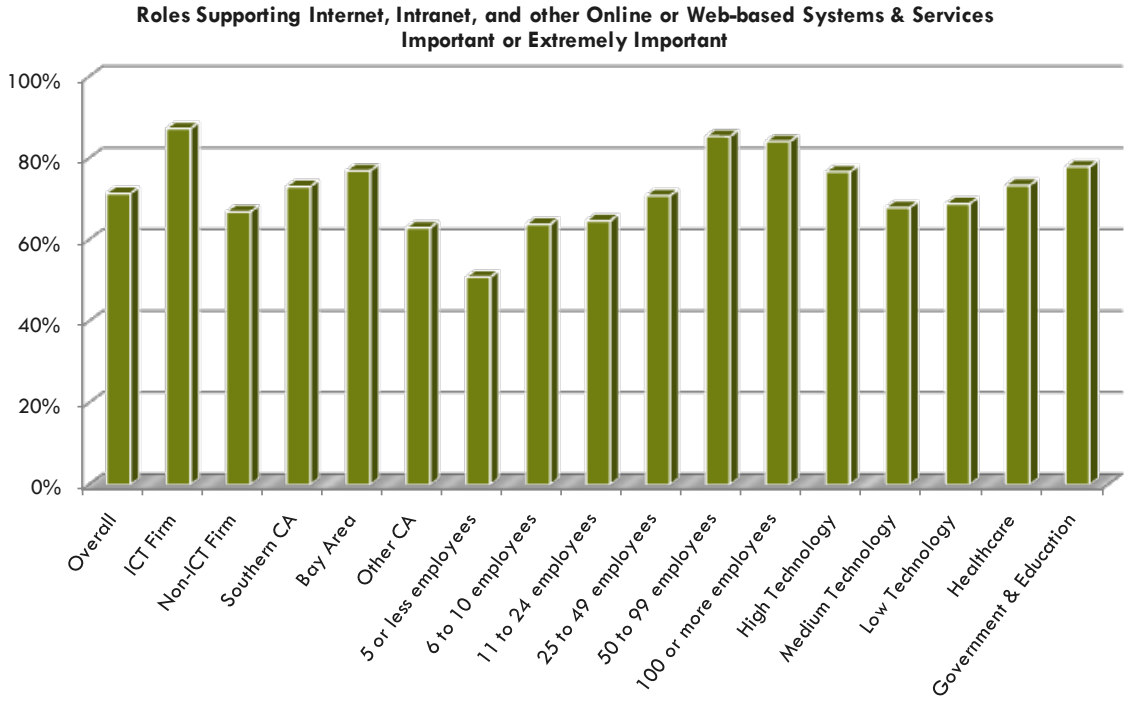
2. Roles supporting Enterprise-wide and data center ICT systems, such as phone, server, data storage, telecommunications and networking systems.
    - More than two-thirds of all firms think roles supporting Enterprise-wide and data center ICT systems are important or extremely important.
    - 85% of ICT firms and 62% of non-ICT firms think these roles are important or extremely important.
    - As firms get larger, roles supporting Enterprise-wide and data center ICT systems are more important.
    - Roles supporting ICT enterprise-wide and data center ICT systems are somewhat more important to Bay Area firms than firms in other geographies.

Figure 29: Importance of Enterprise and Data Center ICT Support Roles



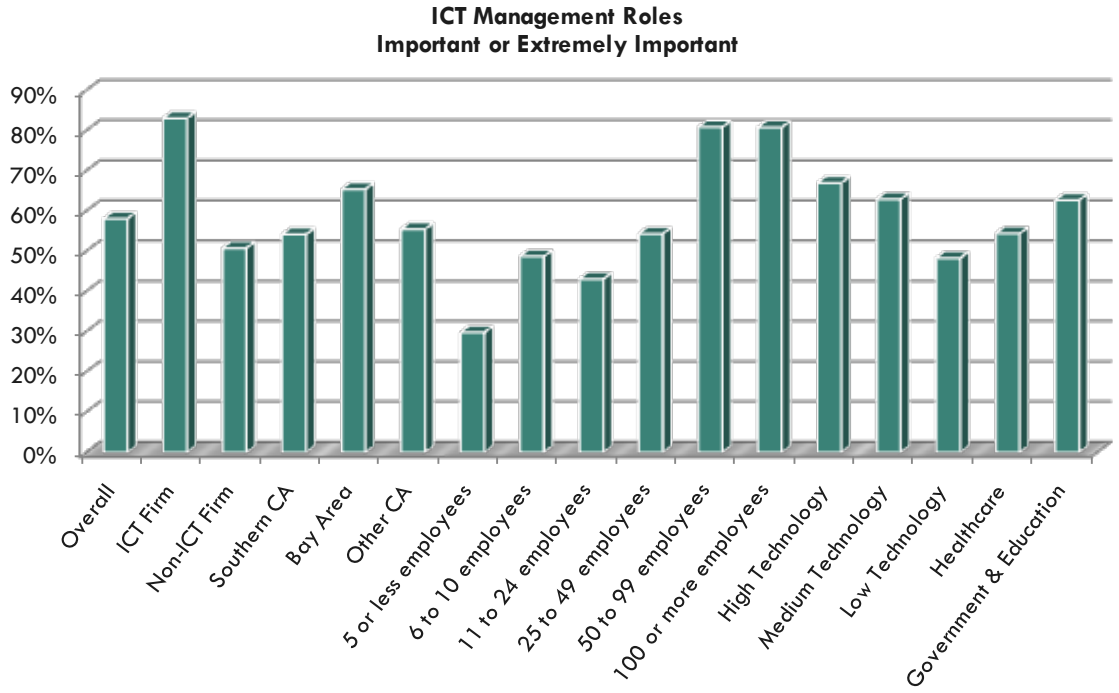
3. Roles supporting Internet, Intranet and other online or web-based systems and services, such as web design and development, online commerce and webmaster.
    - 71% of firms report that roles supporting online and web-based systems are important or very important to their organizations.
    - 87% of ICT firms and 69% of non-ICT firms think that roles supporting Internet, Intranet, and other online or web-based systems and services are important or extremely important to their organizations.
    - As firms get larger, roles supporting Internet, Intranet, and other online or web-based systems and services are more important.
    - These roles are somewhat more important to Bay Area firms than Southern California firms and to Southern California firms than firms in other geographies.

Figure 30: Importance of ICT Internet/Online Support Roles



4. ICT management roles, such as system and business process design, vendor selection and management, and ICT strategic planning.
    - 58% of firms report that ICT management roles are important or very important to their organizations.
    - 83% of ICT firms and 51% of non-ICT firms think that roles supporting ICT management are important or extremely important to their organizations.
    - As firms get larger, roles supporting ICT management are more important.
    - Roles supporting ICT management are more important to Bay Area firms than others.

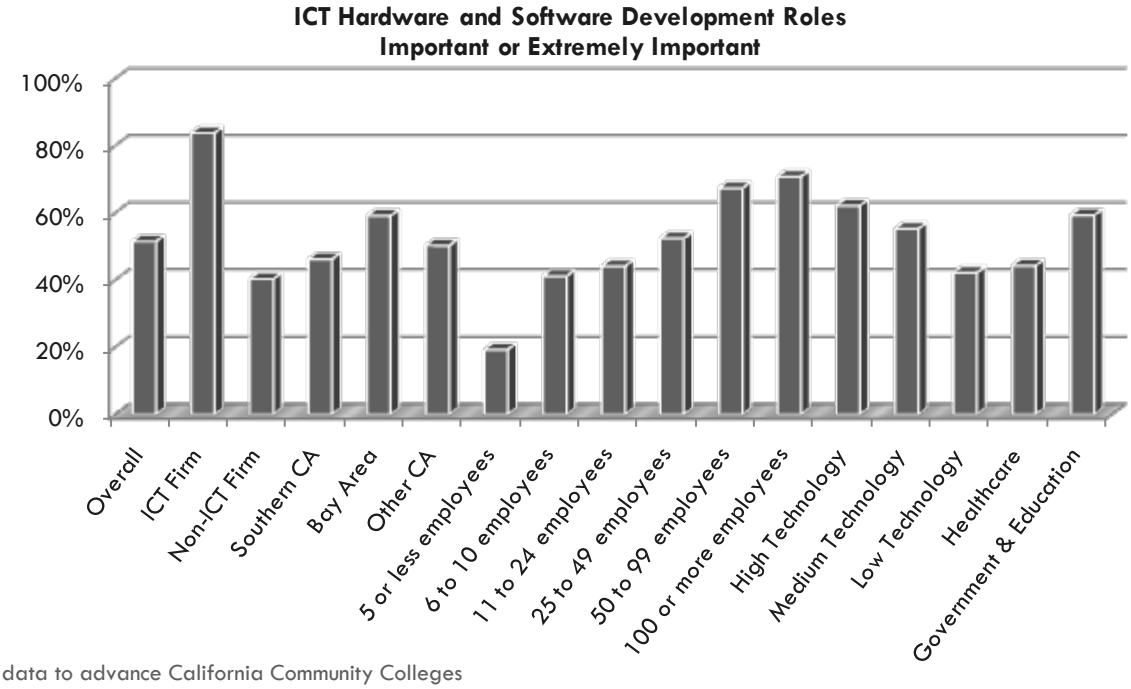
Figure 31: Importance of ICT Management Roles



5. Hardware and software development roles, like hardware engineer, software engineer and programmer.

- 51% of all firms report that hardware and software development roles are important or very important to their organizations.
- 84% of ICT firms and 40% of non-ICT firms think that roles supporting hardware and software development are important or extremely important to their organizations.
- As firms get larger, roles supporting hardware & software development are more important.
- Roles supporting hardware and software development are more important to Bay Area firms than firms in other geographies.

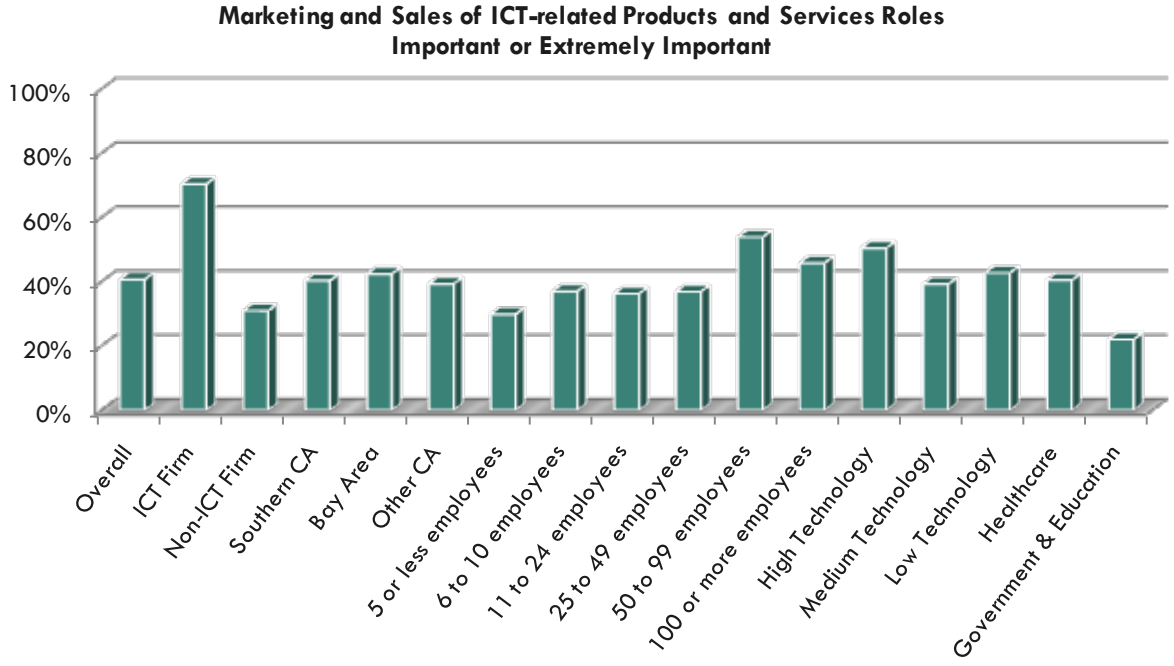
Figure 32: Importance of ICT Hardware and Software Development Roles



6. Roles supporting marketing and sales of ICT related products and services.

- Only 41% of all firms report that ICT marketing and sales roles are important or very important to their organizations.
- Of ICT-related respondents, 70% think roles supporting marketing and sales of ICT related products and services are important or extremely important.
- Of non-ICT-related respondents, only 31% think roles supporting marketing and sales of ICT related products and services are important or extremely important.

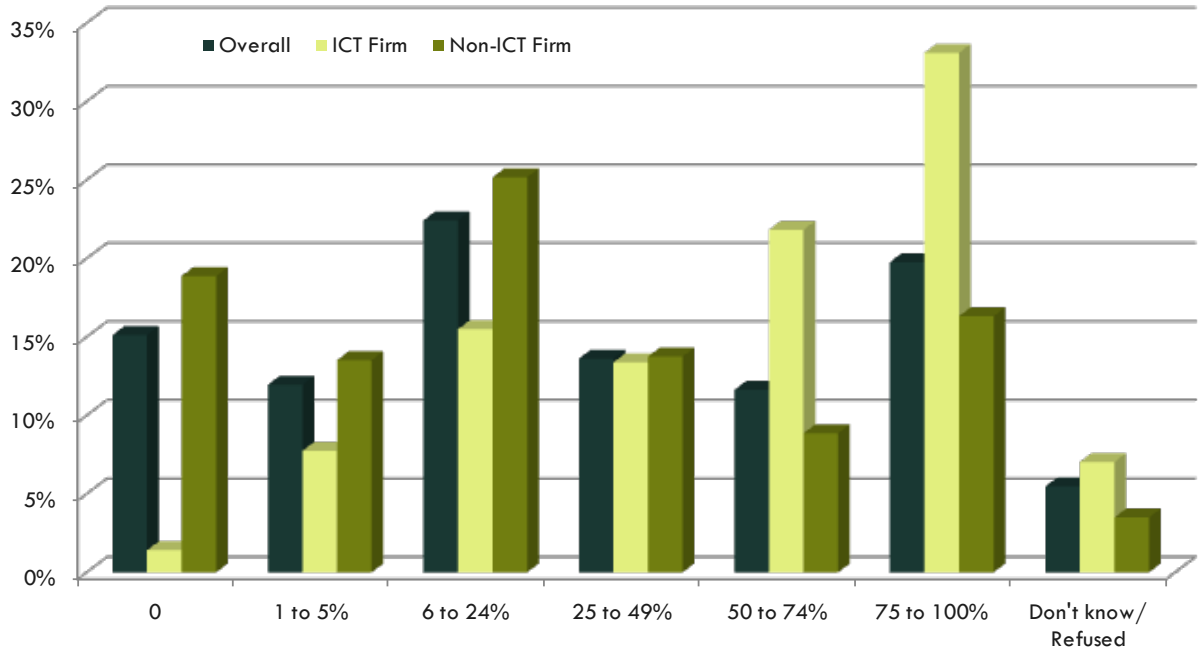
Figure 33: Importance of ICT Marketing and Sales Roles



When asked about how much of their overall workforce were expected to have at least some of these ICT workforce skills, California companies responded:

- 85% of companies require at least some employees to have at least some of the described ICT workforce skills.
- Half of all companies require at least 25% of employees to have at least some of the described ICT workforce skills.
- 75% of ICT-related businesses require at least 25% of employees to have at least some of the described ICT workforce skills.
- 42% of non-ICT-related businesses require at least 25% of employees to have at least some of the described ICT workforce skills.

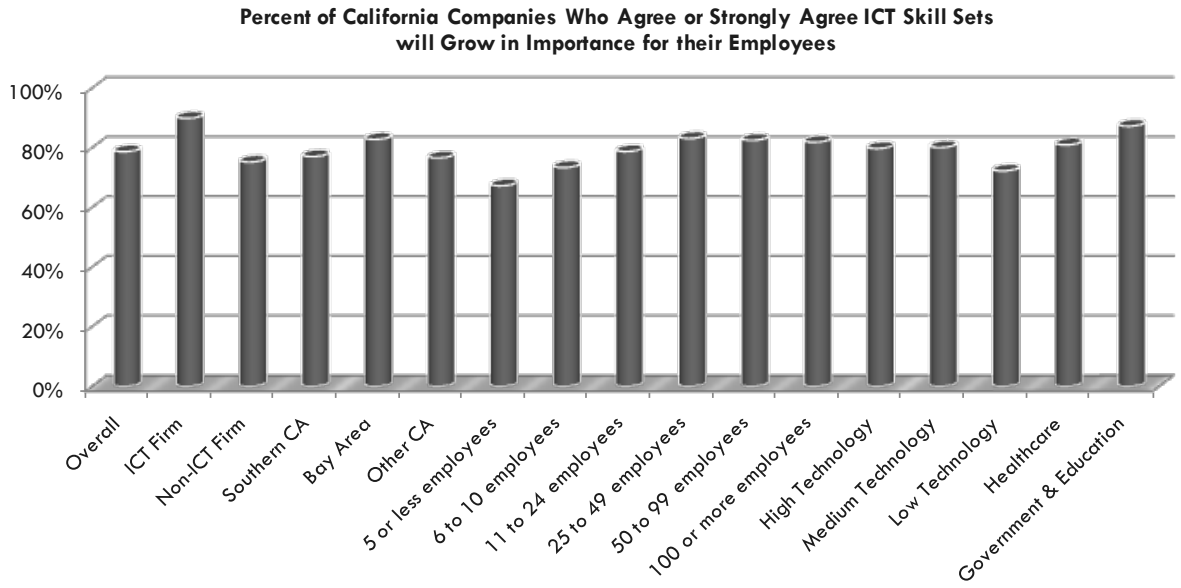
Figure 34: Percent of Employees Needing Some ICT Workforce Skills



Regarding ICT workforce skill sets, 75% of non-ICT and 90% of ICT firms either agree or strongly agree that they will grow in importance for their employees. As may be expected, ICT workforce skills are more important to larger than smaller firms.

- Overall, 79% of respondents agree or strongly agree that ICT workforce skill sets will grow in importance for their employees.
- In firms that least support the statement, companies with 5 or fewer employees, more than two-thirds agree that ICT workforce skills will grow in importance for their employees.

Figure 35: Growing Importance of ICT

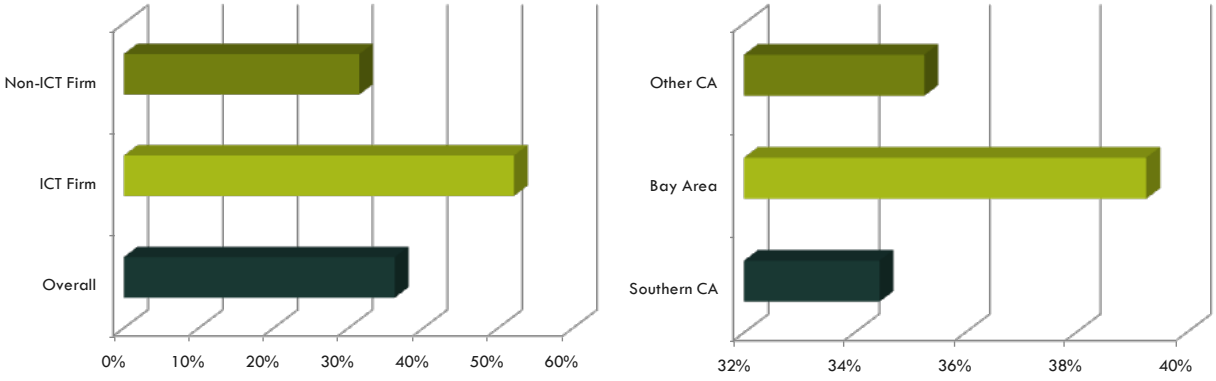


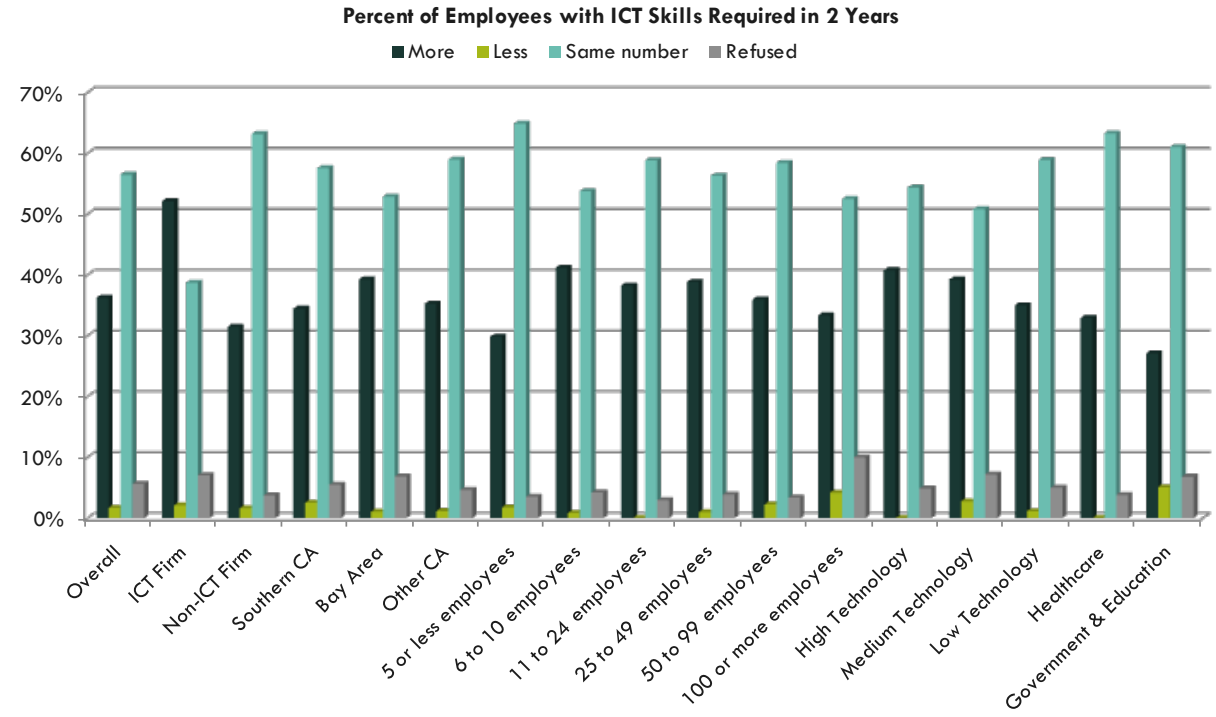
Short-Term Overall Employment Growth Expectations

Survey participants were also asked how many more or fewer employees with at least some of the described ICT workforce skills they expected to need in two years.

- Overall, 36% of respondents expect to have more people, and only 2% expect fewer, employed in ICT workforce roles in 2 years.
- 52% of ICT-related firms expect to have more people, and only 2% expected fewer, employed in ICT-related job functions in 2 years. ICT-related firms are 26 times more likely to expect to need more than fewer people with ICT workforce skills.
- 31% of non-ICT-related firms expect to have more people, and only 4% expected fewer, employed in ICT-related job functions in 2 years. Non-ICT-related firms are 8 times more likely to expect to need more than fewer people with ICT workforce skills.
- In each geographic area, more than a third of firms expect to have more employees with ICT-related job functions 2 years from now.
- Bay Area firms expect more ICT-related job function growth than other geographies.

Figures 36: Need for More Employees with ICT Skills in 2 Years

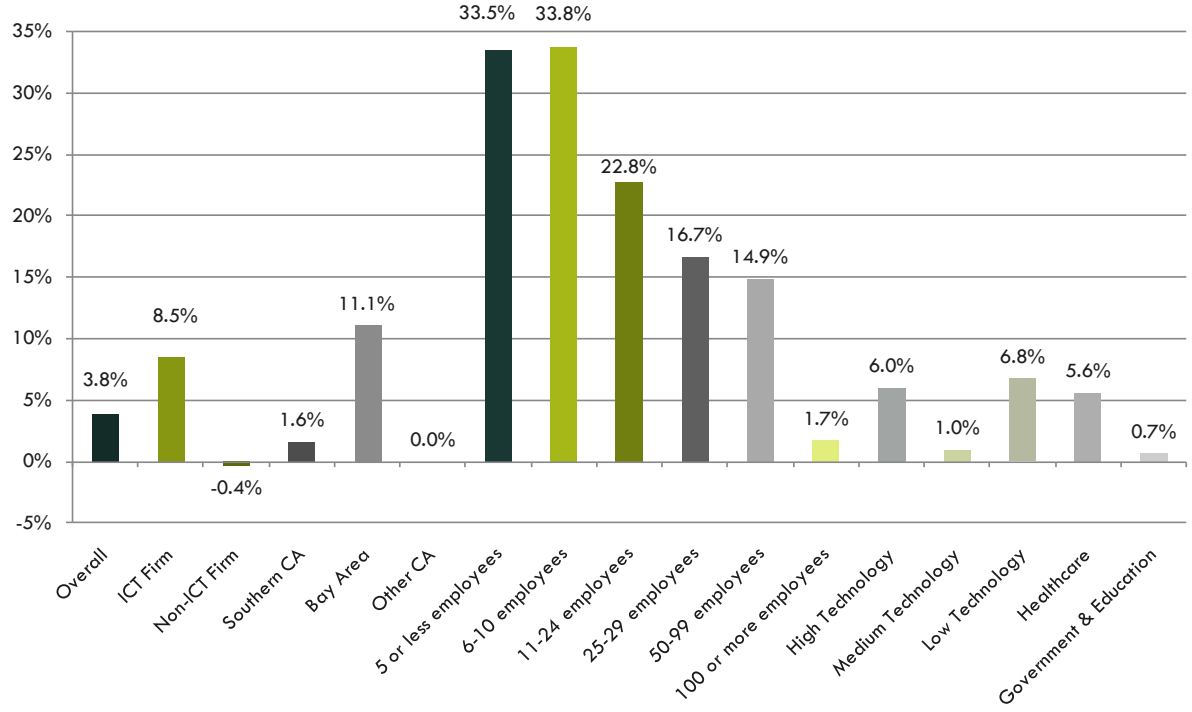




California companies anticipate 3.8% overall employment growth over the next two years. This is consistent with other estimates for employment growth for the California economy. However, companies providing ICT goods and/or services expect 8.5% employment growth over the next two years, and those that do not provide ICT goods and/or services expect overall employment to shrink by 0.4% over the next two years.

Over the next two years, Bay Area companies expect 11.1% overall employment growth, Southern California companies expect 1.6% employment growth, and the rest of California companies expect no employment growth. Smaller companies expect a higher percentage of overall employment growth than larger companies. Government and education and medium technology organizations expect low overall employment growth, while healthcare, high technology and low technology organizations expect higher overall employment growth.

Figure 37: 2 Year Overall Employment Growth

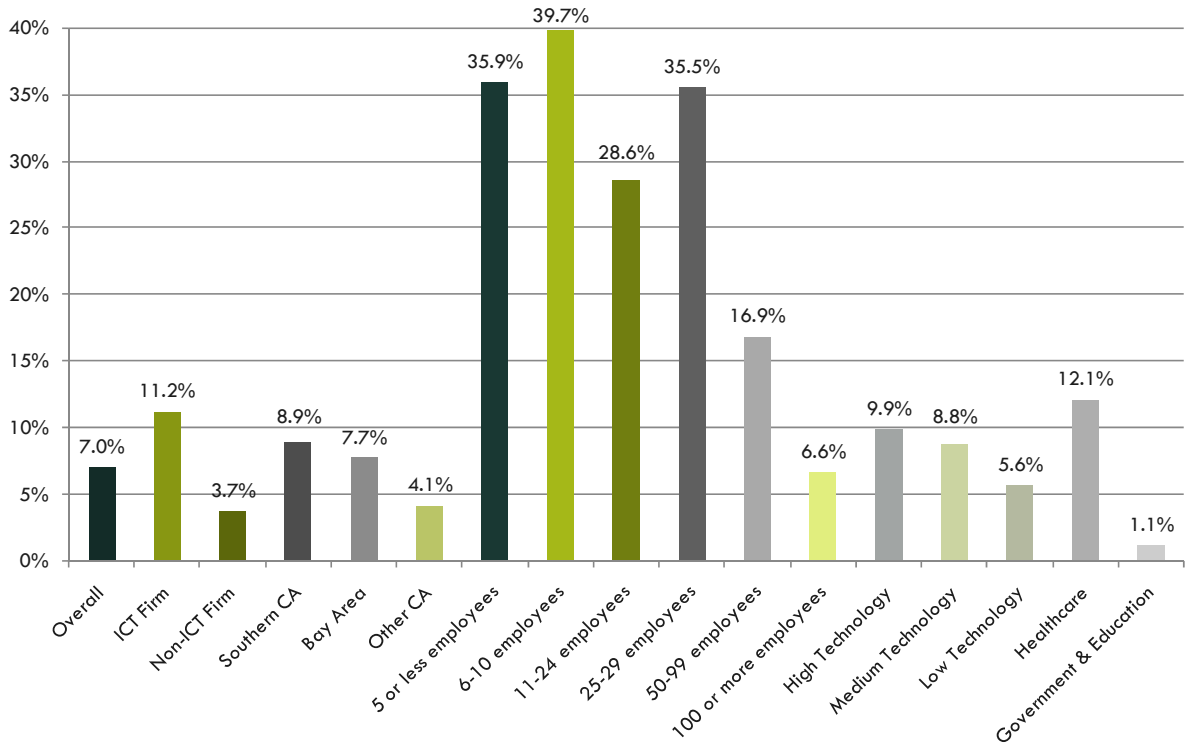


Short-Term ICT Employment Growth Expectations

The same California companies that report 3.8% overall employment growth anticipate 7% growth of their ICT workforce over the next two years. This finding illustrates that ICT job growth is expected to far outpace job growth generally in the state. Specifically, employers report that:

- Companies providing ICT goods and/or services expect 11.2% growth in employment for people with ICT workforce skills over the next two years, compared with overall employment growth expectations of 8.5%.
- While companies that do not provide ICT goods and/or services expect -.4% overall employment growth, they expect 3.7% growth in employment of people with ICT workforce skills.
- San Francisco Bay Area companies expect 8.9% ICT workforce employment growth, Southern California companies expect 7.7% growth, and the rest of California companies expect 4.1% growth. For Southern California and the rest of California (not including the Bay Area), ICT workforce growth is expected to be higher than overall employment growth.
- Over the next two years, companies of all sizes expect ICT workforce employment growth, but smaller companies expect greater percentage growth than larger companies in California. Government and education organizations do not expect particularly large ICT workforce employment growth, but all other types of organizations expect larger ICT workforce growth than overall employment growth over the next two years.

Figure 38: 2 Year ICT Workforce Employment Growth

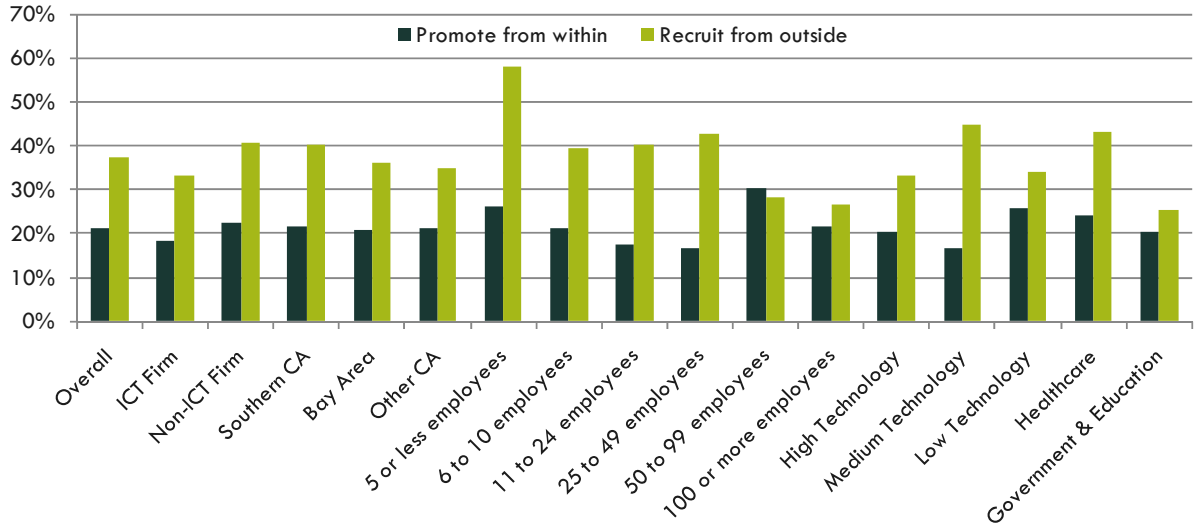


ICT Workforce Hiring

Companies were asked whether they were more likely to fill ICT-related job function roles by hiring people from outside the company or by promoting from within the company.

- Overall, companies were 45% more likely fill ICT workforce job function growth with external hires than to develop and promote internal employees to those roles.
- Smaller firms and non-ICT firms are more likely than larger or ICT firms to hire for ICT-related job roles from outside the company than to promote people from inside the company into those roles.

Figure 39: Hiring Versus Promoting ICT Workforce



"Our company is already highly dependent on ICT and is moving toward even greater reliance on computer/ internet-based interaction with our customers.

— Participant Response,
Centers of Excellence Employer Survey

Companies were asked about the importance of technical skills, interpersonal communications skills, creative problem-solving skills, ability to work with different groups or departments and technical writing skills in their ICT workforce. Clearly, it is not enough to have just technical knowledge and skills to be successful in the ICT workforce for most California employers.

- Across the various classifications of firms, technical competence specific to the position is the most important skill area for new ICT-related role hires.
- Overall, more than 60% of employers report that interpersonal communication skills, creative problem-solving skills and an ability to work with different groups or departments are among the most important skills for new ICT-related role hires.

Figure 40a: Important ICT Skills

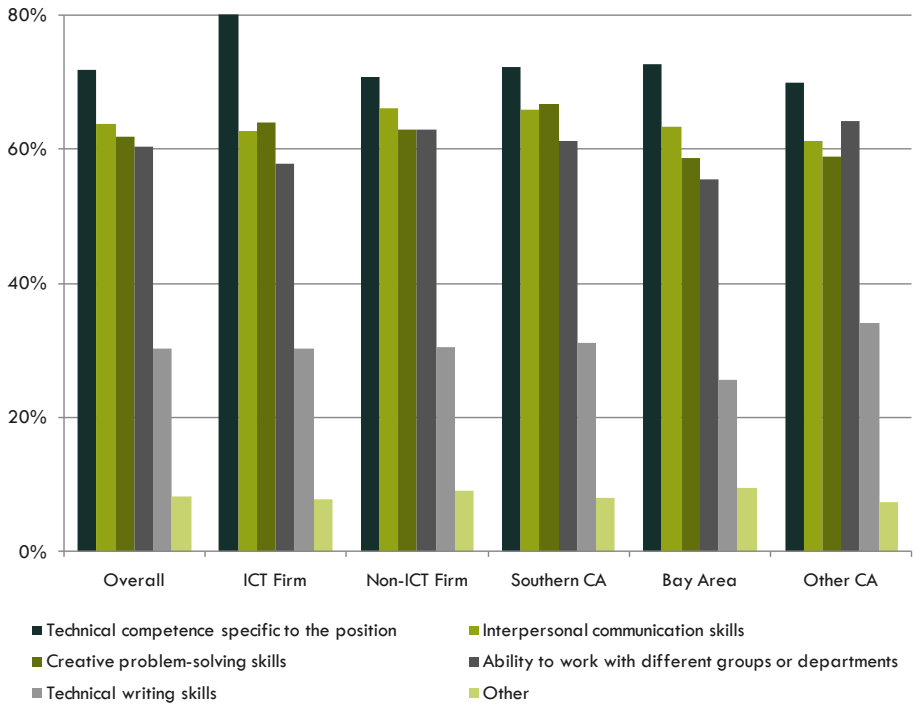
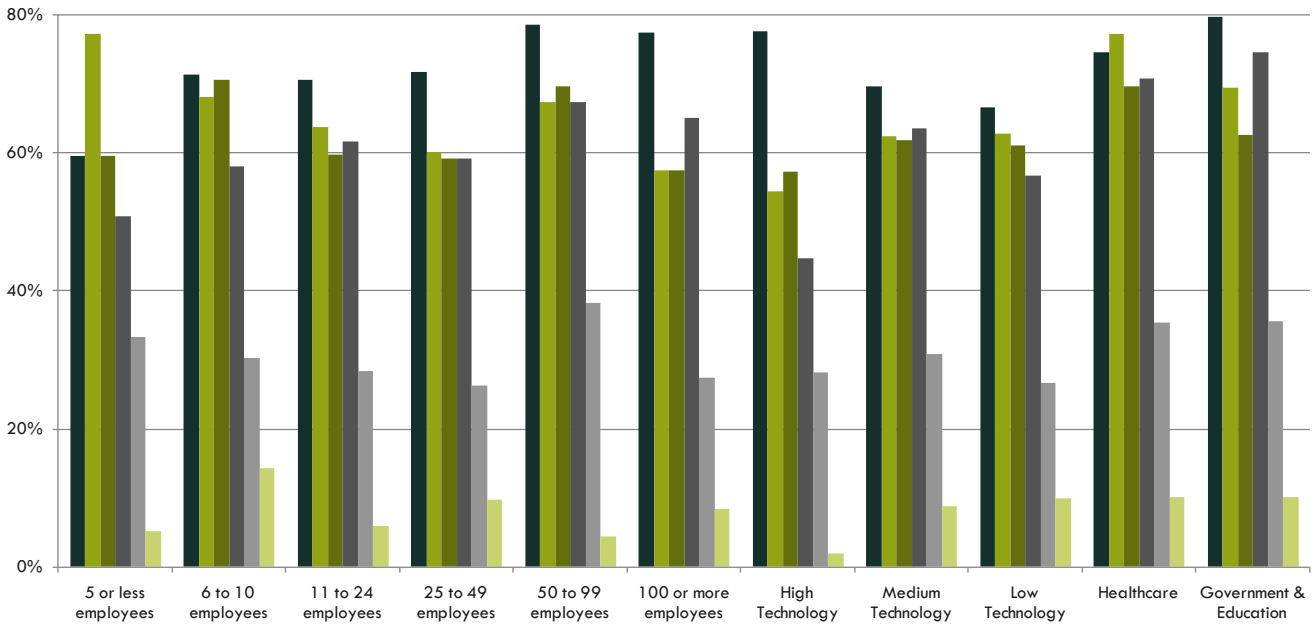


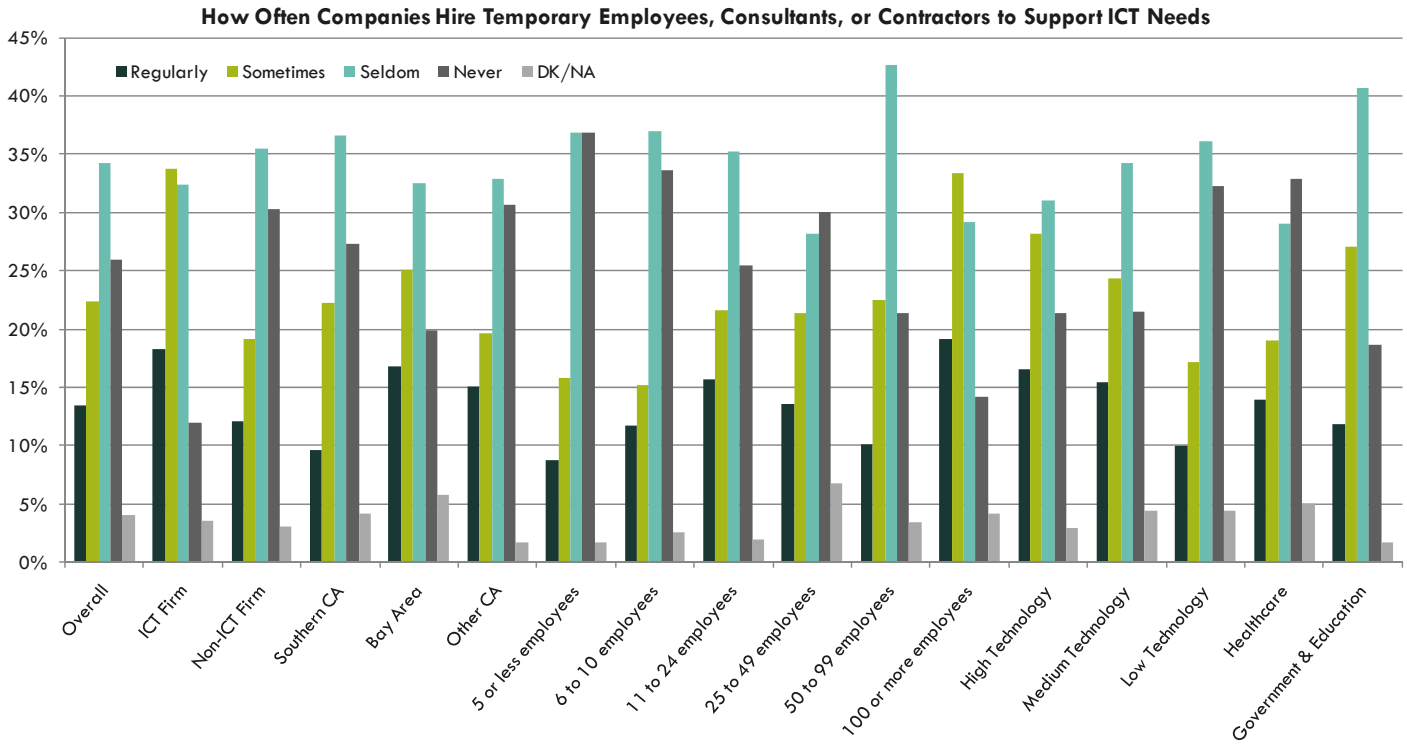
Figure 40b: Important ICT Skills



Companies were asked how often they hire temporary employees, consultants, or contractors to support their ICT needs.

- ICT-related firms are more likely to hire temporary employees, consultants or contractors for ICT-related job roles.
- Bay area firms are more likely to hire temporary employees, consultants or contractors for ICT-related job roles than companies in other geographies.
- Bigger firms are more likely to hire temporary employees, consultants or contractors for ICT-related job roles than smaller companies.

Figure 41: ICT Temp, Consultant and Contractor Needs



Difficulties in Recruitment and Retention

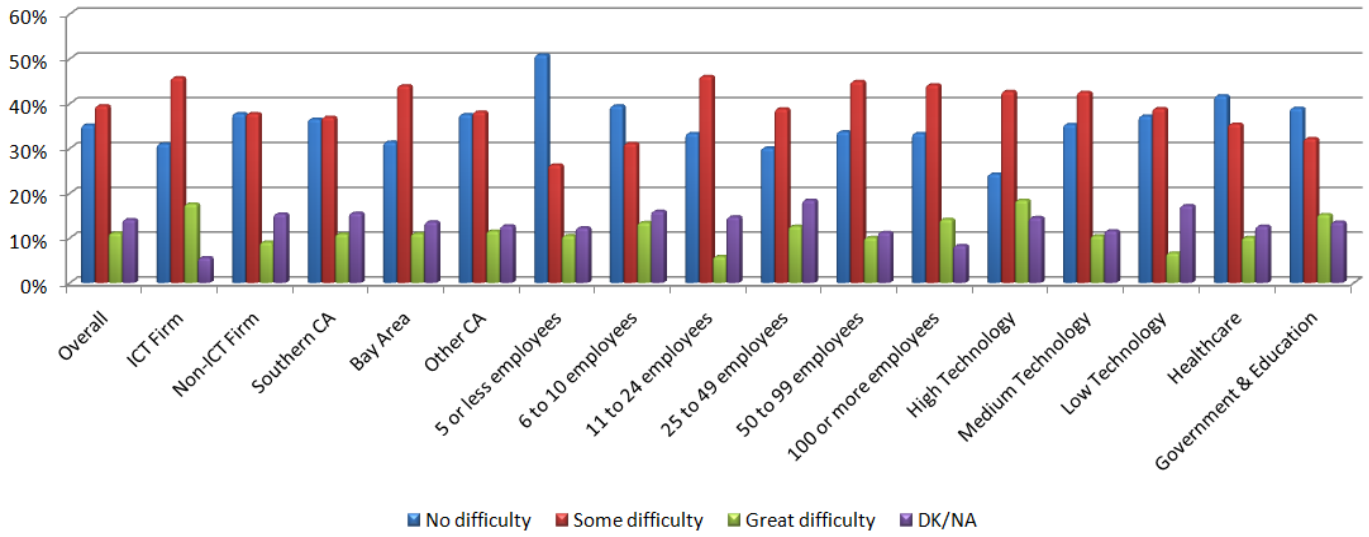
Over half of all firms report difficulty recruiting employees with appropriate ICT skills and training. These findings are surprising given the high rates of unemployment in the state. Specifically:

- Two in three ICT-related firms and nearly half of non-ICT firms report some or great difficulty recruiting employees with appropriate ICT skills and training.
- Larger firms report more difficulty than smaller firms in recruiting qualified employees

"We will become more reliant on personnel with ICT skills and will have need for more of our staff to have increased familiarity — at least with the use of ICT — if not the direct development of ICT products or services."

— Participant Response,
Centers of Excellence Employer Survey

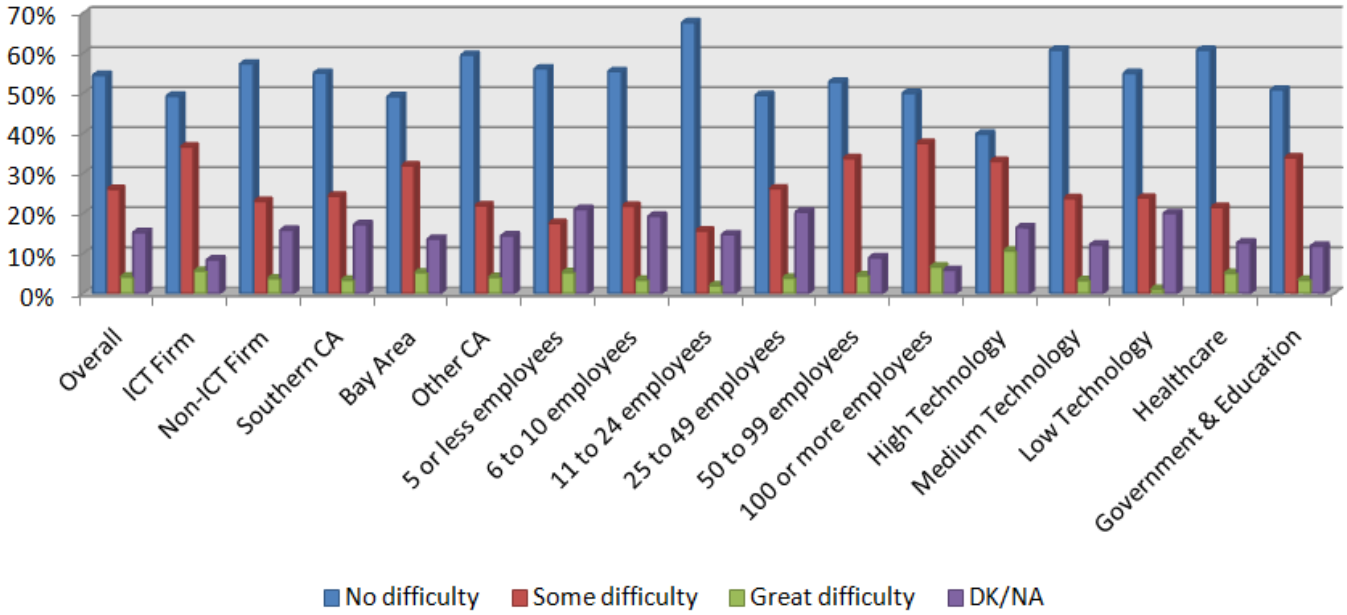
Figure 42: ICT Recruiting Difficulties



Firms were asked about whether it was difficult to retain their ICT workforce:

- Overall, 54% of firms report no difficulty retaining ICT employees.
- 30% of firms report some or great difficulty retaining ICT employees.
- ICT firms have more difficulty retaining employees (42%) than non-ICT firms (27%).

Figure 43: ICT Workforce Retention Difficulties



ICT Education and Training Preferences

Companies were asked about bachelor level degree requirements for their ICT workforce.[17]

- 64% of ICT related firms require a BA/BS degree for at least half of their ICT workforce jobs.
- 54% of Non-ICT firms do not require a BA/BS degree for at least half of their ICT workforce.
- Non-ICT firms are much less likely to require a 4-year degree for ICT workforce job roles.
- Almost half of California companies do not require a bachelor degree for at least half of their ICT workforce.
- Larger firms are more likely than smaller firms to require a 4-year degree for ICT workforce jobs.

Figures 44: ICT Workforce Bachelor Degree Requirements*

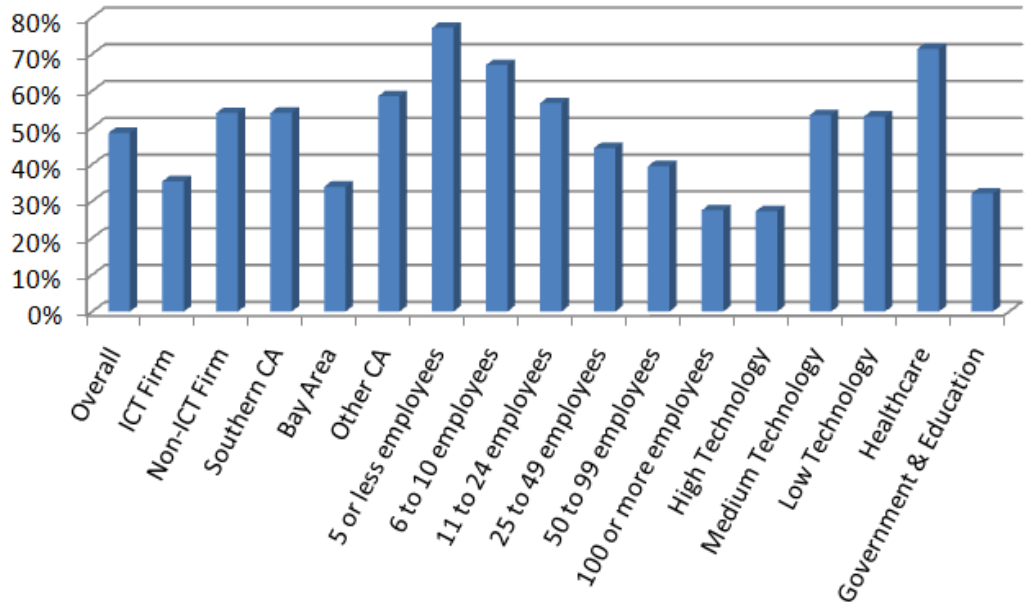
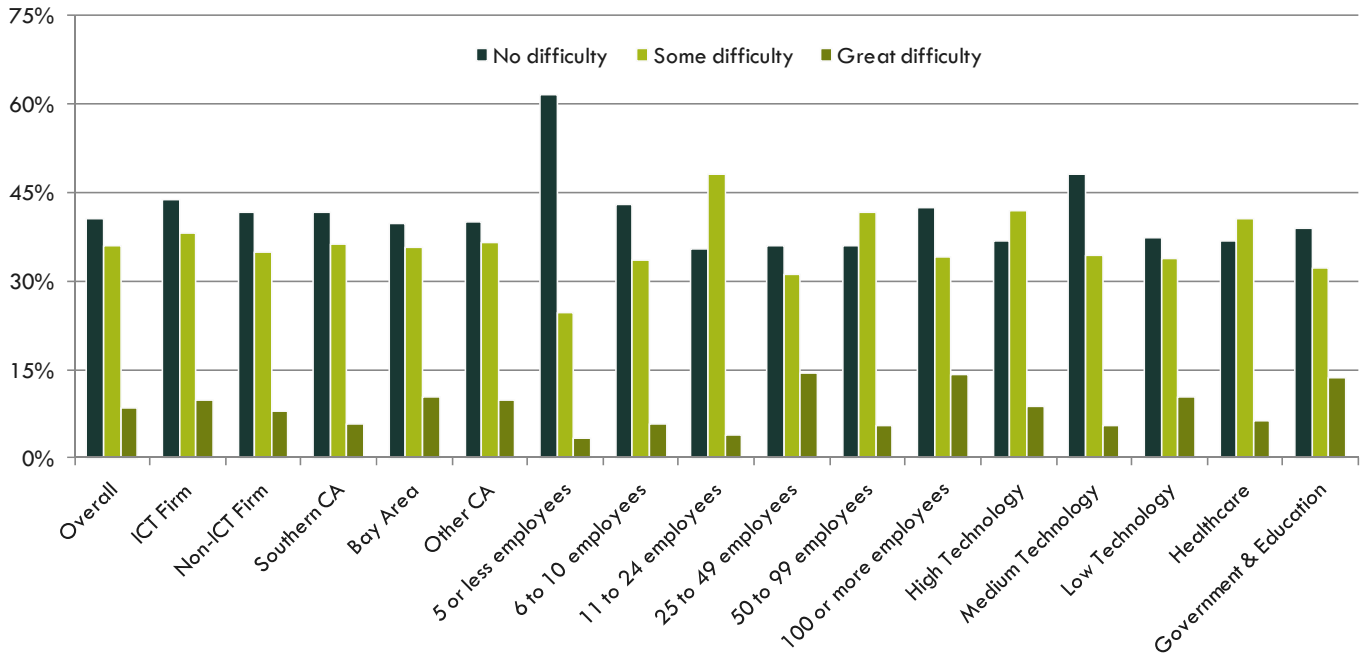


*Chart displays percent of California Companies with at least one ICT Employee who do not Require a BA/BS Degree for at least Half of Their ICT Workforce

Firms were evenly split on their difficulty in keeping their ICT workforce up to date with new skills, and there were no major differences among the various classifications of firms. When asked about providing ICT training for their employees to grow and advance, 45% reported some or great difficulty, while 41% reported no difficulty.

[17] This study did not test the hypothesis, but anecdotal evidence collected by MPICT suggests that many employers relate the minimum requirement of a BA/BS degree for ICT positions to the importance of soft skills (also referred to as workplace or employability skills), such as interpersonal communication skills, creative problem-solving skills, and an ability to work with different groups or departments.

Figure 45: Difficulty Training Existing ICT Workforce



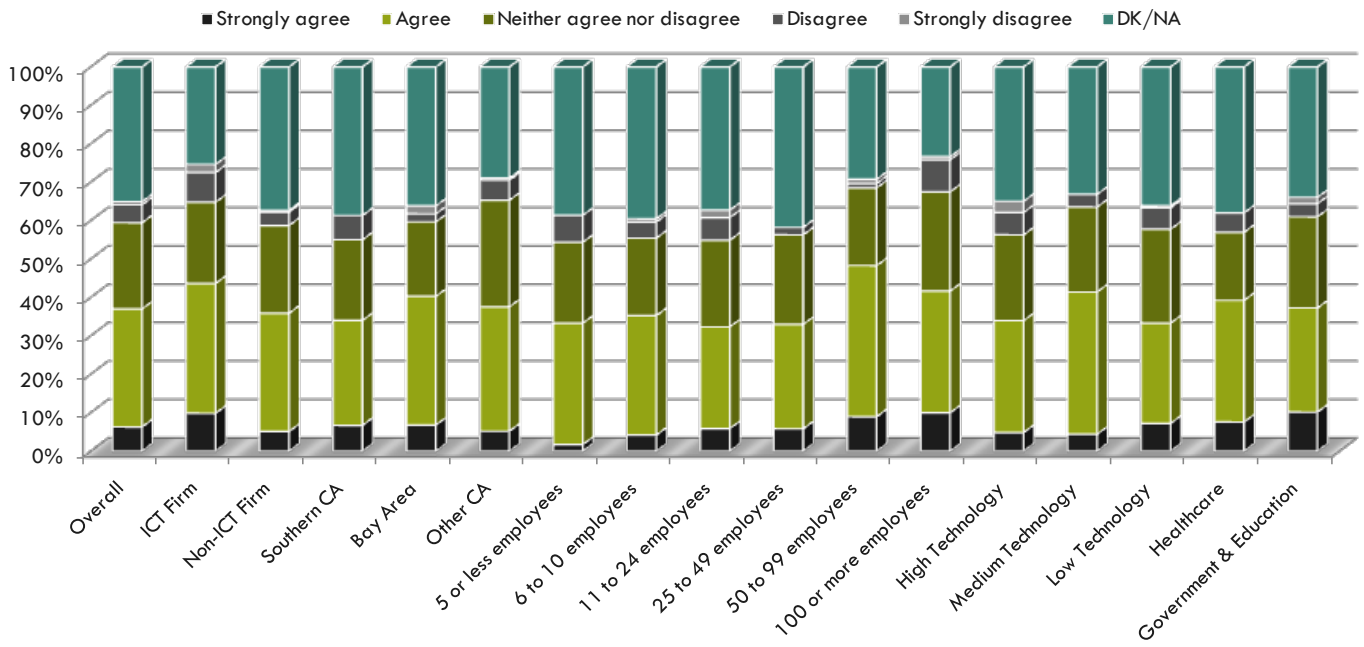
When asked whether California community colleges are doing a good job developing the ICT workforce, more than half didn't know or had no opinion, frequently the highest response category. This suggests a visibility problem or marketing and outreach opportunity for California community colleges and their ICT-related programs.

- Overall, 37% of firms either agree or strongly agree, and only 5% disagree or strongly disagree, that California community colleges are doing a good job developing the ICT workforce.
- Larger companies are more likely to agree than smaller companies that California community colleges are doing a good job developing the ICT workforce.
- ICT firms are more likely to agree than non-ICT firms that California community colleges are doing a good job developing the ICT workforce.

California companies are 3.5 times more likely to value statewide ICT standards that would align employer ICT workforce needs with education and training programs.

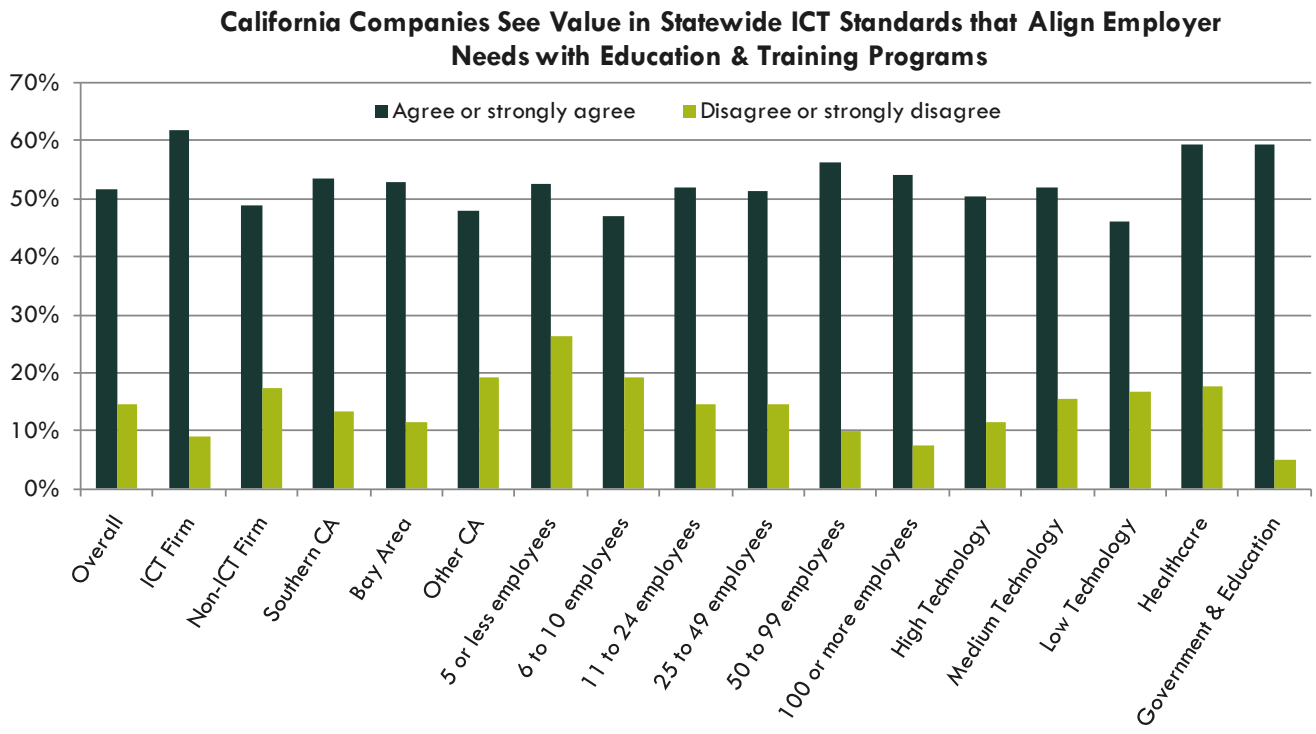
— Centers of Excellence Employer Survey

Figure 46: Quality of CCCs in Developing ICT Workforce



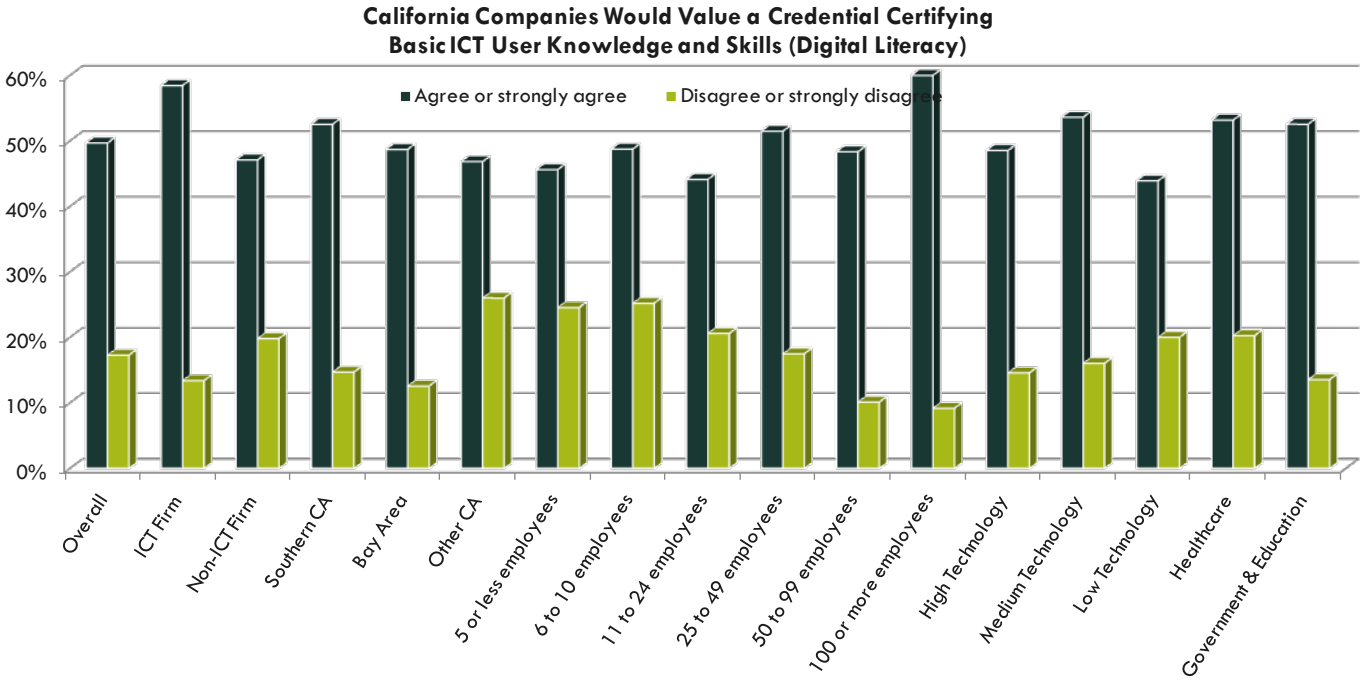
A majority of firms (51%) value statewide ICT standards that would align employer needs with education and training programs. Overall, firms are 3.5 times more likely to agree or strongly agree than disagree or strongly disagree that they would value ICT standards. ICT firms are 6.8 times and non-ICT firms are 2.8 times more likely to agree or strongly agree than disagree or strongly disagree that they would value ICT standards.

Figure 47: Statewide ICT Standards Value



Approximately half of all firms and 58% of ICT firms indicated desire for a digital literacy, or ICT end-user knowledge and skills credential. Overall, firms are 2.9 times more likely to agree or strongly agree than disagree or strongly disagree that they would value a Digital or ICT end-user knowledge and skills credential. ICT firms are 4.4 times and non-ICT firms are 2.4 times more likely to agree or strongly agree than disagree or strongly disagree that they would value a Digital Literacy credential.

Figure 48: ICT Digital Literacy Credential Value



Employers were presented with an open-ended question about perceived weaknesses of community college students they have hired as part of their ICT workforces. Responses included challenges to community colleges to improve student:

- Communications skills
- Real world experiences
- Understanding the relevance of technical knowledge, how it is applied in business
- Social skills
- Professional skills
- Problem solving skills
- Work ethic
- Inter-relational skills
- Understanding the big picture of how companies work and what they do
- Motivation
- "Grit"
- Independence

Employers were presented with an open-ended question about how they think their ICT workforce needs will change over the next 3 to 5 years. Responses included:

- "We will become more reliant on personnel with ICT skills, and will have need for more of our staff to have increased familiarity at least with the use of ICT, if not the direct development of ICT products or services."
- "Broad based skill sets"
- "We will be looking for higher skilled employees in the ICT area."
- "I expect each employee to become more proficient and able to support themselves."

- "The needs will become greater and greater as technology advances."
- "Continual progression requiring ICT workforces to be proficient in multiple disciplines"
- "This opportunity for a person to gain "currency" in technology and the implementation/ maintenance is important but must be able to work with other people is the key."
- "It will increase as all our employees must be computer literate."
- "IT services will be even more important to all employees"

Responses to an open-ended question about suggestions for improving ICT education programs and plans included:

- "Stress on effective and readily understood ways to use the technology choices to simplify, not complicate, information and communication within the firm and with customers"
- "Training or exposure to the concept of the importance of "soft" skills, i.e., the ability to work in teams, to work well with diverse groups of "customers", to manage interpersonal relationships well within the workplace."
- "Real world experience, i.e. internship"
- "Teach them how to work with consumers: how to ask questions, do not treat people as if they do not know what they are talking about, treat end users with respect. Speak good English, write well. Comprehend mathematics and science so one can solve problems."
- "More focus on how these systems are used and the business benefits derived there from."
- "Involvement of industry players"
- "Workgroup skills. Listening and diagnosis skills."
- "Improve problem solving skills and keep the training up to date with the latest technology."
- "To train up people not only can work in ICT, but also be able to communicate and cooperate with the others."
- "Interdisciplinary work to combine tech skills and effective communication skills"
- "Ability to be creative, work as a team, good interpersonal skills, good communication skills are very important"
- "Teaching the "me generation" that not everyone is a winner every day. That a pat on the back for a good job may not come every day."
- "Making the employee well rounded academically"
- "Interacting with different types of people - effectively communicating with others"
- "ICT staff who know both hardware and software."
- "Help in dealing with working with overseas employees and consultants"
- "Knowing something and knowing how to use that same thing are polar opposites in the real world. Students need hands on experience."
- "Applied skills"
- "As technology grows it is very important that our High Schools and Colleges continue to have the funding to keep up with technology."
- "Basic computer skills for everyone!"
- "Aside from technical proficiency, as an employer the most glaring weakness in the pool of potential employees is the inability to write effectively."
- "Critical thinking and analysis, problem solving, people skills, listening, team mentality"
- "Require good to excellent writing skills, as this seems to be the biggest weakness."

Conclusions

In the information and knowledge economies of the 21st century, all kinds of organizations and individuals increasingly depend on computer, information and communications technologies for productivity, efficiency, connectivity and growth.

The U.S. still has a mostly fragmented view of the technology, industry and occupational clusters related to these rapidly emerging, evolving and converging fields. Much of the rest of the world collects and analyzes data for one large, umbrella cluster, a superset term capturing all of these inter-related and interdependent fields: Information and Communications Technologies (ICT).

In doing so, other countries better understand ICT technologies, industries, and occupations, and therefore may be more likely to have implemented strategic public and educational plans and policies to advance ICT. The effectiveness of those efforts may be contributing to the ongoing slide of the U.S. in various international ICT rankings.

This study of industries, occupations and employers using the ICT framework clearly shows that ICT is strategically very important in California.

ICT industries include about 4% of companies, 6% of private sector revenues, 4% of workers and 12% of private sector wages in California, with much higher job growth and compensation expected than for most other industries or the nation as a whole.

ICT occupations span and are strategically important to most industries, which leverage ICT for productivity. ICT occupations include about 1 in 20 private sector jobs in the U.S. and in California, with strong job growth expected and median ICT Workforce wages about twice the average in California. ICT occupations are California's 8th largest occupational cluster by job count.

Employers across California industries and geographies overwhelmingly acknowledge the current and growing strategic importance of ICT to their organizations. There is strong ICT workforce demand for roles supporting ICT end users, enterprise systems and online systems across most industries and organizations. There is strong ICT workforce demand for ICT management, hardware and software development and marketing and sales in firms selling ICT goods or services and larger companies. ICT workforce demand growth exceeds overall job growth, for both ICT and non-ICT companies.

There are strong ICT job and career prospects for people with advanced training and degrees and for applied technologists without advanced degrees. Employers are struggling to find adequately trained employees, and a significant number report difficulty in training their ICT workforce in California. Community colleges and their ICT-related programs need to do a better job of raising their visibility with employers. There is significant support from California companies for a common framework or set of standards mapping ICT workforce needs and jobs to education and training credentials, and there is also support for a credential certifying basic ICT User, or digital literacy competency in California.

Intuitively, most people think of California, especially the San Francisco Bay Area and Silicon Valley, as a global leader in ICT. California policymakers, investors and education planners should use the information in this report to develop and implement strategic plans to improve ICT infrastructure, adoption, industries, employment and education — to build on California's strengths and stay competitive in the global community. Information and communications technologies are empowering and enabling for all kinds of individuals and organizations. Implementing high quality ICT strategic and educational plans should lead to increased economic performance and higher employment in the state, across all industries and economic strata. It should also help to stem the nation's decline in global rankings of important measures of ICT competitiveness.

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A: About CCC Economic and Workforce Development Centers of Excellence

This report is designed to provide current industry data to:

- Define potential strategic opportunities relative to an industry's emerging trends and workforce needs;
- Influence and inform local college program planning and resource development;
- Promote a future-oriented and market responsive way of thinking among stakeholders; and,
- Assist faculty, Economic Development and CTE administrators, and Community and Contract Education programs in connecting with industry partners.

The information in this report has been validated by employers and also includes a listing of what programs are already being offered by colleges to address those workforce needs. In some instances, the labor market information and industry validation will suggest that colleges might not want to begin or add programs, thereby avoiding needless replication and low enrollments.

About the Centers of Excellence

The Centers of Excellence (COE), in partnership with business and industry, deliver regional workforce research customized for community college decision making and resource development. This information has proven valuable to colleges in beginning, revising, or updating economic development and Career Technical Education (CTE) programs, strengthening grant applications, assisting in the accreditation process, and in supporting strategic planning efforts.

The Centers of Excellence Initiative is funded in part by the Chancellor's Office, California Community Colleges, Economic and Workforce Development Program. The total grant amount (grant number 09-305-021 for $112,000) represents funding for multiple projects and written reports through the Center of Excellence. The Centers aspire to be the premier source of regional economic and workforce information and insight for California's community colleges.

More information about the Centers of Excellence is available at www.coeccc.net.

Important Disclaimer

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, MPICT, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives, or others, based upon components or recommendations contained in this study.

B: About the Mid-Pacific ICT Center

In the information and knowledge economies of the 21st century, we all increasingly depend on information and communications technologies - and the increased connectivity and productivity they enable.

Information and Communications Technologies (ICT) is an umbrella term, widely used outside the United States and in the United Nations, to encompass all rapidly emerging, evolving and converging computer, software, networking, telecommunications, Internet, programming and information systems technologies.

Improvements to deployed ICT technologies, infrastructure, systems and solutions, and people's abilities to productively use them, are strategically important issues to individuals and organizations of all kinds – and to local, state, national and global economies.

To enhance education initiatives in this field, the National Science Foundation Advanced Technological Education (ATE) program awarded a 4 year, $3 million grant to establish the Mid-Pacific ICT (MPICT) Center, at City College of San Francisco.

MPICT's mission is to coordinate, promote and improve the quality of ICT education, with an emphasis on 2-year colleges, in a region consisting of northern California, northern Nevada, southern Oregon, Hawaii and the Pacific Territories.

To accomplish this mission, MPICT launched with 4 Regional Partner schools: Ohlone College, Cabrillo College, Foothill College and Santa Rosa Junior College, which together with City College of San Francisco's Computer Networking and Information Technologies (CNIT) and Computer Science (CS) departments, represent the San Francisco Bay Area. In the Fall of 2009, MPICT added a new Regional Partner school, Truckee Meadows Community College in Reno, NV, which adds connections to ICT programs at all 4 Nevada community colleges through the NSF funded NVITE project.

MPICT endeavors to:

- Champion the importance of ICT
- Build collaborative relationships with the rich ICT industry resources of the San Francisco Bay Area and Silicon Valley to improve ICT education
- Coordinate efforts to harmonize, improve and communicate educational and career pathways and experiences in ICT
- Expand, diversify and improve the skilled ICT workforce

C: Global ICT Trends

Figure 48: OECD Ranking of Median Broadband Price per Mbps

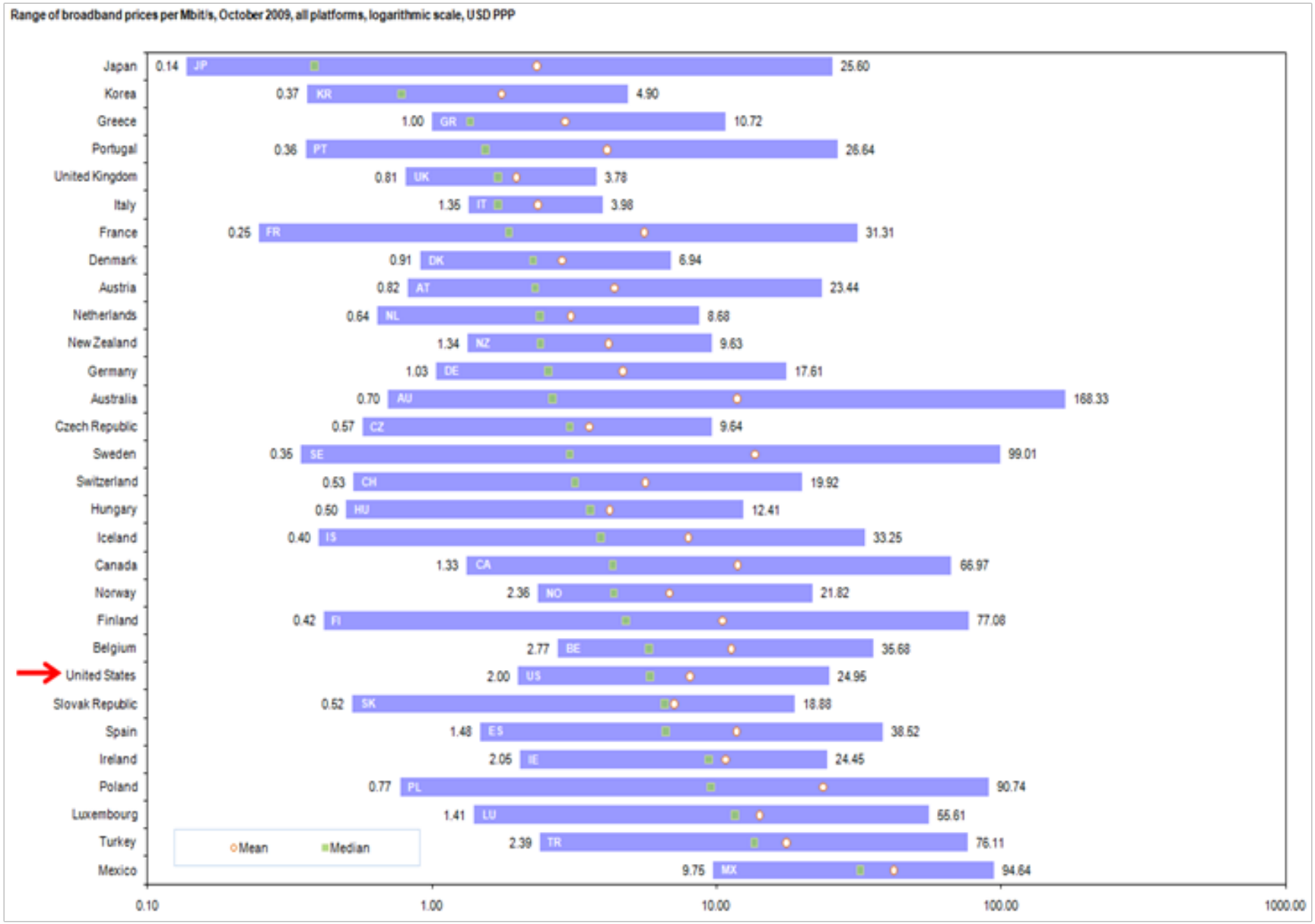
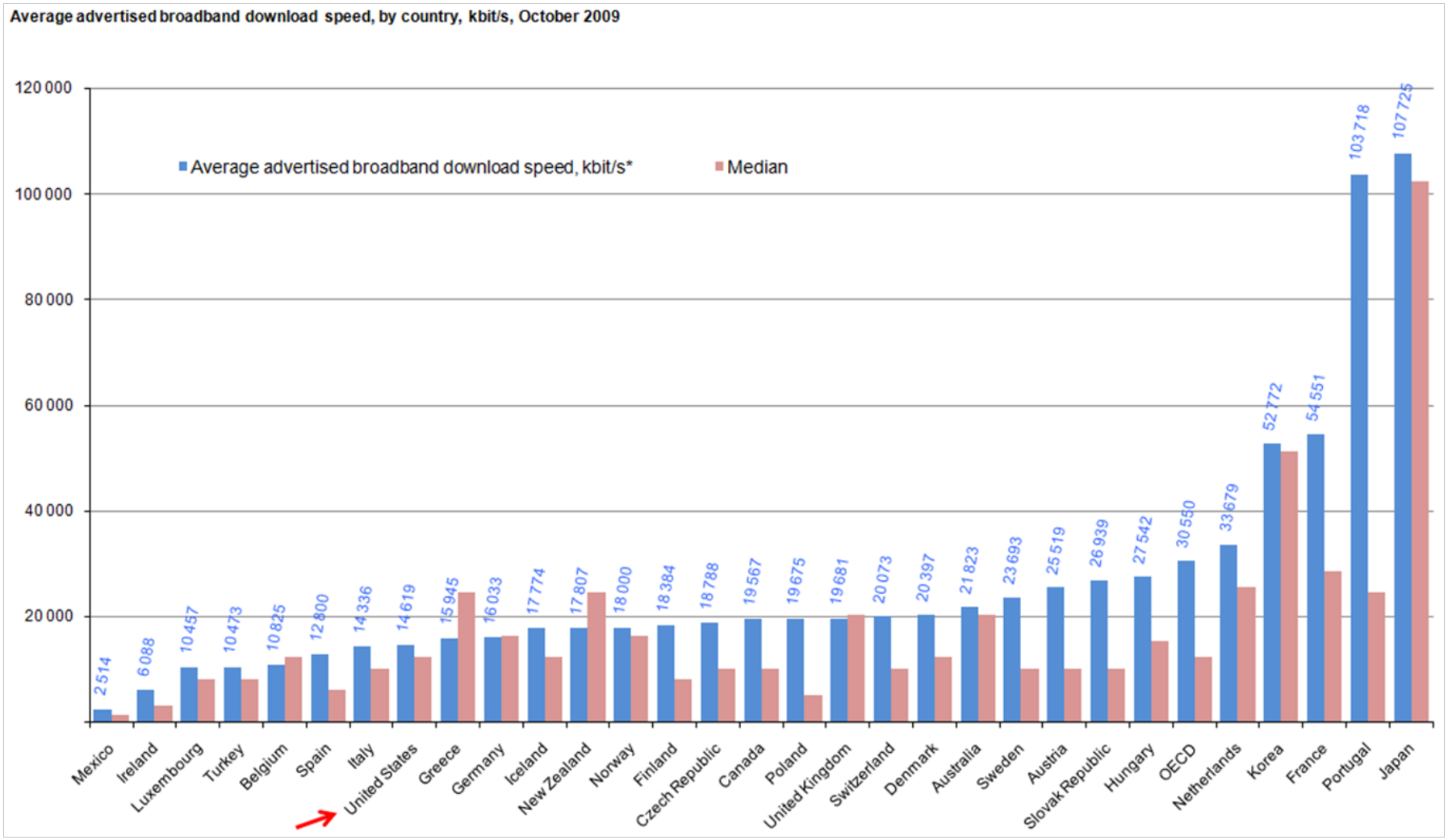


Figure 49 OECD Ranking of Median Broadband Price per Mbps



D: ICT Primary and Secondary NAICS Mapping

For purposes of this study, Secondary ICT NAICS codes are assumed to be partially involved in ICT industry activities or significantly dependent on ICT industries. It is not possible at this time to know to what extent; therefore, this study conservatively attributes only 25% of Secondary ICT NAICS economic activity to ICT.

PRIMARY:	These are industries directly involved in the manufacture of Information and Communications Technologies (ICT) related equipment, peripherals or software, delivering network or telecommunications services, providing exclusively Internet or web-based services or doing exclusively Internet or web based commerce, providing computer system related services, or providing computer or communications equipment or software repair, maintenance or management services.

NAICS	Industry	Description
323115	Digital Printing	This U.S. industry comprises establishments primarily engaged in printing graphical materials using digital printing equipment. Establishments known as digital printers typically provide sophisticated prepress services including using scanners to input images and computers to manipulate and format the graphic images prior to printing.
334111	Electronic Computer Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing and/or assembling electronic computers, such as mainframes, personal computers, workstations, laptops, and computer servers. Computers can be analog, digital, or hybrid. Digital computers, the most common type, are devices that do all of the following: (1) store the processing program or programs and the data immediately necessary for the execution of the program; (2) can be freely programmed in accordance with the requirements of the user; (3) perform arithmetical computations specified by the user; and (4) execute, without human intervention, a processing program that requires the computer to modify its execution by logical decision during the processing run. Analog computers are capable of simulating mathematical models and contain at least analog, control, and programming elements. The manufacture of computers includes the assembly or integration of processors, coprocessors, memory, storage, and input/output devices into a user-programmable final product.
334112	Computer Storage Device Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing computer storage devices that allow the storage and retrieval of data from a phase change, magnetic, optical, or magnetic/optical media. Examples of products made by these establishments are CD-ROM drives, floppy disk drives, hard disk drives, and tape storage and backup units.
334113	Computer Terminal Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing computer terminals. Computer terminals are input/output devices that connect with a central computer for processing.
334119	Other Computer Peripheral Equipment Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing computer peripheral equipment (except storage devices and computer terminals).
334210	Telephone Apparatus Manufacturing	This industry comprises establishments primarily engaged in manufacturing wire telephone and data communications equipment. These products may be standalone or board-level components of a larger system. Examples of products made by these establishments are central office switching equipment, cordless telephones (except cellular), PBX equipment, telephones, telephone answering machines, LAN modems, multi-user modems, and other data communications equipment, such as bridges, routers, and gateways.
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.

PRIMARY:	These are industries directly involved in the manufacture of Information and Communications Technologies (ICT) related equipment, peripherals or software, delivering network or telecommunications services, providing exclusively Internet or web-based services or doing exclusively Internet or web based commerce, providing computer system related services, or providing computer or communications equipment or software repair, maintenance or management services.

NAICS	Industry	Description
334290	Other Communications Equipment Manufacturing	This industry comprises establishments primarily engaged in manufacturing communications equipment (except telephone apparatus, and radio and television broadcast, and wireless communications equipment).
334611	Software Reproducing	This U.S. industry comprises establishments primarily engaged in mass reproducing computer software. These establishments do not generally develop any software. They mass reproduce data and programs on magnetic or optical media, such as CD-ROMs, diskettes, tapes, or cartridges. This industry includes establishments that mass reproduce game cartridges.
335921	Fiber Optic Cable Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing insulated fiber-optic cable from purchased fiber-optic strand.
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	This industry comprises establishments primarily engaged in the merchant wholesale distribution of computers, computer peripheral equipment, loaded computer boards, and/or computer software.
425110	Business to Business Electronic Markets	This industry comprises business-to-business electronic markets bringing together buyers and sellers of goods using the Internet or other electronic means and generally receiving a commission or fee for the service. Business-to-business electronic markets for durable and nondurable goods are included in this industry.
443120	Computer and Software Stores	This industry comprises establishments primarily engaged in retailing new computers, computer peripherals, and prepackaged computer software without retailing other consumer-type electronic products or office equipment, office furniture, and office supplies; or retailing these new products in combination with repair and support services.
454111	Electronic Shopping	This U.S. Industry comprises establishments engaged in retailing all types of merchandise using the Internet.
454112	Electronic Auctions	This U.S. Industry comprises establishments engaged in providing sites for and facilitating consumer-to-consumer or business-to-consumer trade in new and used goods, on an auction basis, using the Internet. Establishments in this industry provide the electronic location for retail auctions, but do not take title to the goods being sold.
511210	Software Publishers	This industry comprises establishments primarily engaged in computer software publishing or publishing and reproduction. Establishments in this industry carry out operations necessary for producing and distributing computer software, such as designing, providing documentation, assisting in installation, and providing support services to software purchasers. These establishments may design, develop, and publish, or publish only.
517110	Wired Telecommunications Carriers	This industry comprises establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services; wired (cable) audio and video programming distribution; and wired broadband Internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.

PRIMARY:	These are industries directly involved in the manufacture of Information and Communications Technologies (ICT) related equipment, peripherals or software, delivering network or telecommunications services, providing exclusively Internet or web-based services or doing exclusively Internet or web based commerce, providing computer system related services, or providing computer or communications equipment or software repair, maintenance or management services.

NAICS	Industry	Description
517210	Wireless Telecommunications Carriers (except Satellite)	This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular phone services, paging services, wireless Internet access, and wireless video services.
517410	Satellite Telecommunications	This industry comprises establishments primarily engaged in providing telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications.
517911	Telecommunications Resellers	This U.S. industry comprises establishments engaged in purchasing access and network capacity from owners and operators of telecommunications networks and reselling wired and wireless telecommunications services (except satellite) to businesses and households. Establishments in this industry resell telecommunications; they do not operate transmission facilities and infrastructure. Mobile virtual network operators (MVNOs) are included in this industry.
517919	All Other Telecommunications	This U.S. industry comprises establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Establishments providing Internet services or voice over Internet protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry.
518210	Data Processing, Hosting, and Related Services	This industry comprises establishments primarily engaged in providing infrastructure for hosting or data processing services. These establishments may provide specialized hosting activities, such as web hosting, streaming services or application hosting; provide application service provisioning; or may provide general time-share mainframe facilities to clients. Data processing establishments provide complete processing and specialized reports from data supplied by clients or provide automated data processing and data entry services.
519130	Internet Publishing and Broadcasting and Web Search Portals	This industry comprises establishments primarily engaged in 1) publishing and/or broadcasting content on the Internet exclusively or 2) operating Web sites that use a search engine to generate and maintain extensive databases of Internet addresses and content in an easily searchable format (and known as Web search portals). The publishing and broadcasting establishments in this industry do not provide traditional (non-Internet) versions of the content that they publish or broadcast. They provide textual, audio, and/or video content of general or specific interest on the Internet exclusively. Establishments known as Web search portals often provide additional Internet services, such as e-mail, connections to other web sites, auctions, news, and other limited content, and serve as a home base for Internet users.

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NAICS	Industry	Description
541511	Custom Computer Programming Services	This U.S. industry comprises establishments primarily engaged in writing, modifying, testing, and supporting software to meet the needs of a particular customer.
541512	Computer Systems Design Services	This U.S. industry comprises establishments primarily engaged in planning and designing computer systems that integrate computer hardware, software, and communication technologies. The hardware and software components of the system may be provided by this establishment or company as part of integrated services or may be provided by third parties or vendors. These establishments often install the system and train and support users of the system.
541513	Computer Facilities Management Services	This U.S. industry comprises establishments primarily engaged in providing on-site management and operation of clients computer systems and/or data processing facilities. Establishments providing computer systems or data processing facilities support services are included in this industry.
541519	Other Computer Related Services	This U.S. industry comprises establishments primarily engaged in providing computer related services (except custom programming, systems integration design, and facilities management services). Establishments providing computer disaster recovery services or software installation services are included in this industry.
611420	Computer Training	This industry comprises establishments primarily engaged in conducting computer training (except computer repair), such as computer programming, software packages, computerized business systems, computer electronics technology, computer operations, and local area network management. Instruction may be provided in diverse settings, such as the establishments or client's training facilities, educational institutions, the workplace, or the home, and through diverse means, such as correspondence, television, the Internet, or other electronic and distance-learning methods. The training provided by these establishments may include the use of simulators and simulation methods.
811212	Computer and Office Machine Repair and Maintenance	This U.S. industry comprises establishments primarily engaged in repairing and maintaining computers and office machines without retailing new computers and office machines, such as photocopying machines; computer terminals, storage devices, and printers; and CD-ROM drives.
811213	Communication Equipment Repair and Maintenance	This U.S. industry comprises establishments primarily engaged in repairing and maintaining communications equipment without retailing new communication equipment, such as telephones, fax machines, communications transmission equipment, and two-way radios.

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NAICS	Industry	Description
238211	Electrical Contractors and Other Wiring Installation Contractors (res)	This industry comprises establishments primarily engaged in installing and servicing electrical wiring and equipment. Contractors included in this industry may include both the parts and labor when performing work. These contractors may perform new work, additions, alterations, maintenance, and repairs.
238212	Electrical Contractors and Other Wiring Installation Contractors (non-residential)	
237130	Power and Communication Line and Related Structures Construction	This industry comprises establishments primarily engaged in the construction of power lines and towers, power plants, and radio, television, and telecommunications transmitting/receiving towers. The work performed may include new work, reconstruction, rehabilitation, and repairs. Specialty trade contractors are included in this group if they are engaged in activities primarily related to power and communication line and related structures construction. All structures (including buildings) that are integral parts of power and communication networks (e.g., transmitting towers, substations, and power plants) are included.
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing (printer toner, etc.)	This U.S. industry comprises establishments primarily engaged in manufacturing sensitized film, sensitized paper, sensitized cloth, sensitized plates, toners (i.e., for photocopiers, laser printers, and similar electrostatic printing devices), toner cartridges, and photographic chemicals.
331422	Copper Wire (Except Mechanical) Drawing	This U.S. industry comprises establishments primarily engaged in drawing or drawing and insulating communication and energy wire and cable from purchased copper or in integrated secondary smelting and wire drawing plants.
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding	This U.S. industry comprises establishments primarily engaged in (1) rolling, drawing, or extruding shapes (e.g., bar, plate, sheet, strip, tube) from purchased nonferrous metals) and/or (2) recovering nonferrous metals from scrap and rolling, drawing, and/or extruding shapes (e.g., bar, plate, sheet, strip, tube) in integrated mills.
333295	Semiconductor Machinery Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing wafer processing equipment, semiconductor assembly and packaging equipment, and other semiconductor making machinery.
334412	Bare Printed Circuit Board Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing bare (i.e., rigid or flexible) printed circuit boards without mounted electronic components. These establishments print, perforate, plate, screen, etch, or photoprint interconnecting pathways for electric current on laminates.
334413	Semiconductor and Related Device Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing semiconductors and related solid state devices. Examples of products made by these establishments are integrated circuits, memory chips, microprocessors, diodes, transistors, solar cells and other optoelectronic devices.
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	This U.S. industry comprises establishments primarily engaged in loading components onto printed circuit boards or who manufacture and ship loaded printed circuit boards. Also known as printed circuit assemblies, electronics assemblies, or modules, these products are printed circuit boards that have some or all of the semiconductor and electronic components inserted or mounted and are inputs to a wide variety of electronic systems and devices.

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NAICS	Industry	Description
334419	Other Electronic Component Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing electronic components (except electron tubes; bare printed circuit boards; semiconductors and related devices; electronic capacitors; electronic resistors; coils, transformers and other inductors; connectors; and loaded printed circuit boards).
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	This U.S. industry comprises establishments primarily engaged in mass reproducing audio and video material on magnetic or optical media. Examples of products mass reproduced by these establishments are prerecorded audio compact discs, audio and video cassettes, and digital video discs (DVDs).
334613	Magnetic and Optical Recording Media Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing magnetic and optical recording media, such as blank magnetic tape, blank diskettes, blank optical discs, hard drive media, and blank magnetic tape cassettes.
335929	Other Communication and Energy Wire Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing insulated wire and cable of nonferrous metals from purchased wire.
335931	Current-Carrying Wiring Device Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing current-carrying wiring devices.
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	This U.S. industry comprises establishments primarily engaged in manufacturing industrial and commercial electric apparatus and other equipment (except lighting equipment, household appliances, transformers, motors, generators, switchgear, relays, industrial controls, batteries, communication and energy wire and cable, wiring devices, and carbon and graphite products). This industry includes power converters (i.e., AC to DC and DC to AC), power supplies, surge suppressors, and similar equipment for industrial-type and consumer-type equipment.
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	This industry comprises establishments primarily engaged in the merchant wholesale distribution of electrical construction materials; wiring supplies; electric light fixtures; light bulbs; and/or electrical power equipment for the generation, transmission, distribution, or control of electric energy.
423690	Other Electronic Parts and Equipment Merchant Wholesalers	This industry comprises establishments primarily engaged in the merchant wholesale distribution of electronic parts and equipment (except electrical apparatus and equipment, wiring supplies, and construction materials; electrical and electronic appliances; and television and radio sets).
454113	Mail-Order Houses	This U.S. industry comprises establishments primarily engaged in retailing all types of merchandise using mail catalogs or television to generate clients and display merchandise. Included in this industry are establishments primarily engaged in retailing from catalog showrooms of mail-order houses as well as establishments providing a combination of Internet and mail-order sales.
515111	Radio Networks	This U.S. industry comprises establishments primarily engaged in assembling and transmitting aural programming to their affiliates or subscribers via over-the-air broadcasts, cable, or satellite. The programming covers a wide variety of material, such as news services, religious programming, weather, sports, or music.

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NAICS	Industry	Description
515210	Cable and Other Subscription Programming	This industry comprises establishments primarily engaged in operating studios and facilities for the broadcasting of programs on a subscription or fee basis. The broadcast programming is typically narrowcast in nature (e.g., limited format, such as news, sports, education, or youth-oriented). These establishments produce programming in their own facilities or acquire programming from external sources. The programming material is usually delivered to a third party, such as cable systems or direct-to-home satellite systems, for transmission to viewers.
532420	Office Machinery and Equipment Rental and Leasing	This industry comprises establishments primarily engaged in renting or leasing office machinery and equipment, such as computers, office furniture, duplicating machines (i.e., copiers), or facsimile machines.
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	This industry comprises establishments primarily engaged in renting or leasing nonconsumer-type machinery and equipment (except heavy construction, transportation, mining, and forestry machinery and equipment without operators; and office machinery and equipment). Establishments in this industry rent or lease products, such as manufacturing equipment; metalworking, telecommunications, motion picture, or theatrical machinery and equipment; institutional (i.e., public building) furniture, such as furniture for schools, theaters, or buildings; or agricultural equipment without operators.
541430	Graphic Design Services	This industry comprises establishments primarily engaged in planning, designing, and managing the production of visual communication in order to convey specific messages or concepts, clarify complex information, or project visual identities. These services can include the design of printed materials, packaging, advertising, signage systems, and corporate identification (logos). This industry also includes commercial artists engaged exclusively in generating drawings and illustrations requiring technical accuracy or interpretative skills.
541611	Administrative Management and General Management Consulting Services	This U.S. industry comprises establishments primarily engaged in providing operating advice and assistance to businesses and other organizations on administrative management issues, such as financial planning and budgeting, equity and asset management, records management, office planning, strategic and organizational planning, site selection, new business startup, and business process improvement. This industry also includes establishments of general management consultants that provide a full range of administrative; human resource; marketing; process, physical distribution, and logistics; or other management consulting services to clients.
541618	Other Management Consulting Services	This U.S. industry comprises establishments primarily engaged in providing management consulting services (except administrative and general management consulting; human resources consulting; marketing consulting; or process, physical distribution, and logistics consulting). Establishments providing telecommunications or utilities management consulting services are included in this industry.
541690	Other Scientific and Technical Consulting Services	This industry comprises establishments primarily engaged in providing advice and assistance to businesses and other organizations on scientific and technical issues (except environmental).
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	This U.S. Industry comprises establishments primarily engaged in conducting research and experimental development (except biotechnology research and experimental development) in the physical, engineering, and life sciences, such as agriculture, electronics, environmental, biology, botany, computers, chemistry, food, fisheries, forests, geology, health, mathematics, medicine, oceanography, pharmacy, physics, veterinary and other allied subjects.

SECONDARY: These are industries non-exclusively or indirectly involved in the manufacture of ICT related equipment, peripherals, components or software, delivering network or telecommunications services, providing exclusively Internet or web-based services or doing exclusively Internet or web based commerce, providing computer system related services, or providing computer or communications equipment or software repair, maintenance or management services.

NAICS	Industry	Description
541910	Marketing Research and Public Opinion Polling	This industry comprises establishments primarily engaged in systematically gathering, recording, tabulating, and presenting marketing and public opinion data.
561431	Private Mail Centers	This U.S. industry comprises (1) establishments primarily engaged in providing mailbox rental and other postal and mailing (except direct mail advertising) services or (2) establishments engaged in providing these mailing services along with one or more other office support services, such as facsimile services, word processing services, on-site PC rental services, and office product sales.
561439	Other Business Service Centers (including Copy Shops)	This U.S. industry comprises (1) establishments generally known as copy centers or shops primarily engaged in providing photocopying, duplicating, blueprinting, and other document copying services, without also providing printing services (e.g., offset printing, quick printing, digital printing, prepress services) and (2) establishments (except private mail centers) engaged in providing a range of office support services (except printing services), such as document copying services, facsimile services, word processing services, on-site PC rental services, and office product sales.
926130	Regulation and Administration of Communications, Electric, Gas, and Other Utilities	This industry comprises government establishments primarily engaged in the administration, regulation, licensing and inspection of utilities, such as communications, electric power (including fossil, nuclear, solar, water, and wind), gas and water supply, and sewerage.

E: ICT Primary and Secondary SOC Mapping

For purposes of this study, Primary ICT SOC codes are assumed to be 100% counted as ICT-related employment. Secondary ICT SOC codes are assumed to be partially involved in ICT employment activities. It is not possible at this time to know to what extent; therefore, this study conservatively attributes only 25% of Secondary ICT SOC employment activity to ICT.

Primary:	**These are occupations directly involved in the development, manufacture, sales, implementation, maintenance, monitoring or support of ICT equipment, peripherals, software,**		
SOC	**Occupation**	**Description**	**Sample Job Titles**
11-3021	Computer and Information Systems Managers	Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming.	Information Technology Manager (IT Manager), Information Technology Director (IT Director), Information Systems Director (IS Director), Data Processing Manager, MIS Director (Management Information Systems Director), Information Systems Manager (IS Manager), Information Systems Supervisor (IS Supervisor), Computing Services Director, Director of Application Development, Technical Services Manager
15-1011	Computer and Information Scientists, Research	Conduct research into fundamental computer and information science as theorists, designers, or inventors. Solve or develop solutions to problems in the field of computer hardware and software.	Computer Scientist, Control System Computer Scientist, Scientific Programmer Analyst
15-1021	Computer Programmers	Convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language. Develop and write computer programs to store, locate, and retrieve specific documents, data, and information. May program web sites.	Programmer Analyst, Programmer, Analyst Programmer, Computer Programmer, Software Developer, Applications Developer, Computer Programmer Analyst, Internet Programmer, Java Developer, Web Programmer
15-1031	Computer Software Engineers, Applications	Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use with the aim of optimizing operational efficiency. May analyze and design databases within an application area, working individually or coordinating database development as part of a team.	Software Engineer, Application Integration Engineer, Programmer Analyst, Software Development Engineer, Computer Consultant, Software Architect, Software Developer, Technical Consultant, Applications Developer, Business Systems Analyst
15-1032	Computer Software Engineers, Systems Software	Research, design, develop, and test operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computing applications. Set operational specifications and formulate and analyze software requirements. Apply principles and techniques of computer science, engineering, and mathematical analysis.	Software Engineer, Software Developer, Systems Engineer, Network Engineer, Developer, Publishing Systems Analyst, Application Developer, Averaged HEND (High-Energy Neutron Data) Data Product Lead (AHD Product Lead), Business Systems Analyst, Computer Consultant
15-1041	Computer Support Specialists	Provide technical assistance to computer system users. Answer questions or resolve computer problems for clients in person, via telephone or from remote location. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems.	Information Technology Specialist (IT Specialist), Support Specialist, Computer Technician, Computer Support Specialist, Help Desk Analyst, Technical Support Specialist, Network Support Specialist, Electronic Data Processing Auditor (EDP Auditor), Network Technician, Computer Specialist

Primary:	These are occupations directly involved in the development, manufacture, sales, implementation, maintenance, monitoring or support of ICT equipment, peripherals, software,		
SOC	**Occupation**	**Description**	**Sample Job Titles**
15-1051	Computer Systems Analysts	Analyze science, engineering, business, and all other data processing problems for application to electronic data processing systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software. May supervise computer programmers.	Systems Analyst, Programmer Analyst, Business Systems Analyst, Computer Systems Analyst, Computer Systems Consultant, Computer Analyst, Information Systems Analyst (ISA), Applications Analyst, Business Analyst, Systems Engineer
15-1061	Database Administrators	Coordinate changes to computer databases, test and implement the database applying knowledge of database management systems. May plan, coordinate, and implement security measures to safeguard computer databases.	Database Administrator (DBA), Database Analyst, Database Administration Manager, Database Coordinator, Database Programmer, Information Systems Manager, Management Information Systems Director (MIS Director), Programmer Analyst, Systems Manager
15-1071	Network and Computer Systems Administrators	Install, configure, and support an organization's local area network (LAN), wide area network (WAN), and Internet system or a segment of a network system. Maintain network hardware and software. Monitor network to ensure network availability to all system users and perform necessary maintenance to support network availability. May supervise other network support and client server specialists and plan, coordinate, and implement network security measures.	Systems Administrator, Network Administrator, Network Engineer, Information Technology Specialist (IT Specialist), Local Area Network Administrator (LAN Administrator), Information Technology Manager (IT Manager), Information Technology Director (IT Director), Systems Engineer, Network Manager, Network Specialist
15-1081	Network Systems and Data Communications Analysts	Analyze, design, test, and evaluate network systems, such as local area networks (LAN), wide area networks (WAN), Internet, intranet, and other data communications systems. Perform network modeling, analysis, and planning. Research and recommend network and data communications hardware and software. Includes telecommunications specialists who deal with the interfacing of computer and communications equipment. May supervise computer programmers.	Network Analyst, Network Engineer, Systems Engineer, Systems Administrator, Systems Analyst, Network Specialist, Network Technician, System Programmer, Telecommunications Manager, Systems Specialist
15-1099	Computer Specialists, All Other	All computer specialists not listed separately.	SEE GROUPING BELOW
17-2061	Computer Hardware Engineers	Design core features of video games. Specify innovative game and role-play mechanics, story lines, and character biographies. Create and maintain design documentation. Guide and collaborate with production staff to produce games as designed.	N/A
25-1021	Computer Science Teachers, Postsecondary	Implement and administer enterprise-wide document management procedures for the capture, storage, retrieval, sharing, and destruction of electronic records and documents.	N/A
43-2011	Switchboard Operators, Including Answering Service	Operate telephone business systems equipment or switchboards to relay incoming, outgoing, and interoffice calls. May supply information to callers and record messages.	Switchboard Operator, PBX Operator (Private Branch Exchange Operator), Administrative Assistant, Operator, CBX Operator, Communication Specialist, Dispatcher, Telecommunications Operator, Office Assistant, Telecommunications Clerk

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SOC	**Occupation**	**Description**	**Sample Job Titles**
43-2021	Telephone Operators	Provide information by accessing alphabetical and geographical directories. Assist customers with special billing requests, such as charges to a third party and credits or refunds for incorrectly dialed numbers or bad connections. May handle emergency calls and assist children or people with physical disabilities to make telephone calls.	Operator, Directory Assistance Operator, Telephone Operator, Customer Service Assistant, Information Specialist, Long Distance Operator (LD Operator), Telecommunications Operator, Toll Operator, 411 Directory Assistance Operator, Live Source Operator
43-2099	Communications Equipment Operators, All Other	All communications equipment operators not listed separately.	N/A
43-9011	Computer Operators	Monitor and control electronic computer and peripheral electronic data processing equipment to process business, scientific, engineering, and other data according to operating instructions. May enter commands at a computer terminal and set controls on computer and peripheral devices. Monitor and respond to operating and error messages.	Computer Operator, Operations and Maintenance Technician, Computer Specialist, Information Technology Specialist, Software Technician, Systems Operator, Computer Console Operator, Computer Technician
43-9031	Desktop Publishers	Format typescript and graphic elements using computer software to produce publication-ready material.	Computer Typesetter, Art Director, Electronic Console Display Operator, Graphic Artist, Mac Operator, Production Manager, Desktop Publishing Specialist, Electronic Imager, Advertising Associate, Creative Director
49-2022	Telecommunications Equipment Installers and Repairers	Set-up, rearrange, or remove switching and dialing equipment used in central offices. Service or repair telephones and other communication equipment on customers' property. May install equipment in new locations or install wiring and telephone jacks in buildings under construction.	Central Office Technician, Install / Repair Technician, Service Technician, Installer, Telecommunications Technician, Customer Service Technician (CST), Combination Technician, Field Technician, Communications Technician, Outside Plant Technician
49-9052	Telecommunications Line Installers and Repairers	String and repair telephone and television cable, including fiber optics and other equipment for transmitting messages or television programming.	Combination Technician, Service Technician, Installation and Repair Technician (I & R Technician), Cable Splicer, Cable Technician, Installer, Outside Plant Technician, Construction Technician, Construction Worker, Lineman

Secondary:	These are occupations directly involved in the development, manufacture, sales, implementation, maintenance, monitoring or support of ICT equipment, peripherals, software, services, or systems.		
SOC	**Occupation**	**Description**	**Sample Job Titles**
17-2071	Electrical Engineers	Design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use.	Electrical Engineer, Electrical Design Engineer, Project Engineer, Electrical Controls Engineer, Test Engineer, Hardware Design Engineer, Broadcast Engineer, Circuits Engineer, Electrical and Instrument Maintenance Supervisor (E and I Maintenance Supervisor), Electrical Project En
17-3023	Electrical and Electronic Engineering Technicians and Technologists	Apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, calibrate, and modify electrical components, circuitry, controls, and machinery for subsequent evaluation and use by engineering staff in making engineering design decisions.	SEE GROUPING BELOW
27-1024	Graphic Designers	Design or create graphics to meet a client's specific commercial or promotional needs, such as packaging, displays, or logos. May use a variety of mediums to achieve artistic or decorative effects.	
27-3042	Technical Writers	Write technical materials, such as equipment manuals, appendices, or operating and maintenance instructions. May assist in layout work.	Technical Writer, Information Developer, Documentation Specialist, Documentation Designer, Engineering Writer, Technical Communicator
27-4099	Media and Communications Equipment Workers, All Other	All media and communication equipment workers not listed separately.	N/A
41-1011	First Line Managers/Supervisors of Retail Sales Workers	Directly supervise sales workers in a retail establishment or department. Duties may include management functions, such as purchasing, budgeting, accounting, and personnel work, in addition to supervisory duties.	Manager, Store Manager, Assistant Manager, Department Manager, Shift Manager, Meat Department Manager, Assistant Store Manager, Office Manager, Bakery Manager, Deli Manager
41-1012	First Line Managers/Supervisors of Non-Retail Sales Workers	Directly supervise and coordinate activities of sales workers other than retail sales workers. May perform duties, such as budgeting, accounting, and personnel work, in addition to supervisory duties.	Sales Manager, District Sales Manager, Branch Manager, Sales Supervisor, Area Sales Manager, Inside Sales Manager, Outside Sales Manager, Sales Activity Manager, Sales Leader, Sales Team Manager
41-2031	Retail Salespersons	Sell merchandise, such as furniture, motor vehicles, appliances, or apparel in a retail establishment.	Sales Associate, Sales Consultant, Sales Clerk, Sales Person, Customer Assistant, Clerk, Sales Representative, Design Consultant, Salesman, Bridal Consultant
41-3099	Sales Representatives, Services, All Other	All services sales representatives not listed separately.	N/A
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Sell goods for wholesalers or manufacturers where technical or scientific knowledge is required in such areas as biology, engineering, chemistry, and electronics, normally obtained from at least 2 years of post-secondary education.	Sales Representative, Account Manager, Sales Manager, Inside Sales Representative, Account Development Manager, Account Executive, Channel Sales Director, Marketing Representative, Sales Director, Distribution Sales Manage

Secondary:	These are occupations directly involved in the development, manufacture, sales, implementation, maintenance, monitoring or support of ICT equipment, peripherals, software, services, or systems.		
SOC	**Occupation**	**Description**	**Sample Job Titles**
43-1011	First Line Managers/Supervisors of Office and Administrative Workers	Supervise and coordinate the activities of clerical and administrative support workers.	Office Manager, Team Leader, Customer Service Manager, Customer Service Supervisor, Office Supervisor, Accounting Manager, Director, Office Coordinator, Accounts Payable Supervisor, Administrative Supervisor
43-4051	Customer Service Representatives	Interact with customers to provide information in response to inquiries about products and services and to handle and resolve complaints.	Customer Service Representative, Account Manager, Client Services Representative, Account Representative, Customer Service Specialist, Customer Service Agent, Member Services Representative, Hub Associate, Account Service Representative, Call Center Representative
49-2011	Computer, Automated Teller, and Office Machine Repairers	Repair, maintain, or install computers, word processing systems, automated teller machines, and electronic office machines, such as duplicating and fax machines.	Computer Technician, Field Service Engineer, Service Technician, Field Engineer, Computer Repair Technician, Customer Service Engineer, Field Service Technician, Computer Consultant, Copier Technician, Electronics Technician
49-2021	Radio Mechanics	Test or repair mobile or stationary radio transmitting and receiving equipment and two-way radio communications systems used in ship-to-shore communications and found in service and emergency vehicles.	Electronics Technician, Radio Technician, Field Technician, Radio Frequency Technician, Two-Way Radio Technician, Field Service Technician, Radio Repairman
49-2097	Electric Home Entertainment Equipment Installers and Repairers	Repair, adjust, or install audio or television receivers, stereo systems, camcorders, video systems, or other electronic home entertainment equipment.	Electronic Technician, Home Theater Installer, Field Service Technician, Satellite Installer, Television Analyzer, Installer, Service Technician, Television Repairman, Field Service Representative, Low Voltage Electrician
51-2022	Electrical and Electronic Equipment Assemblers	Assemble or modify electrical or electronic equipment, such as computers, test equipment telemetering systems, electric motors, and batteries.	Assembler, Assembly Worker, Production Worker, Electronic Assembler, Factory Assembler, Factory Worker, Armature Assembler, Breaker Units Assembler, Final Motor Assembler, Gear Assembler
51-9141	Semiconductor Processors	Perform any or all of the following functions in the manufacture of electronic semiconductors: load semiconductor material into furnace; saw formed ingots into segments; load individual segment into crystal growing chamber and monitor controls; locate crystal axis in ingot using x-ray equipment and saw ingots into wafers; clean, polish, and load wafers into series of special purpose furnaces, chemical baths, and equipment used to form circuitry and change conductive properties.	Wafer Fabrication Operator, Fabrication Operator, Process Technician, Diffusion Operator, Engineering Technician, Manufacturing Technician, Device Processing Engineer, Manufacture Specialist, Metalorganic Chemical Vapor Deposition Engineer (MOCVD Engineer), Probe Operator

F: ICT Industry NAICS Code Analysis

Primary:	These are industries directly involved in the manufacture of ICT related equipment, peripherals or software, delivering network or telecommunications services, providing exclusively Internet or web-based services or doing exclusively Internet or web based commerce, providing computer system related services, or providing computer or communications equipment or software repair, maintenance or management services.							
NAICS	**Industry**	**Employment Development Department (EDD)**				**InfoUSA**		
		2008 Establishments	**2008 Annual Employment**	**2008 Total Payroll (in thousands)**	**2008 Average Annual Payroll (Per Worker)**	**2008 Establishments**	**Sales Revenue 2008 (in thousands)**	**Total 2008 Employment**
323115	Digital Printing	241	3,655	$177,772	$48,638	-	$0	-
334111	Electronic Computer Manufacturing	173	43,085	$6,926,669	$160,768	223	$14,795,754	23,140
334112	Computer Storage Device Manufacturing	N/A	N/A	N/A	N/A	37	$18,552	12,024
334113	Computer Terminal Manufacturing	N/A	N/A	N/A	N/A	5	$21,172	568
334119	Other Computer Peripheral Equipment Manufacturing	164	8,213	$788,336	$95,986	165	$1,448,742	17,925
334210	Telephone Apparatus Manufacturing	92	6,083	$865,949	$142,356	44	$1,783,644	3,861
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	234	16,873	$1,490,449	$88,333	120	$1,520,302	5,372
334290	Other Communications Equipment Manufacturing	100	4,330	$430,244	$99,364	186	$1,469,110	6,834
334611	Software Reproducing	84	2,128	$157,693	$74,104	5	$17,472	63
335921	Fiber Optic Cable Manufacturing	33	1,218	$105,684	$86,769	41	$371,076	1,632
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	1,467	37,037	$4,137,387	$111,710	548	$5,886,600	10,263
425110	Business to Business Electronic Markets	916	8,635	$602,802	$69,809	264	$1,689,388	2,712
443120	Computer and Software Stores	1,903	24,285	$2,358,756	$97,128	7,004	$24,883,296	83,529
454111	Electronic Shopping	1,059	12,031	$711,866	$59,169	528	$1,654,455	4,590
454112	Electronic Auctions	99	4,492	$604,333	$134,535	2	$264,957	651
511210	Software Publishers	1,032	43,246	$6,151,259	$142,239	141	$1,256,462	29,149
517110	Wired Telecommunications Carriers	1,944	35,965	$3,121,915	$86,804	886	$3,575,922	14,185
517210	Wireless Telecommunications Carriers (except Satellite)	1,122	30,026	$3,528,152	$117,503	4,058	$14,151,576	30,257
517410	Satellite Telecommunications	327	6,444	$482,113	$74,816	-	$0	-
517911	Telecommunications Resellers	1,454	42,861	$3,442,936	$80,328	12	$53,196	146
517919	All Other Telecommunications	154	2,244	$233,659	$104,126	3,023	$39,799,747	102,426
518210	Data Processing, Hosting, and Related Services	1,062	19,617	$1,887,034	$96,194	4,090	$6,760,346	44,980
519130	Internet Publishing and Broadcasting and Web Search Portals	1,005	30,443	$4,787,669	$157,267	1	$2,005	5
541511	Custom Computer Programming Services	10,157	117,509	$13,180,399	$112,165	5,431	$6,884,887	50,994
541512	Computer Systems Design Services	7,337	73,691	$7,282,651	$98,827	3,493	$4,374,208	26,950
541513	Computer Facilities Management Services	188	2,760	$163,421	$59,210	-	$0	-

NAICS	Industry	Employment Development Department (EDD)				InfoUSA		
		2008 Establishments	2008 Annual Employment	2008 Total Payroll (in thousands)	2008 Average Annual Payroll (Per Worker)	2008 Establishments	Sales Revenue 2008 (in thousands)	Total 2008 Employment
541519	Other Computer Related Services	1,022	11,689	$1,117,390	$95,593	1,447	$1,983,660	12,674
611420	Computer Training	161	1,136	$65,480	$57,640	445	$513,400	3,271
811212	Computer and Office Machine Repair and Maintenance	708	5,931	$287,311	$48,442	3,846	$2,742,601	17,948
811213	Communication Equipment Repair and Maintenance	105	905	$43,691	$48,277	114	$57,348	486
Subtotal		**34,343**	**596,532**	**$65,133,022**	**$94,575**	**36,159**	**$137,979,878**	**506,635**

Secondary: These are industries non-exclusively or indirectly involved in the manufacture of ICT related equipment, components or software, delivering network or telecommunications services, providing exclusively Internet or web-based services or doing exclusively Internet or web based commerce, providing computer system related services, or providing computer or communications equipment or software repair, maintenance or management services.

NAICS	Industry	Employment Development Department (EDD)				InfoUSA		
		2008 Establishments	2008 Annual Employment	2008 Total Payroll (in thousands)	2008 Average Annual Payroll (Per Worker)	2008 Establishments	Sales Revenue 2008 (in thousands)	Total 2008 Employment
238211	Electrical Contractors and Other Wiring Installation Contractors (res)	5,074	35,029	$774,040	$47,619	9,821	$1,321,320	70,584
238212	Electrical Contractors and Other Wiring Installation Contractors (non-residential)	2,935	55,207	$51,886	$65,900	N/A	$0	
237130	Power and Communication Line and Related Structures Construction	316	10,975	$40,271	$70,528	477	$0	8,250
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing (printer toner, etc.)	50	863	$45,187	$60,123	0	$398,708	0
331422	Copper Wire (Except Mechanical) Drawing	17	826	$1,135,467	$48,754	0	$0	0
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding	37	975	$796,162	$46,346	39	$2,507,237	1,107
333295	Semiconductor Machinery Manufacturing	89	8,878	$5,906,428	$127,897	0	$8,373,276	0
334412	Bare Printed Circuit Board Manufacturing	289	14,418	$391,972	$55,220	328	$0	18,065
334413	Semiconductor and Related Device Manufacturing	554	48,687	$1,248,798	$121,314	545	$5,565,925	50,128
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	216	8,182	$110,889	$47,907	0	$499,847	0
334419	Other Electronic Component Manufacturing	249	16,032	$349,923	$77,894	872	$302,376	39,078
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	92	1,534	$31,443	$72,288	208	$152,470	2,003
334613	Magnetic and Optical Recording Media Manufacturing	26	3,247	$195,014	$107,768	10	$279,310	517

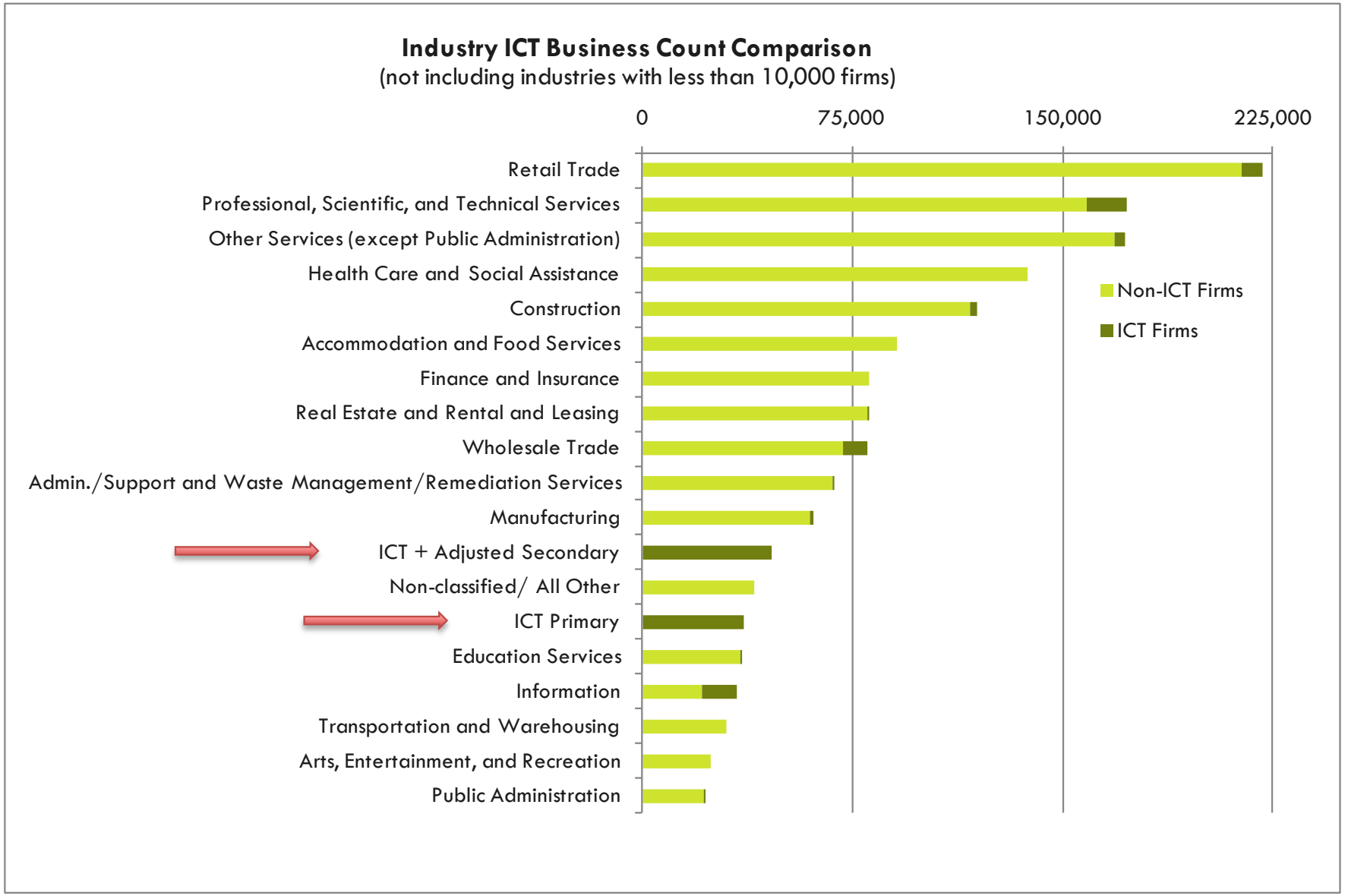
NAICS	Industry	Employment Development Department (EDD)				InfoUSA		
		2008 Establishments	2008 Annual Employment	2008 Total Payroll (in thousands)	2008 Average Annual Payroll (Per Worker)	2008 Establishments	Sales Revenue 2008 (in thousands)	Total 2008 Employment
335929	Other Communication and Energy Wire Manufacturing	26	704	$205,869	$44,663	12	$941,106	415
335931	Current-Carrying Wiring Device Manufacturing	71	3,022	$1,151,326	$64,531	14	$50,449,343	1,334
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	159	3,522	$2,622,715	$58,452	211	$24,014,417	4,028
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	1,284	17,077	$453,928	$67,420	5,786	$2,602,765	79,155
423690	Other Electronic Parts and Equipment Merchant Wholesalers	2,054	28,451	$247,075	$92,184	2,207	$0	27,492
454113	Mail-Order Houses	557	9,974	$1,405,440	$45,511	541	$7,441,725	7,709
515111	Radio Networks	183	3,645	$75,519	$67,785	0	$828,014	0
515210	Cable and Other Subscription Programming	276	19,818	$423,258	$70,917	554	$1,850,795	8,016
532420	Office Machinery and Equipment Rental and Leasing	117	991	$874,577	$76,205	407	$4,217,398	3,631
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	626	7,909	$3,509,649	$53,516	761	$908,620	10,485
541430	Graphic Design Services	2,476	13,396	$1,556,186	$65,286	5,386	$6,452,162	22,832
541611	Administrative Management and General Management Consulting Services	5,470	34,790	$4,434,166	$100,881	632	$3,813,726	5,829
541618	Other Management Consulting Services	1,903	16,337	$10,113,077	$95,255	4,907	$5,456	37,523
541690	Other Scientific and Technical Consulting Services	15,129	69,013	$880,245	$64,251	2,182	$2,753,272	16,411
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	2,303	87,937	$98,366	$115,004	4	$57,276	30
541910	Marketing Research and Public Opinion Polling	1,421	13,454	$501,496	$65,426	1,664	$1,402,296	22,665
561431	Private Mail Centers	839	3,645	$0	$26,987	152	$0	388
561439	Other Business Service Centers (including Copy Shops)	1,350	14,160	$44,936,561	$35,416	1,375	$139,036,076	10,677
926130	Regulation and Administration of Communications, Electric, Gas, and Other Utilities					203	$0	7,238
Subtotal		**46,188**	**552,698**	**$84,566,933**	**$69,653**	**39,298**	**$266,174,916**	**455,590**
25% of Subtotal		**11,547**	**138,175**	**$21,141,733**	**$17,413**	**9,825**	**$66,543,729**	**113,898**

Industry Totals	Employment Development Department (EDD)				InfoUSA		
	2008 Establishments	2008 Annual Employment	2008 Total Payroll (in thousands)	2008 Average Annual Payroll (Per Worker)	2008 Establishments	Sales Revenue 2008 (in thousands)	Total 2008 Employment
Total Primary Plus Secondary ICT NAICS	80,531	1,149,230	$149,699,954	N/A	75,457	$404,154,794	962,225
Total Primary Plus 25% of Secondary ICT NAICS	45,890	734,707	$86,274,755	N/A	45,984	$204,523,607	620,533
Total for California in All Industries	1,293,475	13,039,293	$661,146,094	$50,700	1,482,813	$3,007,000,000	16,479,681
Primary ICT NAICS as Percent of All California NAICS	3%	5%	10%	187%	2%	5%	3%
Secondary ICT NAICS as Percent of All California NAICS	4%	4%	13%	137%	3%	9%	3%
Primary + Secondary NAICS as % of All California NAICS	6%	9%	23%		5%	13%	6%
25% of Secondary ICT NAICS as % of All California NAICS	1%	1%	3%		1%	2%	1%
Primary + 25% of Secondary NAICS as % of All California NAICS	4%	6%	13%		3%	7%	4%

Industry ICT Business Count Comparison

2-Digit NAICS	Industry	Non-ICT Firms	ICT Firms	Total Firms
44-45	Retail Trade	213,708	7,669	221,377
54	Professional, Scientific, and Technical Services	158,718	14,065	172,783
81	Other Services (except Public Administration)	168,400	3,960	172,360
62	Health Care and Social Assistance	137,675	-	137,675
23	Construction	116,891	2,575	119,466
72	Accommodation and Food Services	90,613	-	90,613
52	Finance and Insurance	80,924	-	80,924
53	Real Estate and Rental and Leasing	80,126	292	80,418
42	Wholesale Trade	71,607	8,805	80,412
56	Admin./Support and Waste Management/Remediation Services	68,148	382	68,530
31-33	Manufacturing	59,612	1,386	60,998
	ICT + Adjusted Secondary	**-**	**45,984**	**45,984**
99	Non-classified/ All Other	39,980	-	39,980
	ICT Primary	**-**	**36,159**	**36,159**
61	Education Services	34,798	445	35,243
51	Information	21,238	12,350	33,588
48-49	Transportation and Warehousing	29,790	-	29,790
71	Arts, Entertainment, and Recreation	24,562	-	24,562
92	Public Administration	21,908	51	21,959

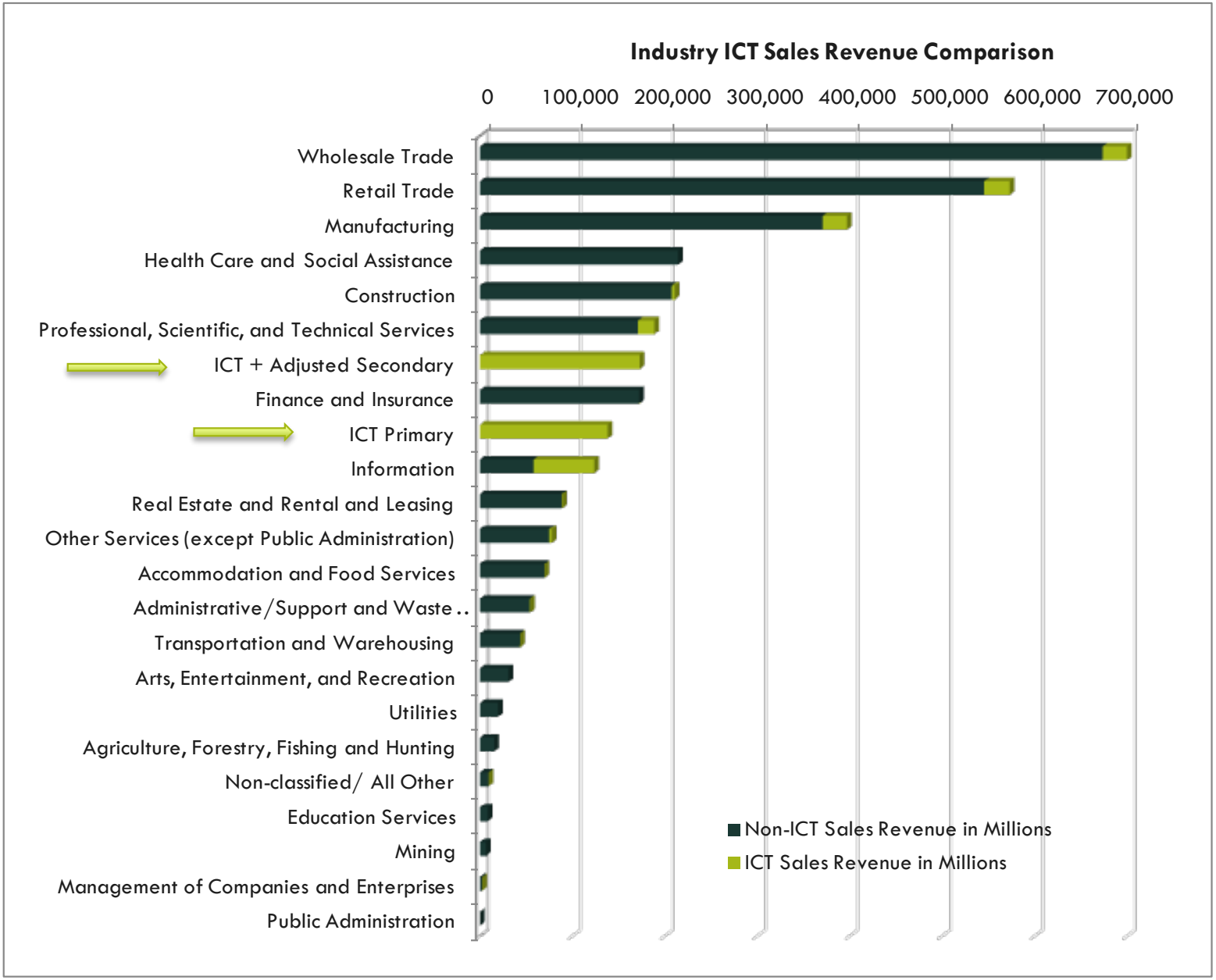
Industry ICT Business Count Comparison



ICT Industry Sales Revenue Comparison

2-Digit NAICS	Industry	Non-ICT Sales Revenue in Millions	ICT Sales Revenue in Millions	Total Sales Revenue in Millions
42	Wholesale Trade	673,493	26,192	699,685
44-45	Retail Trade	545,549	27,453	573,002
31-33	Manufacturing	370,807	26,201	397,008
62	Health Care and Social Assistance	214,252	-	214,252
23	Construction	207,511	3,305	210,815
54	Professional, Scientific, and Technical Services	171,014	17,780	188,795
	ICT + Adjusted Secondary	**-**	**172,739**	**172,739**
52	Finance and Insurance	172,330	-	172,330
	ICT Primary	**-**	**137,980**	**137,980**
51	Information	58,046	65,601	123,647
53	Real Estate and Rental and Leasing	88,417	670	89,087
81	Other Services (except Public Administration)	75,183	2,800	77,983
72	Accommodation and Food Services	70,042	-	70,042
56	Administrative/Support and Waste Management/Remediation Services	54,140	365	54,505
48-49	Transportation and Warehousing	43,403	-	43,403
71	Arts, Entertainment, and Recreation	30,908	-	30,908
22	Utilities	19,566	-	19,566
11	Agriculture, Forestry, Fishing and Hunting	15,355	-	15,355
99	Non-classified/ All Other	9,386	-	9,386
61	Education Services	8,381	-	8,381
21	Mining	6,556	-	6,556
55	Management of Companies and Enterprises	2,264	-	2,264
92	Public Administration	116	-	116

ICT Industry Sales Revenue Comparison



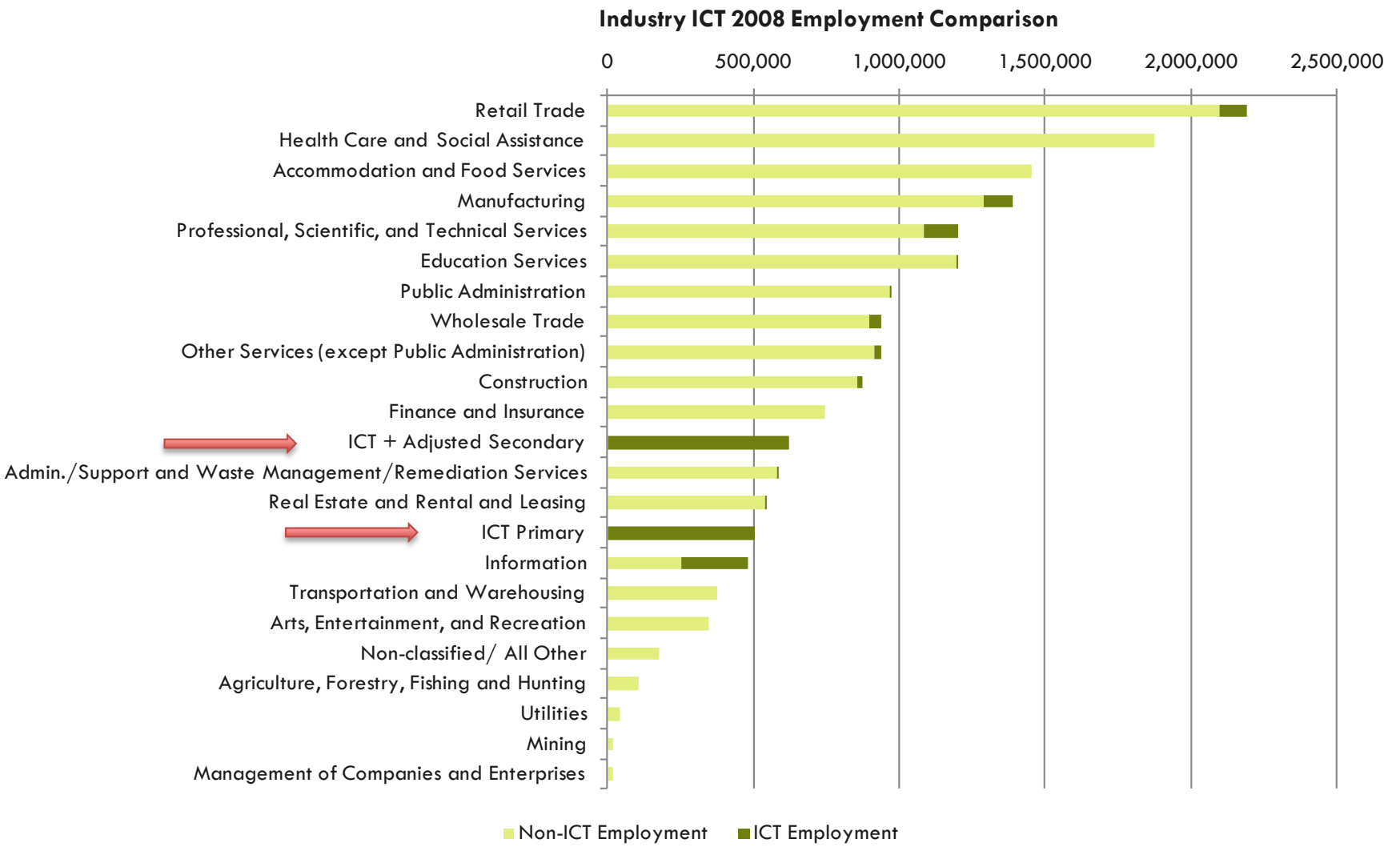
ICT Industry 2008 Employment Comparison

2-Digit NAICS	Industry	Non-ICT Employment	ICT Employment	Total Employment
44-45	Retail Trade	2,099,440	90,697	2,190,137
62	Health Care and Social Assistance	1,877,626	-	1,877,626
72	Accommodation and Food Services	1,454,686	-	1,454,686
31-33	Manufacturing	1,289,910	100,588	1,390,498
54	Professional, Scientific, and Technical Services	1,086,022	116,941	1,202,963
61	Education Services	1,196,686	3,271	1,199,957
92	Public Administration	967,800	1,810	969,610
42	Wholesale Trade	900,170	39,637	939,807
81	Other Services (except Public Administration)	917,690	18,434	936,124
23	Construction	854,999	19,709	874,708
52	Finance and Insurance	745,764	-	745,764
	ICT + Adjusted Secondary	**-**	**620,533**	**620,533**
56	Admin./Support and Waste Management/Remediation Services	581,258	2,901	584,159
53	Real Estate and Rental and Leasing	542,379	3,529	545,908
	ICT Primary	**-**	**506,635**	**506,635**
51	Information	256,320	223,152	479,472
48-49	Transportation and Warehousing	379,324	-	379,324
71	Arts, Entertainment, and Recreation	349,988	-	349,988
99	Non-classified/ All Other	176,874	-	176,874
11	Agriculture, Forestry, Fishing and Hunting	105,673	-	105,673
22	Utilities	41,717	-	41,717
21	Mining	17,621	-	17,621
55	Management of Companies and Enterprises	17,065	-	17,065

ICT Industry 2008 Employment Comparison

2-Digit NAICS	Industry	Non-ICT Employment	ICT Employment	Total Employment
44-45	Retail Trade	2,099,440	90,697	2,190,137
62	Health Care and Social Assistance	1,877,626	-	1,877,626
72	Accommodation and Food Services	1,454,686	-	1,454,686
31-33	Manufacturing	1,289,910	100,588	1,390,498
54	Professional, Scientific, and Technical Services	1,086,022	116,941	1,202,963
61	Education Services	1,196,686	3,271	1,199,957
92	Public Administration	967,800	1,810	969,610
42	Wholesale Trade	900,170	39,637	939,807
81	Other Services (except Public Administration)	917,690	18,434	936,124
23	Construction	854,999	19,709	874,708
52	Finance and Insurance	745,764	-	745,764
	ICT + Adjusted Secondary	**-**	**620,533**	**620,533**
56	Admin./Support and Waste Management/Remediation Services	581,258	2,901	584,159
53	Real Estate and Rental and Leasing	542,379	3,529	545,908
	ICT Primary	**-**	**506,635**	**506,635**
51	Information	256,320	223,152	479,472
48-49	Transportation and Warehousing	379,324	-	379,324
71	Arts, Entertainment, and Recreation	349,988	-	349,988
99	Non-classified/ All Other	176,874	-	176,874
11	Agriculture, Forestry, Fishing and Hunting	105,673	-	105,673
22	Utilities	41,717	-	41,717
21	Mining	17,621	-	17,621
55	Management of Companies and Enterprises	17,065	-	17,065

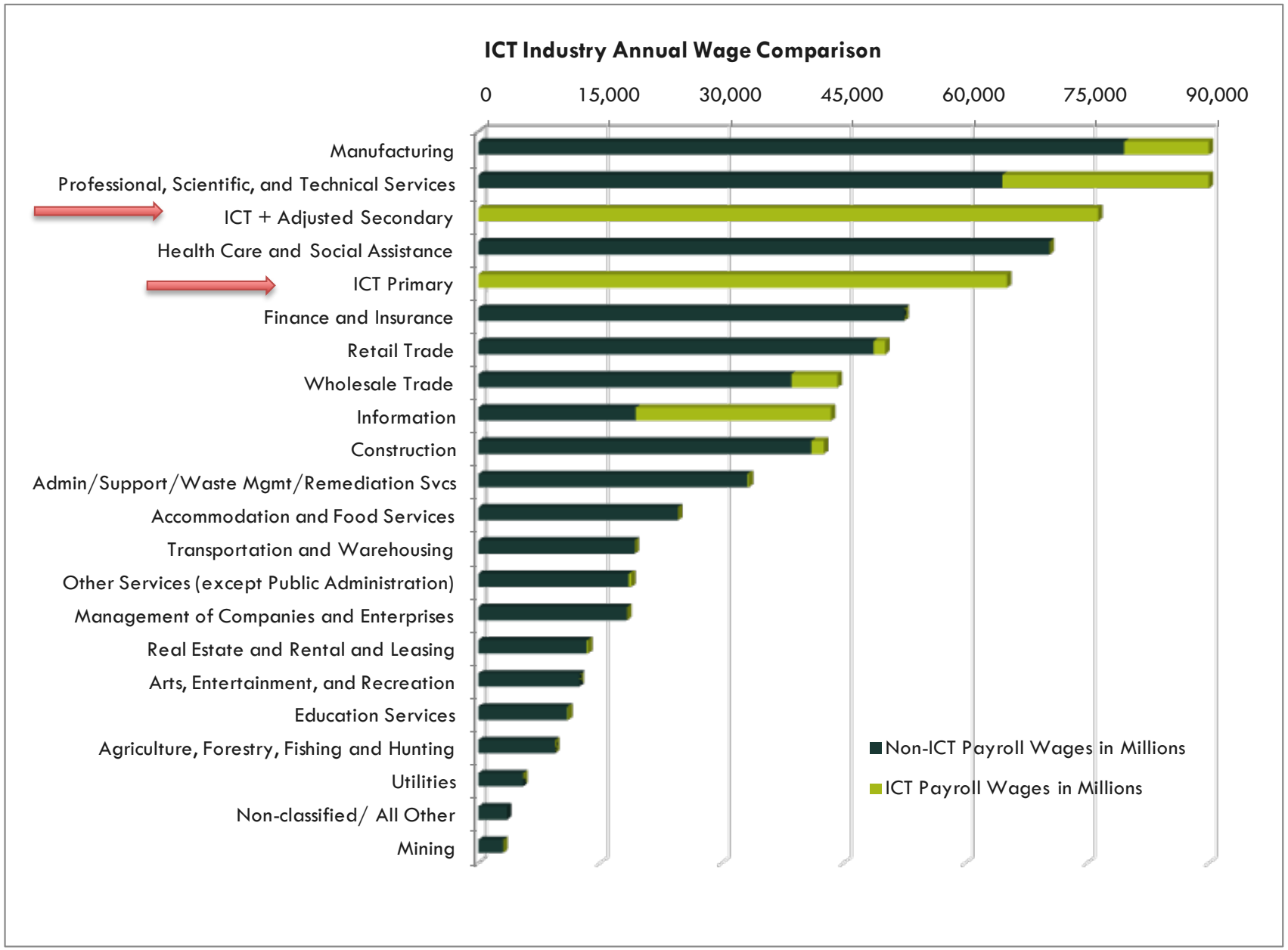
ICT Industry 2008 Employment Comparison



ICT Industry 2008 Annual Payroll Comparison

2-Digit NAICS	Industry	Non-ICT Payroll Wages in Millions	ICT Payroll Wages in Millions	Total Annual Payroll in Millions
31-33	Manufacturing	79,591	13,570	$93,161
54	Professional, Scientific, and Technical Services	64,592	27,086	$91,678
	ICT + Adjusted Secondary	-	76,367	$76,367
62	Health Care and Social Assistance	70,394	-	$70,394
	ICT Primary	-	65,133	$65,133
52	Finance and Insurance	52,461	-	$52,461
44-45	Retail Trade	48,716	1,430	$50,145
42	Wholesale Trade	38,576	5,684	$44,260
51	Information	19,408	24,048	$43,456
23	Construction	41,063	1,520	$42,583
56	Admin/Support/Waste Mgmt/Remediation Svcs	33,171	150	$33,321
72	**Accommodation and Food Services**	**24,607**	**-**	**$24,607**
48-49	Transportation and Warehousing	19,279	-	$19,279
81	Other Services (except Public Administration)	18,529	331	$18,860
55	**Management of Companies and Enterprises**	**18,340**	**-**	**$18,340**
53	Real Estate and Rental and Leasing	13,397	125	$13,522
71	Arts, Entertainment, and Recreation	12,463	-	$12,463
61	Education Services	11,000	65	$11,066
11	Agriculture, Forestry, Fishing and Hunting	9,456	-	$9,456
22	Utilities	5,508	-	$5,508
99	Non-classified/ All Other	3,526	-	$3,526
21	Mining	3,059	-	$3,059

ICT Industry 2008 Annual Payroll Wage Comparison



G: ICT Related Occupational (SOC Code) Data and Analysis

Totals	EDD						EMSI							BLS					
	Estimated 2006 Employment	Estimated 2016 Employment	2006-2016 Numeric Change	2006-2016 % Change	Annual New and Repl. Jobs	Median Hourly Wage	Estimated 2010 Employment	Estimated 2016 Employment	2010-2016 Numeric Change	2010-2016 % Change	2010-2016 New and Repl. Jobs	Annual New and Repl. Jobs	Median Hourly Wage	2008 Estimated Employment	2018 Estimated Employment	2008-2018 Numeric Change	2008-2018 % Change	2008-2018 New and Repl. Jobs	2008-2018 Annual New and Repl. Jobs
TOTAL PRIMARY + SECONDARY	1,964,600	2,336,900	372,300	18.95%	86,040	$29.75	2,313,070	2,571,025	257,955	11.15%	594,480	99,080	$29.17	17,080,000	19,033,800	1,953,900	11.4%	6,104,900	610,490
TOTAL PRIMARY + 25% OF SECONDARY	901,175	1,088,000	186,825	20.73%	40,230	$29.75	1,052,649	1,183,380	130,731	12.42%	279,653	46,609	$29.17	7,633,000	8,700,000	1,067,175	14.0%	2,742,125	274,213
Total for California/U.S. in All SOC Codes	17,173,500	19,683,800	2,510,300	14.62%	632,240	$17.31	20,297,255	22,117,349	1,820,094	9.00%	4,481,219	448,122	$22.00	150,932,000	########	15,274,000	10.1%	34,284,400	3,428,440
Primary ICT SOCs as Percent of All SOCs	3%	3%	5%		4%	203%	3%	3%	5%		4%	6%	141%	3%	3%	5%		5%	5%
Secondary ICT SOCs as Percent of All SOCs	8%	8%	10%		10%	141%	8%	8%	9%		9%	16%	124%	8%	8%	8%		13%	13%
Primary + Secondary NAICS as % of All SOCs	11%	12%	15%		14%	174%	11%	12%	14%		13%	22%	123%	11%	11%	13%		18%	18%
25% of Secondary ICT SOCs as % of All SOCs	2%	2%	2%		2%	N/A	2%	2%	2%		2%	4%	N/A	2%	2%	2%		3%	3%
Primary + 25% of Secondary SOCs as % of All SOCs	5%	6%	7%		6%	N/A	5%	5%	7%		6%	10%	N/A	5%	5%	7%		8%	8%

Primary: These are occupations directly involved in the development, manufacture, sales, implementation, maintenance, monitoring or support of ICT equipment, components, software, services, or systems.

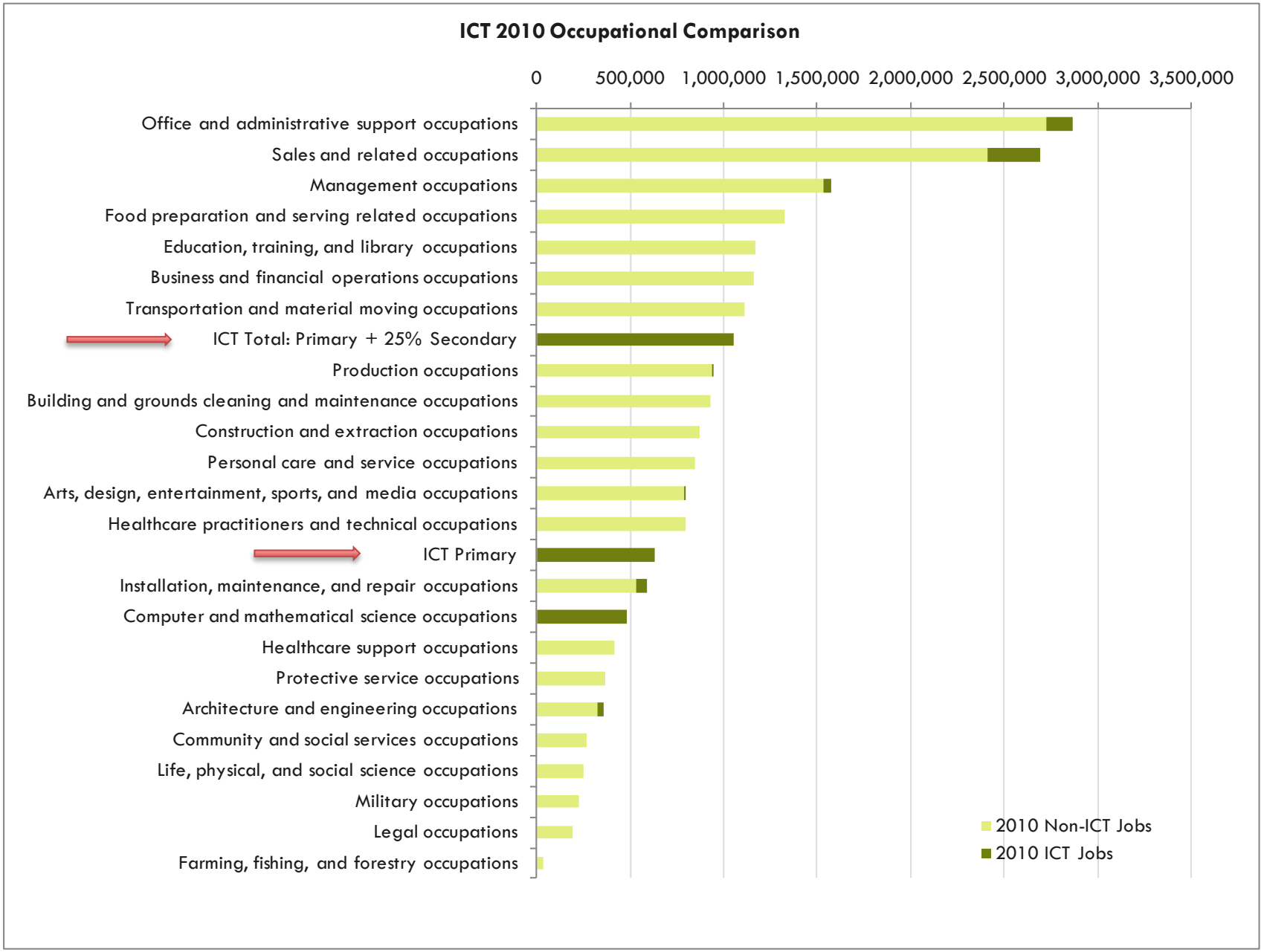
SOC	Occupation	EDD						EMSI							BLS (National data)					
		Estimated 2006 Employment	Estimated 2016 Employment	2006-2016 Numeric Change	2006-2016 % Change	Annual New and Repl. Jobs	Median Hourly Wage	Estimated 2010 Employment	Estimated 2016 Employment	2010-2016 Numeric Change	2010-2016 % Change	2010-2016 New and Repl. Jobs	Annual New and Repl. Jobs	Median Hourly Wage	2008 Estimated Employment	2018 Estimated Employment	2008-2018 Numeric Change	2008-2018 % Change	2008-2018 New and Repl. Jobs	2008-2018 Annual New and Repl. Jobs
11-3021	Computer and Information Systems Managers	36,400	43,400	7,000	19.2%	1,290	$61.34	42,170	46,804	4,634	10.99%	8,628	1,438	$56.81	293,000	342,500	49,500	16.9%	97,100	9,710
15-1011	Computer and Information Scientists, Research	5,300	6,600	1,300	24.5%	270	$54.44	11,085	12,360	1,275	11.50%	2,988	498	$31.29	28,900	35,900	7,000	24.2%	13,200	1,320
15-1021	Computer Programmers	36,900	35,700	-1,200	-3.3%	770	$39.31	44,966	45,768	802	1.78%	7,460	1,243	$33.11	426,700	414,400	-12,300	-2.9%	80,300	8,030
15-1031	Computer Software Engineers, Applications	87,300	128,400	41,100	47.1%	5,380	$46.81	84,953	106,626	21,673	25.51%	28,767	4,795	$43.29	514,800	689,900	175,100	34.0%	218,400	21,840
15-1032	Computer Software Engineers, Systems Software	52,100	66,800	14,700	28.2%	2,230	$50.80	77,599	91,057	13,458	17.34%	20,048	3,341	$46.61	394,800	515,000	120,200	30.4%	153,400	15,340
15-1041	Computer Support Specialists	61,100	71,600	10,500	17.2%	2,940	$23.59	66,992	73,393	6,401	9.55%	18,527	3,088	$22.82	565,700	643,700	78,000	13.8%	234,600	23,460
15-1051	Computer Systems Analysts	53,900	69,100	15,200	28.2%	2,950	$38.86	62,390	73,577	11,187	17.93%	20,759	3,460	$35.58	532,200	640,300	108,100	20.3%	222,800	22,280
15-1061	Database Administrators	11,400	14,900	3,500	30.7%	470	$39.32	15,380	17,962	2,582	16.79%	3,536	589	$37.47	120,400	144,700	24,400	20.3%	44,400	4,440
15-1071	Network and Computer Systems Administrators	32,400	42,200	9,800	30.2%	1,720	$36.65	37,848	44,419	6,571	17.36%	11,577	1,930	$34.98	339,500	418,400	78,900	23.2%	135,500	13,550
15-1081	Network Systems and Data Communications Analysts	28,900	45,900	17,000	58.8%	2,290	$36.96	41,778	52,656	10,878	26.04%	15,743	2,624	$30.12	292,000	447,800	155,800	53.4%	208,300	20,830
15-1099	Computer Specialists, All Other	32,600	39,400	6,800	20.9%	1,540	$37.90	37,460	41,783	4,323	11.54%	10,130	1,688	$34.10	209,300	236,800	27,500	13.1%	72,600	7,260
17-2061	Computer Hardware Engineers	21,400	23,700	2,300	10.7%	890	$52.98	20,628	22,253	1,625	7.88%	5,420	903	$51.01	74,700	77,500	2,800	3.7%	23,500	2,350
25-1021	Computer Science Teachers, Postsecondary	2,800	3,600	800	28.6%	130	$12.97	N/A	N/A	N/A	#VALUE!	N/A	N/A	N/A	N/A	N/A	N/A	#VALUE!	N/A	N/A
43-2011	Switchboard Operators, Including Answering Service	19,300	17,400	-1,900	-9.8%	400	$21.13	18,659	17,594	-1,065	-5.71%	3,283	547	$12.73	155,200	138,300	-16,900	-10.9%	32,100	3,210
43-2021	Telephone Operators	3,100	2,000	-1,100	-35.5%	40	$22.68	2,139	1,811	-328	-15.33%	680	113	$16.67	22,700	21,900	-800	-3.5%	3,900	390
43-2099	Communications Equipment Operators, All Other	N/A	N/A	N/A	N/A	N/A	$18.62	378	407	29	7.67%	71	12	$21.82	3,600	3,200	-400	-11.1%	800	80
43-9011	Computer Operators	12,600	9,600	-3,000	-23.8%	200	$19.04	12,696	11,007	-1,689	-13.30%	3,128	521	$17.97	110,000	89,500	-20,500	-18.6%	12,400	1,240
43-9031	Desktop Publishers	2,900	2,900	0	0.0%	60	$28.76	6,428	7,217	789	12.27%	1,546	258	$15.11	26,400	20,400	-5,900	-22.3%	4,400	440
49-2022	Telecommunications Equipment Installers and Repairers	29,500	30,500	1,000	3.4%	830	$25.67	27,976	31,609	3,633	12.99%	7,650	1,275	$27.27	203,100	202,600	-500	-0.2%	35,600	3,560
49-9052	Telecommunications Line Installers and Repairers	16,800	18,000	1,200	7.1%	560	$35.15	20,983	22,528	1,545	7.36%	4,769	795	$22.36	171,000	172,600	1,600	0.9%	27,900	2,790
	SUBTOTAL	**546,700**	**671,700**	**125,000**	**22.86%**	**24,960**	**$35.15**	**632,508**	**720,831**	**88,323**	**13.96%**	**174,710**	**29,118**	**$31.11**	**4,484,000**	**5,255,400**	**771,600**	**17.2%**	**1,621,200**	**162,120**

Secondary These are occupations indirectly involved in the development, manufacture, sales, implementation, maintenance, monitoring or support of ICT equipment, components, software, services, or systems.

		EDD						EMSI							BLS					
SOC	Occupation	Estimated 2006 Employment	Estimated 2016 Employment	2006-2016 Numeric Change	2006-2016 % Change	Annual New and Repl. Jobs	Median Hourly Wage	Estimated 2010 Employment	Estimated 2016 Employment	2010-2016 Numeric Change	2010-2016 % Change	2010-2016 New and Repl. Jobs	Annual New and Repl. Jobs	Median Hourly Wage	2008 Estimated Employment	2018 Estimated Employment	2008-2018 Numeric Change	2008-2018 % Change	2008-2018 New and Repl. Jobs	2008-2018 Annual New and Repl. Jobs
17-2071	Electrical Engineers	19,600	20,700	1,100	5.6%	570	$45.56	19,285	20,140	855	4.00%	3,540	590	$43.72	157,800	160,500	2,700	1.7%	38,900	3,890
17-3023	Electrical and Electronic Engineering Technicians and Technologists	23,000	25,300	2,300	10.0%	680	$28.23	19,540	20,522	982	5.00%	3,264	544	$27.14	164,000	160,400	-3,600	-2.2%	31,000	3,100
27-1024	Graphic Designers	36,700	41,800	5,100	14.0%	1,490	$24.29	38,325	43,908	5,583	15.00%	12,418	2,070	$22.73	286,100	323,100	37,000	13.0%	124,800	12,480
27-3042	Technical Writers	7,200	8,600	1,400	19.4%	360	$37.08	8,905	9,960	1,055	12.00%	2,623	437	$30.90	48,900	57,800	8,900	18.2%	16,800	1,680
27-4099	Media and Communications Equipment Workers, All Other	4,800	5,600	800	16.7%	200	$23.24	7,090	7,589	499	7.00%	1,559	260	$20.08	20,600	23,100	2,600	12.6%	7,600	760
41-1011	First Line Managers/Supervisors of Retail Sales Workers	188,900	210,600	21,700	11.5%	6,130	$17.34	267,849	288,067	20,218	8.00%	53,122	8,854	$16.86	1,685,500	1,773,900	88,400	5.2%	450,100	45,010
41-1012	First Line Managers/Supervisors of Non-Retail Sales Workers	56,400	60,500	4,100	7.3%	1,220	$32.94	118,240	129,653	11,413	10.00%	21,328	3,555	$25.88	506,800	531,200	24,400	4.8%	129,500	12,950
41-2031	Retail Salespersons	494,500	603,800	109,300	22.1%	26,160	$9.88	547,510	610,378	62,868	11.00%	160,914	26,819	$10.40	4,489,200	4,863,900	374,700	8.3%	1,626,900	162,690
41-3099	Sales Representatives, Services, All	97,800	127,200	29,400	30.1%	5,240	$25.48	114,787	132,421	17,634	15.00%	33,299	5,550	$23.41	589,700	671,600	81,900	13.9%	228,100	22,810
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific	45,400	53,500	8,100	17.8%	1,810	$36.25	68,814	74,625	5,811	8.00%	14,736	2,456	$36.39	432,900	475,000	42,000	9.7%	142,300	14,230
43-1011	First Line Managers/Supervisors of Office and Administrative Workers	187,500	200,400	12,900	6.9%	5,160	$24.81	203,477	214,173	10,696	5.00%	35,417	5,903	$23.37	1,457,200	1,617,500	160,300	11.0%	489,000	48,900
43-4051	Customer Service Representatives	201,200	256,800	55,600	27.6%	11,160	$16.67	210,647	243,978	33,331	16.00%	67,382	11,230	$16.27	2,252,400	2,651,900	399,500	17.7%	1,108,400	110,840
49-2011	Computer, Automated Teller, and Office Machine Repairers	20,500	21,200	700	3.4%	310	$18.89	21,323	22,119	796	4.00%	2,269	378	$18.69	5,700	5,500	-200	-3.5%	1,000	100
49-2021	Radio Mechanics	N/A	N/A	N/A	N/A	N/A	$27.27	847	905	58	7.00%	200	33	$21.40	203,100	202,600	-500	-0.2%	35,600	3,560
49-2097	Electric Home Entertainment Equipment Installers and Repairers	N/A	N/A	N/A	N/A	N/A	$16.61	6,247	6,617	370	6.00%	714	119	$18.30	51,200	56,800	5,500	10.7%	14,300	1,430
51-2022	Electrical and Electronic Equipment	25,000	20,400	-4,600	-18.4%	430	$13.29	20,967	18,428	-2,539	-12.00%	5,747	958	$13.13	213,300	182,000	-31,300	-14.7%	32,900	3,290
51-9141	Semiconductor Processors	9,400	8,800	-600	-6.4%	160	$15.97	6,709	6,711	2	0.00%	1,238	206	$16.83	31,600	21,600	-10,000	-31.6%	6,500	650
	SUBTOTAL	**1,417,900**	**1,665,200**	**247,300**	**17.44%**	**61,080**	**$24.34**	**1,680,562**	**1,850,194**	**169,632**	**10.09%**	**419,770**	**69,962**	**$27.24**	**12,596,000**	**13,778,400**	**1,182,300**	**9.4%**	**4,483,700**	**448,370**
	25% OF SUBTOTAL	**354,475**	**416,300**	**61,825**	**17.44%**	**15,270**	**$24.34**	**420,141**	**462,549**	**42,408**	**10.09%**	**104,943**	**17,490**	**$27.24**	**3,149,000**	**3,444,600**	**295,575**	**9.4%**	**1,120,925**	**112,093**

2010 ICT Occupations Comparison

SOC	Description	2010 Non-ICT Jobs	2010 ICT Jobs	2010 Total Jobs
43-0000	Office and administrative support occupations	2,722,174	143,831	2,866,005
41-0000	Sales and related occupations	2,414,334	279,300	2,693,634
11-0000	Management occupations	1,535,118	42,170	1,577,288
35-0000	Food preparation and serving related occupations	1,324,674	-	1,324,674
25-0000	Education, training, and library occupations	1,171,386	-	1,171,386
13-000	Business and financial operations occupations	1,165,057	-	1,165,057
53-0000	Transportation and material moving occupations	1,113,820	-	1,113,820
	ICT Total: Primary + 25% Secondary	**-**	**1,052,649**	**1,052,649**
51-0000	Production occupations	939,640	6,919	946,559
37-0000	Building and grounds cleaning and maintenance occupations	931,017	-	931,017
47-0000	Construction and extraction occupations	875,417	-	875,417
39-0000	Personal care and service occupations	843,340	-	843,340
27-0000	Arts, design, entertainment, sports, and media occupations	786,942	13,580	800,522
29-0000	Healthcare practitioners and technical occupations	796,258	-	796,258
	ICT Primary	**-**	**632,508**	**632,508**
49-0000	Installation, maintenance, and repair occupations	532,940	56,063	589,003
15-0000	Computer and mathematical science occupations	-	480,451	480,451
31-0000	Healthcare support occupations	420,360	-	420,360
33-0000	Protective service occupations	364,920	-	364,920
17-0000	Architecture and engineering occupations	325,537	30,334	355,871
21-0000	Community and social services occupations	264,904	-	264,904
19-0000	Life, physical, and social science occupations	252,878	-	252,878
55-0000	Military occupations	224,856	-	224,856
23-0000	Legal occupations	191,795	-	191,795
45-0000	Farming, fishing, and forestry occupations	33,748	-	33,748


ICT 2010 Occupational Comparison
0
500,000
1,000,000
1,500,000
2,000,000
2,500,000
3,000,000
3,500,000
Office and administrative support occupations
Sales and related occupations
Management occupations
Food preparation and serving related occupations
Education, training, and library occupations
Business and financial operations occupations
Transportation and material moving occupations
ICT Total: Primary + 25% Secondary
Production occupations
Building and grounds cleaning and maintenance occupations
Construction and extraction occupations
Personal care and service occupations
Arts, design, entertainment, sports, and media occupations
Healthcare practitioners and technical occupations
ICT Primary
Installation, maintenance, and repair occupations
Computer and mathematical science occupations
Healthcare support occupations
Protective service occupations
Architecture and engineering occupations
Community and social services occupations
Life, physical, and social science occupations
Military occupations
Legal occupations
Farming, fishing, and forestry occupations
2010 Non-ICT Jobs
2010 ICT Jobs

H: Survey Form

California, March 2010
Information and Communications Technologies

Screener:
Does you firm have more than one business location within California, if yes how many?

1 Yes, _____ business locations in California
2 No, just one business location in California

A. Are you able to talk about the employment needs of your firm at all of your California locations, or are you just comfortable talking about the employment needs at your current location?

1 Yes
2 No, just the current business location in California

Including all full-time and part-time employees, how many permanent and temporary employees work (for your firm in California/at your current location)?
Record total # of employees _____

If you currently have permanent and temporary employees, how many more or less employees do you expect to have at your (firm/location) 2 years from now?

1 More [record #_____]
2 Less [record #_____]
3 Same number of permanent employees

If you currently expect to have full-time and part-time, permanent and temporary employees in two years, how many of those do you expect to be permanent employees?
Record total # of permanent employees _____

The term "information and communications technologies" or ICT includes all emerging computer, software, networking, telecommunications, Internet, programming and information systems technologies.

1. Does your firm develop or produce goods or services directly tied to information and communications technologies or ICT?

1 Yes, our firm develops and/or produces goods in ICT
2 Yes, our firm provides services in ICT
3 Yes, our firm develops and/or produces ICT goods AND provides ICT services
4 No, our firm does not provide goods or services directly in ICT
5 DK/NA

The focus of this survey is to better understand the importance of ICT skills to California employers - and to better understand California employers' ICT workforce and workforce needs. We want to ask you about ICT job functions or skills and not just their corresponding job titles. Think of your ICT workers as those people in your organization who deploy, manage, support and enable ICT infrastructure and systems and support their users, not the ICT users:

2. For each of these ICT related job functions I describe, please tell me if you feel this job function will be extremely important, important, or not too important for your organization over the next two years. How important are the workers who enable and support: Do you feel this technical ICT skill set is extremely important, important, or not too important for your company?

RANDOMIZE

Extremely Important(1) Important (2) Not Too Important (3) DK/NA (4)

A. End user ICT devices, operating systems and applications, in roles like desktop support, help desk, computer support specialists and computer repair
1 2 3 4

B. Enterprise-wide and data center ICT systems, things like phone, server, data storage, telecommunications and networking systems
1 2 3 4

C. Internet, Intranet and other online or web based sytems and services, things like web design and development, online commerce and webmaster
1 2 3 4

D. ICT management, things like system and business process design, vendor selection and management, and ICT strategic planning
1 2 3 4

E. Hardware and software development, this would include ICT solutions developed by your organization 1 2 3 4

F. Marketing and sales of ICT related products and services 1 2 3 4

3. How many permanent or temporary employees work (for your firm in California/at your location), that are required to have at least some of the skills that were described? Record total # of employees _____

4. If you currently have permanent or temporary employees that are required to have at least some of the ICT skills, how many more or less employees do you expect to have two years from now, that require at least some of the ICT skills we have discussed?
1 More [record #_____]
2 Less [record #_____]
3 Same number of permanent employees

5. When a position becomes available that requires ICT skills in your firm, do you more often hire from outside or promote from within the company?
1 Promote from within
2 Even split (50-50 outside & promote)
3 Recruit from outside
4 DK/NA

6. Of your employees that require at least some of these ICT related technical skills that we have been discussing. How many require at least a 4 year or baccalaurete degree? Record total # of employees _____

7. How often do you hire temporary employees, consultants or contractors to support your organization's information and communications technology or ICT needs?
1 Regularly
2 Sometimes
3 Seldom
4 Rarely if ever
5 DK/NA

Now, I'd like to ask about general skills that you look for, among those individuals at your firm that are responsible for information and communications technologies related work.

8. Thinking in general about individuals in your organization that you will hire for work in information and communications technologies, which of the following skills would you say are most important for new hires? You can pick more than one. (MULTIPLE RESPONSES ALLOWED)

1 Technical competence specific to the position

2 Interpersonal communication skills
3 Technical writing skills
4 Creative problem-solving skills
5 Ability to work with different groups or departments
6 Other (Please specify_____)
7 Depends on occupation
8 DK/NA

9. Now, I'm going to read a list of issues facing those employees that are working in information and communications technologies. Please tell me how much difficulty your organization faces in addressing each of these issues. Here's the (first/next) one _____: Please tell me whether your organization has no difficulty, some difficulty, or great difficulty in dealing with this issue.

RANDOMIZE

	No difficulty	Some difficulty	Great difficulty	DK/NA
G. Providing training programs so current ICT employees are productive and stay up-to date on changing ICT Technologies and industry requirements	1	2	3	4
H. Providing ICT training opportunities so current employees are able to grow and advance within the organization	1	2	3	4
I. Recruiting employees with appropriate ICT training, education and skills	1	2	3	4
J. Finding competent and reasonably priced consultants, temporary employees, and external service providers to meet your firm's temporary ICT needs	1	2	3	4
K. Retaining ICT employees	1	2	3	4

10. Please tell me whether you agree or disagree with each of the following statements about the importance of information and communications technologies. Here's the (first/next) one: _____. Do you strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree with the statement?

RANDOMIZE

	Strongly Agree (1)	**Agree (2)**	**Neither Agree nor Disagree (3)**	**Disagree (4)**	**Strongly Disagree (5)**	**(DON'T) READ) DK/NA (6)**
A. Information & communications Technologies are important to the productivity of our organization	1	2	3	4	5	6
B. Information & communications Technologies skill sets will grow in importance for our employees	1	2	3	4	5	6
C. California community colleges are doing a good job developing the ICT workforce	1	2	3	4	5	6
D. Our organization would value statewide ICT standards that align employer needs with education and training programs	1	2	3	4	5	6
E. Our organization would value a credential certifying basic ICT user knowledge and skills, also known as digital literacy	1	2	3	4	5	6

[Q14 – Q17 INTERNET ONLY]

11. Do you have any general statements or comments related to the strategic importance of information and communications technologies with regard to your organization or California?

_____

_____

12. If your organization has hired employees for ICT workforce job functions who were educated at a California community college, what, in general, do you perceive as their weaknesses?

_____

_____

13. How do you expect your needs for a skilled ICT workforce to change in the next 3 to 5 years?

_____

_____

14. As we think about developing and improving training and educational programs for information and communications technology workers, as an employer is there anything you would like to see included in these plans?

_____

_____

15. Are you interested in receiving a report on the findings of the research?
    1 Yes
    2 No
    3 DK/NA

A. First and Last Name of Respondent_____
B. Position of Respondent_____
C. Phone of Respondent_____
D. Email of Respondent_____
E. Name of Organization_____
F. Address of Organization_____
G. Date of Interview _____
H. Time of Interview_____
I. Name of Interviewer_____
J. County _____
K. NAICS_____

I: Survey Methodology

The table below provides a brief overview of the methodology utilized for the project.

Table 1 Overview of Project Methodology

Method	Telephone and Web Survey of California Employers with 5 or more Employees as defined by InfoUSA
Number of Participants	602 Firms Completed a Survey (312 Online; 290 by Phone)
Field Dates	April 13 – May 28, 2010
Survey Universe	473,521 California Employers with 5+ Employees available in the InfoUSA database as of April 9, 2010
Margin of Error	The maximum margin of error for questions answered by all 602 respondents is +/-3.99% at the 95% level of confidence.

Research Objectives

Prior to beginning the project, BW Research met with the MPICT, the Centers of Excellence, and Green LMI to determine the research objectives for the study. Viewed broadly, the main research objectives of the study were to:

- Evaluate employers current demand for ICT skills and their expectations for these skills from workers in the future;
- Assess interest and perceived importance of different ICT programs and potential solutions for workforce development within California;
- Understand the current workforce needs of California employers particularly as they relate to recruiting and developing employees with the appropriate ICT skill sets; and
- Develop a profile of California Employers, in different industry categories, regions within the state and size as it relates to the demand and expectations for ICT related skill sets.

Questionnaire Design

Through an iterative process, BW Research worked closely with the Centers of Excellence, Green LMI, and MPICT to develop a survey instrument that met all the research objectives of the study. In developing the instrument, BW Research utilized techniques to overcome known biases in survey research and minimize potential sources of measurement error within the survey.

Sampling Method

A mixed-method approach (telephone and web) was utilized to interview a representative sample of businesses from California with at least five employees. A database of all known firms matching the study parameters was provided by the Centers of Excellence and represents the universe for the study of (473,521 firms). The universe of firms was stratified based on size, region, and industry. Below are the classification structures for each of the employer categories.

Employer size:

- Small employers = 5 to 24 employees.
- Medium sized employers = 25 to 99 employees.
- Large employers = 100 or more employees.

Region:

- Southern California includes San Diego, Orange, and Los Angeles counties.
- Bay Area includes Santa Clara, San Mateo, San Francisco, Marin, Napa, Sonoma, Solana, Contra Costa, Alameda, Monterey, and Santa Cruz counties.
- Other includes all other counties in California except those identified in Southern California and the Bay Area.

Industry:

Each employer was categorized into one of five general industry classifications based on their two-digit NAICS code. The five general industry classifications are provided with some examples of what industries were included. Quotas were utilized during data collection to ensure representation of firms by employer size, region, and industry classification.

- High technology (professional and technical services, information, and higher technology manufacturing)
- Medium technology (utilities, transportation and warehousing, all other manufacturing, and management of companies)
- Low technology (retail and accommodations and food services)
- Healthcare
- Government and Education.

Data Collection

The mixed-method data collection was comprised of both an online survey (312 completes) followed by a telephone survey (290 completes) of employers. The mixed-method data collection was implemented to ensure a diverse and representative sampling of different sized employers as well as employers from a broad array of industries.

Prior to beginning telephone data collection, BW Research conducted interviewer training and also pre-tested the survey instrument to ensure that all the words and questions were easily understood by respondents. Telephone interviews were generally conducted from 9:00 am to 4:30 pm Monday through Friday. Callbacks were also scheduled at respondents' convenience.

The web version of the survey was distributed through electronic online panels to a sample of California employers with a general invitation to complete a survey. After the web surveys were completed, the sample was reviewed and those employers that were under-represented became the focus of the phone survey to ensure a representative sample of employers.

The data collection period was April 13 through May 28, 2010.

A Note about Margin of Error and Analysis of Sub-Groups

The overall margin of error for the survey, at the 95 percent level of confidence, is between +/- 2.40 percent and +/- 3.99 percent (depending on the distribution of each question) for questions answered by all 602 respondents.

It is important to note that questions asked of smaller sub-groups (such as questions only asked of firms with ICT employees) or analysis of sub-groups (such as differences by industry) will have a margin of error greater than +/-3.99 percent, with the exact margin of error dependent on the number of respondents within each sub-group as well as the distribution of responses.

Five subgroups were created of companies responding to the survey: 1) High Tech, 2) Medium Tech, 3) Low Tech, 4) Healthcare, and 5) government and education by using the following mapping of 2 digit NAICS codes of respondents to subcategory.

Industry Description	2 - Digit NAICS	Subcategory
Agriculture	11	3
Mining	21	2
Utilities	22	2
Construction	23	3
Manufacturing	31	2
Manufacturing (Higher technology)	32	1
Manufacturing	33	2
Wholesale trade	42	2
Retail	44	3
Retail	45	3
Transportation & Warehousing	48	2
Transportation & Warehousing	49	2
Information	51	1
Finance & Insurance	52	2
Real Estate, Rental & Leasing	53	3
Professional, Technical Services	54	1
Management of Companies	55	2
Admin, Waster	56	2
Education	61	5
Health Care	62	4
Arts, Entertainment & Rec.	71	3
Accommodation & Food Services	72	3
Other Services	81	3
Public Administration	92	5

J: ICT Survey Response Data

Information and Communications Technologies – ICT Statewide Survey (n=602)

S_A1 Does you firm have more than one business location within California?

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
			24%	71%	40%	32%	29%	9%	20%	17%	17%	15%	20%	17%	30%	30%	13%	10%
Answer	Yes	40.03%	47.89%	36.60%	33.61%	41.88%	46.82%	15.79%	21.01%	31.37%	41.75%	49.44%	71.67%	33.98%	38.12%	36.67%	45.57%	59.32%
	No	59.97%	52.11%	63.40%	66.39%	58.12%	53.18%	84.21%	78.99%	68.63%	58.25%	50.56%	28.33%	66.02%	61.88%	63.33%	54.43%	40.68%

S_A2 How many business locations do you have in California?

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
	# of Business Locations in California	Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	1	59.97%	52.11%	63.40%	66.39%	58.12%	53.18%	84.21%	78.99%	68.63%	58.25%	50.56%	28.33%	66.02%	61.88%	63.33%	54.43%	40.68%
	2	13.62%	14.08%	13.99%	11.76%	16.23%	13.29%	8.77%	10.08%	13.73%	15.53%	16.85%	16.67%	14.56%	17.68%	11.67%	11.39%	8.47%
	3	6.31%	8.45%	6.06%	6.72%	4.71%	7.51%	-	3.36%	5.88%	5.83%	7.87%	11.67%	8.74%	6.63%	4.44%	8.86%	3.39%
	4	3.65%	2.82%	3.96%	3.36%	4.19%	3.47%	3.51%	1.68%	2.94%	-	7.87%	5.83%	2.91%	4.42%	2.22%	1.27%	10.17%
	5 to 10	6.15%	6.34%	5.36%	4.62%	8.38%	5.78%	3.51%	2.52%	3.92%	9.71%	5.62%	10.83%	4.85%	4.42%	5.56%	11.39%	8.47%
	11 to 24	2.99%	4.23%	2.56%	1.68%	3.66%	4.05%	-	1.68%	0.98%	0.97%	4.49%	8.33%	0.97%	1.10%	3.33%	5.06%	8.47%
	25 to 49	2.33%	3.52%	0.93%	0.84%	1.57%	5.20%	-	0.84%	1.96%	2.91%	2.25%	5.00%	-	0.55%	2.22%	3.80%	10.17%
	50 or more	4.49%	7.04%	3.50%	3.78%	2.62%	7.51%	-	0.84%	-	5.83%	4.49%	13.33%	1.94%	2.76%	7.22%	2.53%	8.47%
	Don't know/ Refused	0.50%	1.41%	0.23%	0.84%	0.52%	-	-	-	1.96%	0.97%	-	-	-	0.55%	-	1.27%	1.69%

S_B Are you able to talk about the employment needs of your firm at all of your California locations

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Yes, all of California	19.44%	23.94%	18.41%	16.39%	20.42%	22.54%	7.02%	5.88%	16.67%	11.65%	25.84%	45.00%	18.45%	20.44%	15.00%	20.25%	30.51%
	No, just the current	80.56%	76.06%	81.59%	83.61%	79.58%	77.46%	92.98%	94.12%	83.33%	88.35%	74.16%	55.00%	81.55%	79.56%	85.00%	79.75%	69.49%
	% of multi-location respndr	20.59%	23.95%	18.19%	17.22%	21.46%	24.28%	8.77%	15.13%	14.70%	30.10%	23.60%	26.67%	15.53%	17.68%	21.67%	25.32%	28.81%

Q1 Total number of permanent and temporary employees (includes both full-time and part-time)

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	5 or less employees	9.47%	6.34%	10.96%	11.76%	5.76%	10.40%	100.00%	-	-	-	-	-	9.71%	11.05%	11.11%	8.86%	-
	6 to 10 employees	19.77%	12.68%	22.14%	24.37%	14.14%	19.65%	-	100.00%	-	-	-	-	14.56%	17.13%	28.33%	25.32%	3.39%
	11 to 24 employees	16.94%	10.56%	19.11%	17.23%	15.18%	18.50%	-	-	100.00%	-	-	-	16.50%	14.36%	20.56%	18.99%	11.86%
	25 to 49 employees	17.11%	18.31%	16.32%	11.76%	22.51%	18.50%	-	-	-	100.00%	-	-	15.53%	17.13%	16.11%	20.25%	18.64%
	50 to 99 employees	14.78%	20.42%	13.52%	12.61%	23.04%	8.67%	-	-	-	-	100.00%	-	20.39%	16.57%	10.00%	11.39%	18.64%
	100 to 249 employees	9.14%	10.56%	9.09%	7.14%	9.95%	10.98%	-	-	-	-	-	45.83%	7.77%	12.15%	6.11%	5.06%	16.95%
	250 to 499 employees	4.32%	5.63%	3.73%	5.04%	2.09%	5.78%	-	-	-	-	-	21.67%	2.91%	5.52%	2.22%	5.06%	8.47%
	500 to 999 employees	2.16%	4.23%	1.40%	2.94%	1.57%	1.73%	-	-	-	-	-	10.83%	3.88%	2.21%	0.56%	2.53%	3.39%
	1,000 or more employees	4.32%	7.75%	2.56%	4.62%	3.14%	5.20%	-	-	-	-	-	21.67%	4.85%	2.76%	2.78%	1.27%	16.95%
	Don't know/ Refused	1.99%	3.52%	1.17%	2.52%	2.62%	0.58%	-	-	-	-	-	-	3.88%	1.10%	2.22%	1.27%	1.69%

Q2 More or less total employees two years from now

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	More	49.67%	57.75%	47.55%	48.32%	52.36%	48.55%	52.63%	49.58%	55.88%	54.37%	57.30%	37.50%	56.31%	53.59%	50.00%	50.63%	23.73%
	Less	6.31%	7.04%	6.29%	5.88%	7.85%	5.20%	5.26%	2.52%	3.92%	2.91%	10.11%	13.33%	5.83%	6.63%	3.89%	1.27%	20.34%
	Same number	39.04%	30.28%	41.72%	39.92%	34.03%	43.35%	38.60%	45.38%	38.24%	39.81%	28.09%	40.00%	34.95%	32.04%	42.22%	44.30%	50.85%
	Don't know/ Refused	4.98%	4.93%	4.43%	5.88%	5.76%	2.89%	3.51%	2.52%	1.96%	2.91%	4.49%	9.17%	2.91%	7.73%	3.89%	3.80%	5.08%

Q3 Number of permanent employees in two years

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No permanent employees	1.50%	1.41%	1.63%	0.84%	1.05%	2.89%	5.26%	1.68%	2.94%	-	-	0.83%	1.94%	0.55%	1.67%	-	5.08%
	5 or less permanent	11.96%	5.63%	13.99%	12.18%	10.99%	12.72%	63.16%	16.81%	4.90%	6.80%	2.25%	0.83%	9.71%	11.05%	17.78%	11.39%	1.69%
	6 to 10 permanent	18.27%	12.68%	20.75%	24.37%	10.47%	18.50%	29.82%	57.14%	16.67%	0.97%	4.49%	2.50%	14.56%	16.02%	25.00%	22.78%	5.08%
	11 to 24 permanent	15.78%	13.38%	16.08%	15.97%	15.71%	15.61%	-	21.01%	61.76%	4.85%	1.12%	0.83%	11.65%	12.71%	18.33%	27.85%	8.47%
	25 to 49 permanent	16.28%	19.01%	15.85%	14.29%	18.85%	16.18%	-	0.84%	12.75%	75.73%	5.62%	0.83%	16.50%	17.13%	13.89%	13.92%	23.73%
	50 to 99 permanent	13.95%	16.90%	13.29%	10.08%	22.51%	9.83%	-	-	0.98%	6.80%	73.03%	9.17%	17.48%	15.47%	10.56%	11.39%	16.95%
	100 to 249 permanent	8.31%	12.68%	7.46%	5.88%	9.95%	9.83%	-	-	-	0.97%	12.36%	31.67%	12.62%	12.15%	3.33%	3.80%	10.17%
	250 to 499 permanent	4.15%	3.52%	4.43%	5.04%	1.57%	5.78%	-	-	-	-	-	20.83%	4.85%	4.97%	2.22%	2.53%	8.47%
	500 to 999 permanent	1.50%	4.23%	0.47%	2.52%	1.05%	0.58%	-	-	-	-	-	7.50%	2.91%	1.66%	-	2.53%	1.69%
	1,000+ permanent	3.16%	4.93%	1.86%	3.78%	1.57%	4.05%	-	-	-	-	-	15.83%	1.94%	2.21%	2.22%	1.27%	13.56%
	Don't know/ Refused	5.15%	5.63%	4.20%	5.04%	6.28%	4.05%	1.75%	2.52%	-	3.88%	1.12%	9.17%	5.83%	6.08%	5.00%	2.53%	5.08%

Q3 Percent permanent employees to total in two years

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	0 percent of all employees in two years will be	1.50%	1.41%	1.63%	0.84%	1.05%	2.89%	5.26%	1.68%	2.94%	-	-	0.83%	1.94%	0.55%	1.67%	-	5.08%
	1 to 5 percent of all employees in two years	1.33%	0.70%	1.40%	0.42%	2.09%	1.73%	-	-	-	2.91%	1.12%	3.33%	0.97%	0.55%	2.22%	-	3.39%
	6 to 24 percent of all employees in two years	4.49%	6.34%	4.20%	5.88%	3.66%	3.47%	3.51%	3.36%	5.88%	4.85%	6.74%	3.33%	2.91%	3.87%	5.56%	7.59%	1.69%
	25 to 49 percent of all employees in two years	3.65%	3.52%	3.26%	3.36%	4.71%	2.89%	5.26%	5.04%	6.86%	2.91%	-	2.50%	1.94%	1.66%	5.00%	7.59%	3.39%
	50 to 74 percent of all employees in two years	9.63%	10.56%	9.09%	9.24%	7.85%	12.14%	7.02%	15.13%	6.86%	6.80%	5.62%	14.17%	6.80%	5.52%	13.89%	11.39%	11.86%
	75 to 100 percent of all employees in two years	72.09%	69.72%	73.89%	72.27%	71.73%	72.25%	75.44%	70.59%	75.49%	77.67%	82.02%	64.17%	79.61%	79.01%	63.89%	68.35%	67.80%
	Don't know/ Refused	7.31%	7.75%	6.53%	7.98%	8.90%	4.62%	3.51%	4.20%	1.96%	4.85%	4.49%	11.67%	5.83%	8.84%	7.78%	5.06%	6.78%

Q4 Does your firm develop or produce goods or services directly tied to ICT?

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Yes, our firm develops and/ or produces goods in ICT	8.31%	35.21%	-	7.98%	8.90%	8.09%	5.26%	5.88%	4.90%	7.77%	8.99%	14.17%	19.42%	5.52%	6.67%	3.80%	8.47%
	Yes, our firm provides	9.30%	39.44%	-	7.56%	13.09%	7.51%	7.02%	4.20%	6.86%	10.68%	15.73%	10.83%	12.62%	7.18%	3.89%	16.46%	16.95%
	Yes, our firm develops and/ or produces ICT goods and	5.98%	25.35%	-	5.46%	8.38%	4.05%	3.51%	5.04%	2.94%	6.80%	7.87%	8.33%	5.83%	6.08%	5.00%	8.86%	5.08%
	No, our firm does not provide goods or services	71.26%	-	100.00%	74.37%	65.97%	72.83%	82.46%	79.83%	80.39%	67.96%	65.17%	60.00%	61.17%	77.90%	73.89%	67.09%	66.10%
	DK/NA	5.15%	-	-	4.62%	3.66%	7.51%	1.75%	5.04%	4.90%	6.80%	2.25%	6.67%	0.97%	3.31%	10.56%	3.80%	3.39%

Q5A End user ICT devices, operating systems and applications, in roles like desktop support, help...

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Extremely important	29.90%	50.70%	24.24%	25.21%	32.46%	33.53%	14.04%	21.85%	24.51%	31.07%	32.58%	49.17%	29.13%	27.62%	27.22%	30.38%	45.76%
	Important	36.71%	35.21%	37.53%	39.08%	37.70%	32.37%	24.56%	34.45%	37.25%	33.98%	47.19%	37.50%	36.89%	41.44%	31.67%	37.97%	35.59%
	Not too important	27.08%	11.27%	32.87%	28.99%	24.61%	27.17%	56.14%	38.66%	31.37%	22.33%	15.73%	10.00%	28.16%	25.41%	32.78%	29.11%	10.17%
	DK/NA	6.31%	2.82%	5.36%	6.72%	5.24%	6.94%	5.26%	5.04%	6.86%	12.62%	4.49%	3.33%	5.83%	5.52%	8.33%	2.53%	8.47%

Q5B Enterprise-wide and data center ICT systems, things like phone, server, data storage, ...

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Extremely important	29.07%	50.70%	22.84%	28.57%	31.41%	27.17%	21.05%	16.81%	22.55%	30.10%	33.71%	46.67%	22.33%	27.07%	27.78%	35.44%	42.37%
	Important	38.21%	33.80%	39.63%	36.97%	40.31%	37.57%	14.04%	41.18%	35.29%	39.81%	50.56%	39.17%	43.69%	39.23%	35.00%	39.24%	33.90%
	Not too important	25.75%	13.38%	31.00%	26.47%	21.47%	29.48%	54.39%	37.82%	34.31%	18.45%	10.11%	10.83%	28.16%	25.97%	28.89%	21.52%	16.95%
	DK/NA	6.98%	2.11%	6.53%	7.98%	6.81%	5.78%	10.53%	4.20%	7.84%	11.65%	5.62%	3.33%	5.83%	7.73%	8.33%	3.80%	6.78%

Q5C Internet, Intranet, and other online or web-based systems and services, ...

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Extremely important	30.07%	49.30%	24.24%	30.67%	30.37%	28.90%	15.79%	29.41%	22.55%	35.92%	23.60%	44.17%	33.01%	22.65%	30.00%	32.91%	44.07%
	Important	41.36%	38.03%	42.66%	42.44%	46.60%	34.10%	35.09%	34.45%	42.16%	34.95%	61.80%	40.00%	43.69%	45.30%	38.89%	40.51%	33.90%
	Not too important	22.92%	11.97%	27.51%	21.43%	17.28%	31.21%	42.11%	31.09%	29.41%	19.42%	10.11%	13.33%	18.45%	27.07%	24.44%	21.52%	15.25%
	DK/NA	5.65%	0.70%	5.59%	5.46%	5.76%	5.78%	7.02%	5.04%	5.88%	9.71%	4.49%	2.50%	4.85%	4.97%	6.67%	5.06%	6.78%

Q5D ICT management, things like system and business process design, vendor selection and mgnt, ...

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Extremely important	20.27%	40.85%	14.92%	19.75%	22.51%	18.50%	5.26%	15.13%	11.76%	20.39%	23.60%	37.50%	21.36%	20.99%	17.22%	18.99%	27.12%
	Important	37.87%	42.25%	35.90%	34.45%	42.93%	36.99%	24.56%	33.61%	31.37%	33.98%	57.30%	43.33%	45.63%	41.99%	31.11%	35.44%	35.59%
	Not too important	34.72%	14.08%	42.42%	38.24%	27.23%	38.15%	61.40%	45.38%	49.02%	33.01%	14.61%	15.83%	26.21%	30.94%	42.78%	40.51%	28.81%
	DK/NA	7.14%	2.82%	6.76%	7.56%	7.33%	6.36%	8.77%	5.88%	7.84%	12.62%	4.49%	3.33%	6.80%	6.08%	8.89%	5.06%	8.47%

Q5E Hardware and software development, this would include ICT solutions developed by your org

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Extremely important	19.60%	47.89%	10.72%	18.07%	20.94%	20.23%	8.77%	15.97%	13.73%	22.33%	20.22%	30.83%	25.24%	18.23%	15.00%	24.05%	22.03%
	Important	31.89%	35.92%	29.60%	28.15%	38.22%	30.06%	10.53%	25.21%	30.39%	30.10%	47.19%	40.00%	36.89%	37.02%	27.22%	20.25%	37.29%
	Not too important	40.37%	14.08%	51.28%	45.38%	31.94%	42.77%	73.68%	52.10%	45.10%	35.92%	28.09%	22.50%	31.07%	35.91%	48.33%	50.63%	32.20%
	DK/NA	8.14%	2.11%	8.39%	8.40%	8.90%	6.94%	7.02%	6.72%	10.78%	11.65%	4.49%	6.67%	6.80%	8.84%	9.44%	5.06%	8.47%

Q5F Marketing and sales of ICT related products and services

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Extremely important	14.29%	33.10%	7.69%	14.71%	15.18%	12.72%	15.79%	13.45%	10.78%	15.53%	13.48%	15.83%	20.39%	10.50%	18.33%	11.39%	6.78%
	Important	26.41%	37.32%	23.31%	25.63%	27.23%	26.59%	14.04%	23.53%	25.49%	21.36%	40.45%	30.00%	30.10%	28.73%	24.44%	29.11%	15.25%
	Not too important	50.33%	26.76%	59.91%	49.58%	49.74%	52.02%	61.40%	57.14%	53.92%	51.46%	40.45%	42.50%	40.78%	51.38%	49.44%	54.43%	61.02%
	DK/NA	8.97%	2.82%	9.09%	10.08%	7.85%	8.67%	8.77%	5.88%	9.80%	11.65%	5.62%	11.67%	8.74%	9.39%	7.78%	5.06%	16.95%

Q6 Number of employees required to have at least some of the ICT skills described

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	Yes	No	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No ICT employees	14.29%	1.41%	17.72%	16.39%	8.90%	17.34%	38.60%	18.49%	15.69%	15.53%	5.62%	4.17%	8.74%	14.36%	18.89%	17.72%	5.08%
	1 to 5 ICT employees	39.04%	24.65%	44.76%	41.18%	37.17%	38.15%	61.40%	57.14%	43.14%	40.78%	31.46%	14.17%	30.10%	42.54%	43.33%	39.24%	30.51%
	6 to 10 ICT employees	12.96%	10.56%	14.22%	12.61%	12.04%	14.45%	-	21.85%	13.73%	12.62%	20.22%	5.83%	15.53%	11.05%	15.56%	10.13%	10.17%
	11 to 24 ICT employees	10.80%	20.42%	8.16%	9.24%	14.14%	9.25%	-	-	24.51%	9.71%	11.24%	16.67%	12.62%	8.29%	8.33%	18.99%	11.86%
	25 to 49 ICT employees	4.82%	8.45%	3.96%	3.78%	7.85%	2.89%	-	-	-	15.53%	7.87%	5.00%	7.77%	4.42%	2.22%	5.06%	8.47%
	50 to 99 ICT employees	6.64%	13.38%	4.43%	6.30%	8.90%	4.62%	-	-	-	-	20.22%	18.33%	10.68%	11.60%	1.67%	1.27%	6.78%
	100 to 249 ICT employees	2.33%	4.93%	1.40%	1.68%	2.09%	3.47%	-	-	-	-	-	11.67%	3.88%	1.10%	0.56%	1.27%	10.17%
	250 to 499 ICT employees	1.50%	4.23%	0.70%	1.68%	0.52%	2.31%	-	-	-	-	-	7.50%	1.94%	1.10%	1.67%	1.27%	1.69%
	500 or more ICT	2.33%	4.93%	1.40%	2.10%	2.09%	2.89%	-	-	-	-	-	11.67%	2.91%	0.55%	1.11%	2.53%	10.17%
	Don't know/ Refused	5.32%	7.04%	3.26%	5.04%	6.28%	4.62%	-	2.52%	2.94%	5.83%	3.37%	5.00%	5.83%	4.97%	6.67%	2.53%	5.08%

Q6 Percentage of employees required to have at least some of the ICT skills described

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
	Percent of Employees Required to Have at Least	Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	0%	15.12%	1.41%	18.88%	17.23%	9.95%	17.92%	38.60%	18.49%	15.69%	15.53%	5.62%	8.33%	8.74%	15.47%	19.44%	18.99%	6.78%
	1 to 5%	11.96%	7.75%	13.52%	10.92%	12.04%	13.29%	-	-	3.92%	15.53%	22.47%	26.67%	10.68%	15.47%	6.11%	6.33%	28.81%
	6 to 24%	22.43%	15.49%	25.17%	19.75%	25.65%	22.54%	1.75%	15.13%	30.39%	30.10%	35.96%	18.33%	21.36%	22.10%	21.11%	25.32%	25.42%
	25 to 49%	13.62%	13.38%	13.75%	16.81%	12.04%	10.98%	17.54%	20.17%	12.75%	12.62%	7.87%	12.50%	9.71%	18.23%	15.56%	11.39%	3.39%
	50 to 74%	11.63%	21.83%	8.86%	12.18%	11.52%	10.98%	10.53%	22.69%	13.73%	2.91%	7.87%	10.83%	14.56%	8.29%	13.33%	10.13%	13.56%
	75 to 100%	19.77%	33.10%	16.32%	18.07%	21.99%	19.65%	31.58%	21.01%	20.59%	17.48%	16.85%	18.33%	29.13%	15.47%	17.22%	25.32%	16.95%
	Don't know/ Refused	5.48%	7.04%	3.50%	5.04%	6.81%	4.62%	-	2.52%	2.94%	5.83%	3.37%	5.00%	5.83%	4.97%	7.22%	2.53%	5.08%

Q7 More or less employees required to have ICT skills two years from now

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
	Number of Employees Required to Have ICT Skills	Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	More	36.21%	52.11%	31.47%	34.45%	39.27%	35.26%	29.82%	41.18%	38.24%	38.83%	35.96%	33.33%	40.78%	39.23%	35.00%	32.91%	27.12%
	Less	1.66%	2.11%	1.63%	2.52%	1.05%	1.16%	1.75%	0.84%	-	0.97%	2.25%	4.17%	-	2.76%	1.11%	-	5.08%
	Same number	56.48%	38.73%	63.17%	57.56%	52.88%	58.96%	64.91%	53.78%	58.82%	56.31%	58.43%	52.50%	54.37%	50.83%	58.89%	63.29%	61.02%
	Refused	5.65%	7.04%	3.73%	5.46%	6.81%	4.62%	3.51%	4.20%	2.94%	3.88%	3.37%	10.00%	4.85%	7.18%	5.00%	3.80%	6.78%

Q8 When a position becomes available that requires ICT skills, more often hire from outside or promo

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
	How ICT Positions Are Filled	Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Promote from within	21.26%	18.31%	22.38%	21.43%	20.94%	21.39%	26.32%	21.01%	17.65%	16.50%	30.34%	21.67%	20.39%	16.57%	25.56%	24.05%	20.34%
	Even split (50-50 outside &	29.57%	44.37%	24.94%	24.37%	32.46%	33.53%	7.02%	21.01%	29.41%	28.16%	34.83%	45.00%	35.92%	28.18%	25.56%	22.78%	44.07%
	Recruit from outside	37.38%	33.10%	40.56%	40.34%	36.13%	34.68%	57.89%	39.50%	40.20%	42.72%	28.09%	26.67%	33.01%	44.75%	33.89%	43.04%	25.42%
	DK/NA	11.79%	4.23%	12.12%	13.87%	10.47%	10.40%	8.77%	18.49%	12.75%	12.62%	6.74%	6.67%	10.68%	10.50%	15.00%	10.13%	10.17%

Q9 Number of employees that require ICT skills that require at least a four-year degree

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No ICT employees that require at least a four-year	43.52%	21.83%	51.05%	47.06%	30.37%	53.18%	82.46%	65.55%	50.98%	41.75%	24.72%	16.67%	22.33%	48.07%	50.00%	62.03%	22.03%
	1 to 5 ICT employees that require at least a four-year	25.58%	18.31%	28.21%	26.47%	26.70%	23.12%	17.54%	29.41%	31.37%	29.13%	34.83%	12.50%	30.10%	22.10%	31.11%	17.72%	22.03%
	6 to 10 ICT employees that require at least a four-year	5.81%	10.56%	4.66%	3.78%	9.95%	4.05%	-	2.52%	5.88%	6.80%	10.11%	8.33%	9.71%	3.87%	5.56%	3.80%	8.47%
	11 to 24 ICT employees that require at least a four-	5.98%	12.68%	4.20%	5.04%	8.90%	4.05%	-	-	6.86%	7.77%	5.62%	13.33%	8.74%	7.18%	1.11%	6.33%	11.86%
	25 to 49 ICT employees that require at least a four-	3.99%	7.75%	2.80%	4.20%	5.76%	1.73%	-	-	-	6.80%	8.99%	7.50%	6.80%	5.52%	1.67%	1.27%	5.08%
	50 to 99 ICT employees that require at least a four-	3.99%	9.86%	2.10%	2.52%	6.81%	2.89%	-	-	-	-	11.24%	11.67%	11.65%	3.31%	1.67%	1.27%	3.39%
	100 to 249 ICT employees that require at least a four-	1.66%	4.23%	0.93%	2.52%	1.57%	0.58%	-	-	-	-	-	8.33%	0.97%	1.66%	-	1.27%	8.47%
	250 or more ICT employees that require at	2.16%	4.93%	1.17%	2.10%	1.57%	2.89%	-	-	-	-	-	10.83%	3.88%	0.55%	1.11%	2.53%	6.78%
	Don't know/ Refused	7.31%	9.86%	4.90%	6.30%	8.38%	7.51%	-	2.52%	4.90%	7.77%	4.49%	10.83%	5.83%	7.73%	7.78%	3.80%	11.86%

Q9 Filtered - Firms with at least one ICT employee: Number that require at least a four-year degree

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		484	130	339	187	162	135	35	94	83	81	81	109	88	146	134	63	53
Answer	No ICT employees that require at least a four-year	36.36%	22.31%	42.18%	39.04%	25.31%	45.93%	71.43%	59.57%	43.37%	33.33%	20.99%	13.76%	15.91%	41.78%	41.79%	55.56%	18.87%
	1 to 5 ICT employees that require at least a four-year	31.82%	20.00%	35.69%	33.69%	31.48%	29.63%	28.57%	37.23%	38.55%	37.04%	38.27%	13.76%	35.23%	27.40%	41.79%	22.22%	24.53%
	6 to 10 ICT employees that require at least a four-year	7.23%	11.54%	5.90%	4.81%	11.73%	5.19%	-	3.19%	7.23%	8.64%	11.11%	9.17%	11.36%	4.79%	7.46%	4.76%	9.43%
	11 to 24 ICT employees that require at least a four-	7.44%	13.85%	5.31%	6.42%	10.49%	5.19%	-	-	8.43%	9.88%	6.17%	14.68%	10.23%	8.90%	1.49%	7.94%	13.21%
	25 to 49 ICT employees that require at least a four-	4.96%	8.46%	3.54%	5.35%	6.79%	2.22%	-	-	-	8.64%	9.88%	8.26%	7.95%	6.85%	2.24%	1.59%	5.66%
	50 to 99 ICT employees that require at least a four-	4.96%	10.77%	2.65%	3.21%	8.02%	3.70%	-	-	-	-	12.35%	12.84%	13.64%	4.11%	2.24%	1.59%	3.77%
	100 to 249 ICT employees that require at least a four-	2.07%	4.62%	1.18%	3.21%	1.85%	0.74%	-	-	-	-	-	9.17%	1.14%	2.05%	-	1.59%	9.43%
	250 or more ICT employees that require at	2.69%	5.38%	1.47%	2.67%	1.85%	3.70%	-	-	-	-	-	11.93%	4.55%	0.68%	1.49%	3.17%	7.55%
	Don't know/ Refused	2.48%	3.08%	2.06%	1.60%	2.47%	3.70%	-	-	2.41%	2.47%	1.23%	6.42%	-	3.42%	1.49%	1.59%	7.55%

Q9 Percentage of employees that require ICT skills that require at least a four-year degree

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
	Percent of ICT employees require at least a four-year	Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	0%	43.52%	21.83%	51.05%	47.06%	30.37%	53.18%	82.46%	65.55%	50.98%	41.75%	24.72%	16.67%	22.33%	48.07%	50.00%	62.03%	22.03%
	1 to 5%	0.33%	-	0.47%	0.84%	-	-	-	-	-	-	1.12%	0.83%	0.97%	0.55%	-	-	-
	6 to 24%	2.66%	2.11%	3.03%	2.10%	2.09%	4.05%	-	0.84%	5.88%	0.97%	3.37%	4.17%	1.94%	1.66%	3.89%	3.80%	1.69%
	25 to 49%	6.81%	9.86%	5.83%	8.82%	5.24%	5.78%	3.51%	5.04%	4.90%	7.77%	12.36%	7.50%	6.80%	7.18%	4.44%	8.86%	10.17%
	50 to 74%	10.96%	15.49%	9.56%	7.98%	12.57%	13.29%	8.77%	7.56%	11.76%	10.68%	12.36%	15.00%	12.62%	10.50%	10.56%	8.86%	13.56%
	75 to 100%	28.41%	40.85%	25.17%	26.89%	41.36%	16.18%	5.26%	18.49%	21.57%	31.07%	41.57%	45.00%	49.51%	24.31%	23.33%	12.66%	40.68%
	Don't know/ Refused	7.31%	9.86%	4.90%	6.30%	8.38%	7.51%	-	2.52%	4.90%	7.77%	4.49%	10.83%	5.83%	7.73%	7.78%	3.80%	11.86%

Q9 Filtered - Firms with at least one ICT employee: Percent that require at least a four-year degree

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
	Percent of ICT employees require at least a four-year	Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		484	130	339	187	162	135	35	94	83	81	81	109	88	146	134	63	53
Answer	0%	36.36%	22.31%	42.18%	39.04%	25.31%	45.93%	71.43%	59.57%	43.37%	33.33%	20.99%	13.76%	15.91%	41.78%	41.79%	55.56%	18.87%
	1 to 5%	0.41%	-	0.59%	1.07%	-	-	-	-	-	-	1.23%	0.92%	1.14%	0.68%	-	-	-
	6 to 24%	3.31%	2.31%	3.83%	2.67%	2.47%	5.19%	-	1.06%	7.23%	1.23%	3.70%	4.59%	2.27%	2.05%	5.22%	4.76%	1.89%
	25 to 49%	8.47%	10.77%	7.37%	11.23%	6.17%	7.41%	5.71%	6.38%	6.02%	9.88%	13.58%	8.26%	7.95%	8.90%	5.97%	11.11%	11.32%
	50 to 74%	13.64%	16.92%	12.09%	10.16%	14.81%	17.04%	14.29%	9.57%	14.46%	13.58%	13.58%	16.51%	14.77%	13.01%	14.18%	11.11%	15.09%
	75 to 100%	35.33%	44.62%	31.86%	34.22%	48.77%	20.74%	8.57%	23.40%	26.51%	39.51%	45.68%	49.54%	57.95%	30.14%	31.34%	15.87%	45.28%
	Don't know/ Refused	2.48%	3.08%	2.06%	1.60%	2.47%	3.70%	-	-	2.41%	2.47%	1.23%	6.42%	-	3.42%	1.49%	1.59%	7.55%

Q10 How often do you hire temporary employees, consultants, or contractors to support your ICT needs

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Regularly	13%	18%	12%	10%	17%	15%	9%	12%	16%	14%	10%	19%	17%	15%	10%	14%	12%
	Sometimes	22%	34%	19%	22%	25%	20%	16%	15%	22%	21%	22%	33%	28%	24%	17%	19%	27%
	Seldom	34%	32%	35%	37%	32%	33%	37%	37%	35%	28%	43%	29%	31%	34%	36%	29%	41%
	Never	26%	12%	30%	27%	20%	31%	37%	34%	25%	30%	21%	14%	21%	22%	32%	33%	19%
	DK/NA	4%	4%	3%	4%	6%	2%	2%	3%	2%	7%	3%	4%	3%	4%	4%	5%	2%

Q11 Most important skills for new hires that will work in ICT

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Technical competence specific to the position	71.76%	80.99%	70.86%	72.27%	72.77%	69.94%	59.65%	71.43%	70.59%	71.84%	78.65%	77.50%	77.67%	69.61%	66.67%	74.68%	79.66%
	Interpersonal	63.79%	62.68%	66.20%	65.97%	63.35%	61.27%	77.19%	68.07%	63.73%	60.19%	67.42%	57.50%	54.37%	62.43%	62.78%	77.22%	69.49%
	Creative problem-solving	61.96%	64.08%	62.94%	66.81%	58.64%	58.96%	59.65%	70.59%	59.80%	59.22%	69.66%	57.50%	57.28%	61.88%	61.11%	69.62%	62.71%
	Ability to work with different groups or	60.30%	57.75%	62.94%	61.34%	55.50%	64.16%	50.88%	57.98%	61.76%	59.22%	67.42%	65.00%	44.66%	63.54%	56.67%	70.89%	74.58%
	Technical writing skills	30.23%	30.28%	30.54%	31.09%	25.65%	34.10%	33.33%	30.25%	28.43%	26.21%	38.20%	27.50%	28.16%	30.94%	26.67%	35.44%	35.59%
	Other	8.31%	7.75%	9.09%	7.98%	9.42%	7.51%	5.26%	14.29%	5.88%	9.71%	4.49%	8.33%	1.94%	8.84%	10.00%	10.13%	10.17%
	DK/NA	8.31%	2.82%	7.69%	6.72%	7.85%	10.98%	7.02%	10.08%	8.82%	8.74%	5.62%	5.83%	5.83%	7.18%	13.33%	6.33%	3.39%
	Depends on occupation	0.33%	0.70%	0.23%	0.42%	0.52%	-	-	0.84%	-	0.97%	-	-	0.97%	0.55%	-	-	-

Q12A Providing training programs so current ICT employees are productive and stay up to date on ...

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No difficulty	39.20%	46.48%	38.23%	37.82%	39.79%	40.46%	50.88%	41.18%	34.31%	33.01%	44.94%	39.17%	33.98%	47.51%	35.00%	43.04%	30.51%
	Some difficulty	37.71%	38.03%	37.53%	37.39%	36.65%	39.31%	28.07%	35.29%	45.10%	40.78%	34.83%	38.33%	39.81%	33.70%	36.11%	41.77%	45.76%
	Great difficulty	6.81%	7.75%	6.76%	8.40%	5.76%	5.78%	3.51%	4.20%	5.88%	5.83%	5.62%	14.17%	8.74%	5.52%	6.11%	5.06%	11.86%
	DK/NA	16.28%	7.75%	17.48%	16.39%	17.80%	14.45%	17.54%	19.33%	14.71%	20.39%	14.61%	8.33%	17.48%	13.26%	22.78%	10.13%	11.86%

Q12B Providing ICT training opportunities so current employees are able to grow and advance ...

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No difficulty	40.53%	43.66%	41.49%	41.60%	39.79%	39.88%	61.40%	42.86%	35.29%	35.92%	35.96%	42.50%	36.89%	48.07%	37.22%	36.71%	38.98%
	Some difficulty	36.05%	38.03%	34.97%	36.13%	35.60%	36.42%	24.56%	33.61%	48.04%	31.07%	41.57%	34.17%	41.75%	34.25%	33.89%	40.51%	32.20%
	Great difficulty	8.47%	9.86%	8.16%	5.88%	10.47%	9.83%	3.51%	5.88%	3.92%	14.56%	5.62%	14.17%	8.74%	5.52%	10.56%	6.33%	13.56%
	DK/NA	14.95%	8.45%	15.38%	16.39%	14.14%	13.87%	10.53%	17.65%	12.75%	18.45%	16.85%	9.17%	12.62%	12.15%	18.33%	16.46%	15.25%

Q12C Recruiting employees with appropriate ICT training, education, and skills

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No difficulty	35.22%	30.99%	37.76%	36.55%	31.41%	37.57%	50.88%	39.50%	33.33%	30.10%	33.71%	33.33%	24.27%	35.36%	37.22%	41.77%	38.98%
	Some difficulty	39.53%	45.77%	37.76%	36.97%	43.98%	38.15%	26.32%	31.09%	46.08%	38.83%	44.94%	44.17%	42.72%	42.54%	38.89%	35.44%	32.20%
	Great difficulty	11.13%	17.61%	9.09%	10.92%	10.99%	11.56%	10.53%	13.45%	5.88%	12.62%	10.11%	14.17%	18.45%	10.50%	6.67%	10.13%	15.25%
	DK/NA	14.12%	5.63%	15.38%	15.55%	13.61%	12.72%	12.28%	15.97%	14.71%	18.45%	11.24%	8.33%	14.56%	11.60%	17.22%	12.66%	13.56%

Q12D Finding competent and reasonably priced consultants, temporary employees, and external service

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No difficulty	37.04%	30.28%	39.63%	41.60%	27.75%	41.04%	63.16%	42.02%	38.24%	30.10%	32.58%	29.17%	24.27%	38.67%	42.22%	45.57%	27.12%
	Some difficulty	36.88%	46.48%	35.20%	34.87%	40.84%	35.26%	21.05%	27.73%	43.14%	33.01%	50.56%	41.67%	41.75%	40.33%	30.56%	35.44%	38.98%
	Great difficulty	10.80%	14.08%	9.79%	7.98%	14.66%	10.40%	5.26%	11.76%	7.84%	15.53%	5.62%	15.83%	20.39%	8.29%	8.33%	5.06%	16.95%
	DK/NA	15.28%	9.15%	15.38%	15.55%	16.75%	13.29%	10.53%	18.49%	10.78%	21.36%	11.24%	13.33%	13.59%	12.71%	18.89%	13.92%	16.95%

Q12E Retaining ICT employees

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	No difficulty	54.49%	49.30%	57.34%	55.04%	49.21%	59.54%	56.14%	55.46%	67.65%	49.51%	52.81%	50.00%	39.81%	60.77%	55.00%	60.76%	50.85%
	Some difficulty	26.08%	36.62%	23.08%	24.37%	31.94%	21.97%	17.54%	21.85%	15.69%	26.21%	33.71%	37.50%	33.01%	23.76%	23.89%	21.52%	33.90%
	Great difficulty	4.15%	5.63%	3.73%	3.36%	5.24%	4.05%	5.26%	3.36%	1.96%	3.88%	4.49%	6.67%	10.68%	3.31%	1.11%	5.06%	3.39%
	DK/NA	15.28%	8.45%	15.85%	17.23%	13.61%	14.45%	21.05%	19.33%	14.71%	20.39%	8.99%	5.83%	16.50%	12.15%	20.00%	12.66%	11.86%

Q13A Information and communications technologies are important to the productivity of our org

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Strongly agree	32.06%	53.52%	26.11%	28.99%	35.08%	32.95%	17.54%	26.05%	25.49%	34.95%	37.08%	45.00%	33.98%	32.60%	27.22%	27.85%	47.46%
	Agree	46.18%	33.80%	50.82%	47.90%	43.98%	46.24%	47.37%	46.22%	54.90%	47.57%	44.94%	38.33%	44.66%	45.86%	48.33%	50.63%	37.29%
	Neither agree nor disagree	10.47%	10.56%	10.02%	10.92%	9.95%	10.40%	10.53%	10.92%	11.76%	3.88%	12.36%	13.33%	15.53%	8.84%	10.56%	8.86%	8.47%
	Disagree	5.81%	0.70%	7.93%	7.56%	3.66%	5.78%	21.05%	10.92%	4.90%	2.91%	2.25%	-	2.91%	7.18%	6.11%	7.59%	3.39%
	Strongly disagree	1.00%	0.70%	1.17%	1.26%	0.52%	1.16%	-	0.84%	0.98%	2.91%	-	0.83%	-	0.55%	0.56%	5.06%	-
	DK/NA	4.49%	0.70%	3.96%	3.36%	6.81%	3.47%	3.51%	5.04%	1.96%	7.77%	3.37%	2.50%	2.91%	4.97%	7.22%	-	3.39%

Q13B IC technologies skill sets will grow in importance for our employees

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Strongly agree	23.26%	36.62%	19.81%	22.69%	23.04%	24.28%	10.53%	19.33%	17.65%	25.24%	25.84%	35.00%	20.39%	21.55%	21.11%	21.52%	42.37%
	Agree	51.16%	51.41%	51.75%	50.84%	52.88%	49.71%	54.39%	47.90%	58.82%	51.46%	53.93%	44.17%	56.31%	54.14%	45.56%	59.49%	38.98%
	Neither agree nor disagree	12.46%	7.75%	13.52%	11.76%	10.99%	15.03%	14.04%	10.92%	14.71%	8.74%	15.73%	12.50%	15.53%	8.29%	17.78%	7.59%	10.17%
	Disagree	7.14%	2.11%	9.32%	8.82%	4.71%	7.51%	17.54%	12.61%	4.90%	5.83%	1.12%	5.00%	3.88%	9.94%	7.78%	7.59%	1.69%
	Strongly disagree	0.50%	-	0.70%	1.26%	-	-	-	0.84%	0.98%	0.97%	-	-	-	0.55%	-	2.53%	-
	DK/NA	5.48%	2.11%	4.90%	4.62%	8.38%	3.47%	3.51%	8.40%	2.94%	7.77%	3.37%	3.33%	3.88%	5.52%	7.78%	1.27%	6.78%

Q13C California community colleges are doing a good job developing the ICT workforce

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Strongly agree	6.31%	9.86%	5.13%	6.72%	6.81%	5.20%	1.75%	4.20%	5.88%	5.83%	8.99%	10.00%	4.85%	4.42%	7.22%	7.59%	10.17%
	Agree	30.73%	33.80%	30.77%	27.31%	33.51%	32.37%	31.58%	31.09%	26.47%	27.18%	39.33%	31.67%	29.13%	37.02%	26.11%	31.65%	27.12%
	Neither agree nor disagree	22.43%	21.13%	22.84%	21.01%	19.37%	27.75%	21.05%	20.17%	22.55%	23.30%	20.22%	25.83%	22.33%	22.10%	24.44%	17.72%	23.73%
	Disagree	4.65%	7.75%	3.50%	6.30%	2.09%	5.20%	7.02%	4.20%	5.88%	1.94%	1.12%	8.33%	5.83%	3.31%	5.56%	5.06%	3.39%
	Strongly disagree	0.83%	2.11%	0.47%	-	2.09%	0.58%	-	0.84%	1.96%	-	1.12%	0.83%	2.91%	-	0.56%	-	1.69%
	DK/NA	35.05%	25.35%	37.30%	38.66%	36.13%	28.90%	38.60%	39.50%	37.25%	41.75%	29.21%	23.33%	34.95%	33.15%	36.11%	37.97%	33.90%

Q13D Would value statewide ICT standards that align employer needs with educ & training programs

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Strongly agree	10.63%	18.31%	8.16%	10.50%	9.42%	12.14%	10.53%	9.24%	7.84%	11.65%	6.74%	16.67%	9.71%	8.84%	11.67%	8.86%	16.95%
	Agree	41.03%	43.66%	40.56%	42.86%	43.46%	35.84%	42.11%	37.82%	44.12%	39.81%	49.44%	37.50%	40.78%	43.09%	34.44%	50.63%	42.37%
	Neither agree nor disagree	22.09%	23.24%	22.38%	22.69%	18.85%	24.86%	17.54%	20.17%	24.51%	15.53%	23.60%	30.00%	28.16%	20.44%	22.78%	15.19%	23.73%
	Disagree	12.13%	7.04%	14.69%	10.92%	9.42%	16.76%	26.32%	17.65%	12.75%	7.77%	8.99%	6.67%	8.74%	12.71%	15.00%	15.19%	3.39%
	Strongly disagree	2.33%	2.11%	2.56%	2.52%	2.09%	2.31%	-	1.68%	1.96%	6.80%	1.12%	0.83%	2.91%	2.76%	1.67%	2.53%	1.69%
	DK/NA	11.79%	5.63%	11.66%	10.50%	16.75%	8.09%	3.51%	13.45%	8.82%	18.45%	10.11%	8.33%	9.71%	12.15%	14.44%	7.59%	11.86%

Q13E Would value a credential certifying basic ICT user knowledge and skills (digital literacy)

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Strongly agree	11.63%	19.72%	9.09%	12.61%	12.57%	9.25%	5.26%	14.29%	8.82%	9.71%	11.24%	16.67%	9.71%	9.94%	11.11%	11.39%	22.03%
	Agree	38.04%	38.73%	38.00%	39.92%	36.13%	37.57%	40.35%	34.45%	35.29%	41.75%	37.08%	43.33%	38.83%	43.65%	32.78%	41.77%	30.51%
	Neither agree nor disagree	23.09%	23.94%	23.08%	24.37%	23.04%	21.39%	24.56%	18.49%	26.47%	18.45%	31.46%	21.67%	25.24%	22.10%	25.56%	16.46%	23.73%
	Disagree	14.78%	11.97%	16.78%	12.18%	12.04%	21.39%	22.81%	21.85%	17.65%	11.65%	10.11%	9.17%	8.74%	14.36%	18.89%	16.46%	11.86%
	Strongly disagree	2.49%	1.41%	3.03%	2.52%	0.52%	4.62%	1.75%	3.36%	2.94%	5.83%	-	-	5.83%	1.66%	1.11%	3.80%	1.69%
	DK/NA	9.97%	4.23%	10.02%	8.40%	15.71%	5.78%	5.26%	7.56%	8.82%	12.62%	10.11%	9.17%	11.65%	8.29%	10.56%	10.13%	10.17%

Geographic Area

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Southern CA (SD, Orange,	39.53%	35.21%	41.26%	100.00%	-	-	49.12%	48.74%	40.20%	27.18%	33.71%	39.17%	30.10%	50.83%	33.89%	44.30%	32.20%
	Bay Area (11 counties)	31.73%	40.85%	29.37%	-	100.00%	-	19.30%	22.69%	28.43%	41.75%	49.44%	26.67%	48.54%	29.83%	28.89%	22.78%	28.81%
	Other CA	28.74%	23.94%	29.37%	-	-	100.00%	31.58%	28.57%	31.37%	31.07%	16.85%	34.17%	21.36%	19.34%	37.22%	32.91%	38.98%

Technology Group

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	High Technology	17.11%	27.46%	14.69%	13.03%	26.18%	12.72%	17.54%	12.61%	16.67%	15.53%	23.60%	16.67%	100.00%	-	-	-	-
	Medium Technology	30.07%	23.94%	32.87%	38.66%	28.27%	20.23%	35.09%	26.05%	25.49%	30.10%	33.71%	34.17%	-	100.00%	-	-	-
	Low Technology	29.90%	19.72%	31.00%	25.63%	27.23%	38.73%	35.09%	42.86%	36.27%	28.16%	20.22%	17.50%	-	-	100.00%	-	-
	Healthcare	13.12%	16.20%	12.35%	14.71%	9.42%	15.03%	12.28%	16.81%	14.71%	15.53%	10.11%	9.17%	-	-	-	100.00%	-
	Government and Education	9.80%	12.68%	9.09%	7.98%	8.90%	13.29%	-	1.68%	6.86%	10.68%	12.36%	22.50%	-	-	-	-	100.00%

Industry

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Accommodation and Food Services (included hotels	4.49%	2.82%	4.43%	5.04%	4.19%	4.05%	3.51%	5.88%	2.94%	5.83%	3.37%	5.00%	-	-	15.00%	-	-
	Administrative and Support Services (i.e., establishments performing routine support activities	3.16%	5.63%	2.56%	4.20%	4.19%	0.58%	7.02%	2.52%	2.94%	2.91%	1.12%	4.17%	-	10.50%	-	-	-
	Agriculture, Forestry,	1.00%	-	1.40%	-	1.05%	2.31%	-	-	0.98%	3.88%	1.12%	-	-	-	3.33%	-	-
	Arts, Entertainment, and	3.32%	3.52%	3.03%	4.20%	1.57%	4.05%	1.75%	5.04%	3.92%	1.94%	3.37%	3.33%	-	-	11.11%	-	-
	Construction	3.82%	0.70%	4.66%	3.36%	3.14%	5.20%	5.26%	5.88%	5.88%	0.97%	4.49%	0.83%	-	-	12.78%	-	-
	Education	6.64%	9.15%	6.29%	6.72%	6.81%	6.36%	-	0.84%	3.92%	6.80%	10.11%	15.00%	-	-	-	-	67.80%
	Finance & Insurance	2.82%	2.82%	2.56%	3.78%	2.62%	1.73%	3.51%	2.52%	4.90%	1.94%	1.12%	3.33%	-	9.39%	-	-	-
	Health Care and Social	13.12%	16.20%	12.35%	14.71%	9.42%	15.03%	12.28%	16.81%	14.71%	15.53%	10.11%	9.17%	-	-	-	100.00%	-
	Information (i.e., Publishing, Motion Picture & Sound, Broadcasting, Telecommunications, Info	3.32%	8.45%	1.86%	2.52%	5.76%	1.73%	1.75%	1.68%	1.96%	1.94%	6.74%	5.00%	19.42%	-	-	-	-
	Management of Companies and Enterprises	1.16%	2.11%	0.93%	1.26%	1.57%	0.58%	-	-	3.92%	-	2.25%	0.83%	-	3.87%	-	-	-
	Manufacturing	11.13%	8.45%	12.35%	15.97%	8.90%	6.94%	5.26%	9.24%	7.84%	8.74%	17.98%	14.17%	6.80%	33.15%	-	-	-
	Mining	0.17%	-	0.23%	0.42%	-	-	-	-	-	0.97%	-	-	-	0.55%	-	-	-
	Professional, Scientific, and Technical Services	12.62%	18.31%	11.42%	9.66%	19.37%	9.25%	15.79%	9.24%	14.71%	13.59%	12.36%	11.67%	73.79%	-	-	-	-
	Public Administration	1.83%	2.11%	1.86%	1.26%	1.05%	3.47%	-	0.84%	2.94%	2.91%	1.12%	2.50%	-	-	-	-	18.64%
	Real Estate & Rental and	2.49%	2.11%	2.33%	1.68%	3.14%	2.89%	8.77%	3.36%	3.92%	0.97%	-	-	-	-	8.33%	-	-
	Retail	8.47%	5.63%	7.93%	4.62%	8.90%	13.29%	3.51%	11.76%	13.73%	8.74%	5.62%	4.17%	-	-	28.33%	-	-
	Transportation and	3.99%	2.11%	4.90%	3.36%	5.76%	2.89%	5.26%	4.20%	1.96%	4.85%	5.62%	3.33%	-	13.26%	-	-	-
	Utilities	1.16%	1.41%	0.93%	0.84%	1.05%	1.73%	-	1.68%	0.98%	0.97%	1.12%	1.67%	-	3.87%	-	-	-
	Wholesale Trade	7.31%	2.11%	9.32%	9.24%	5.24%	6.94%	14.04%	7.56%	2.94%	8.74%	8.99%	5.83%	-	24.31%	-	-	-
	Waste Management and Remediation Services	0.33%	-	0.47%	0.42%	-	0.58%	-	-	-	0.97%	-	0.83%	-	1.10%	-	-	-
	Other	6.31%	4.93%	7.23%	6.72%	5.24%	6.94%	12.28%	10.92%	4.90%	5.83%	2.25%	4.17%	-	-	21.11%	-	-
	Government	1.33%	1.41%	0.93%	-	1.05%	3.47%	-	-	-	0.97%	1.12%	5.00%	-	-	-	-	13.56%

Observatio 1 It might be interesting to determine whether answers to survey questions differ across industries.

Survey Type

			Goods or Services Directly Tied to ICT		Geographic Area			Total Employees						Technology Group				
		Overall	ICT Firm	Non-ICT Firm	Southern CA	Bay Area	Other CA	5 or less employees	6 to 10 employees	11 to 24 employees	25 to 49 employees	50 to 99 employees	100 or more employees	High Technology	Medium Technology	Low Technology	Healthcare	Government & Education
Base		602	142	429	238	191	173	57	119	102	103	89	120	103	181	180	79	59
Answer	Phone	48.17%	38.03%	53.38%	55.88%	30.89%	56.65%	82.46%	66.39%	51.96%	36.89%	35.96%	34.17%	16.50%	57.46%	49.44%	74.68%	35.59%
	Web	51.83%	61.97%	46.62%	44.12%	69.11%	43.35%	17.54%	33.61%	48.04%	63.11%	64.04%	65.83%	83.50%	42.54%	50.56%	25.32%	64.41%

For more information on the employer survey, please contact the COE or MPICT authors.