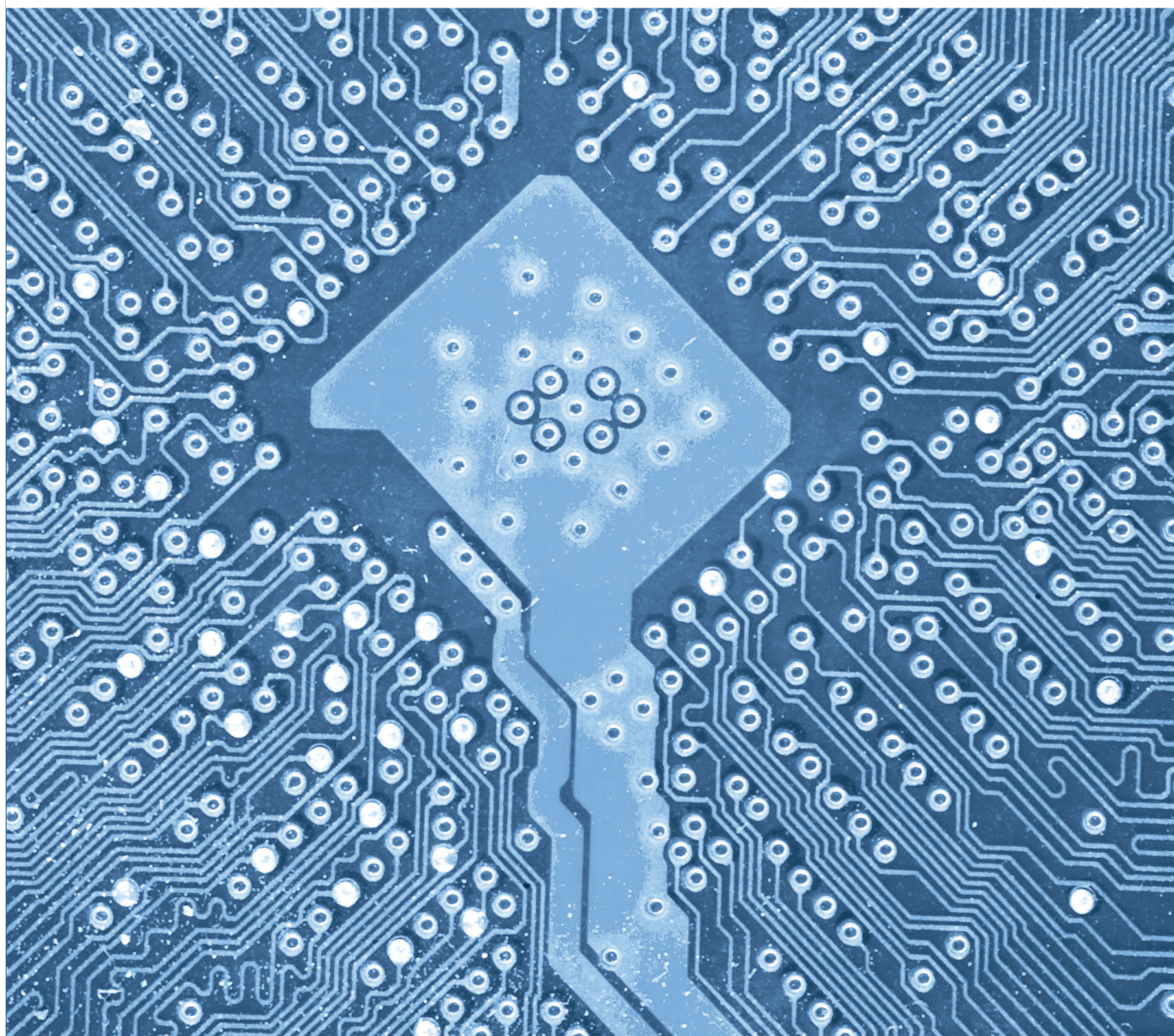


Silicon Valley Workforce Investment Boards: NOVA, work2future, Santa Cruz Co., San Mateo Co.

# Silicon Valley in Transition

Economic and Workforce Implications in the  
Age of iPads, Android Apps, and the Social Web

Managed by the NOVA Workforce Board  
July 2011



Research Team Leaders:

Green LMI, BW Research Partnership, Center for Continuing Study of the California Economy



# Acknowledgements

**A**s befits a comprehensive study of the Silicon Valley information and communications technology cluster, this effort required the expertise and dedication of a wide array of stakeholders.

The four Silicon Valley Workforce Investment Boards (SVWIBs)—NOVA, work2future, San Mateo County, and San Mateo County—are thankful for the tireless contributions of the following:

- The SVWIBs boards of directors and staffs for inspired leadership and execution.
- The research team selection committee:
  - Betty Baker, executive director, technology industry
  - Rafiq Dossani, senior research scholar, Stanford University
  - Chris Galy, director of talent delivery, Intuit Inc. and NOVA board member
  - Kara Gross, vice president, Joint Venture: Silicon Valley Network
  - Bruce Knopf, director of asset and economic development, County of Santa Clara and NOVA board member
  - Peter Koht, economic development coordinator, City of Santa Cruz
  - Robert E. Owen, semiconductor industry consultant
  - Aaron Wilcher, program coordinator, Skyline College
- Study research associate Kimberly Hui, Cornell University.
- An 80-member volunteer stakeholder committee that helped to guide the study.
- The research team that served as a model for collaborative work with workforce board partners. Team members include:
  - Green LMI and BW Research Partnership Inc. and Phil Jordan and Josh Williams (study team leaders) and B. J. Richards (lead writer)
  - California Community Colleges' San Francisco Bay Region Center of Excellence, John Carrese, director
  - Center for Continuing Study of the California Economy, Stephen Levy, director
  - GMC Strategies, Gordon Carr, principal
  - Mid-Pacific ICT Center, James Jones, executive director
- The US Department of Labor for study funding through the American Recovery and Reinvestment Act.
- NOVA executive director Kris Stadelman for her vision in launching the study.
- NOVA Economic Stimulus Manager Luther Jackson served as study project manager.
- NOVA career advisor and graphic artist Cathy Krizik was the graphic designer.



# Table of Contents

Acknowledgements .....	i
Table of Contents .....	ii
List of Figures .....	iii
<b>Executive Summary &amp; Key Findings</b> .....	1
Part I: Silicon Valley's ICT Workforce.....	1
Part II: ICT and Silicon Valley's Global Competitive Positioning .....	3
Part III: The Public Workforce System and its Partners.....	4
<b>Introduction</b> .....	6
The Study Focus: The ICT Cluster.....	7
The Study Methodology and Report Structure.....	8
<b>Part I: Silicon Valley's ICT Workforce</b> .....	10
The ICT Cluster Transition .....	10
The Changing Face of ICT Employment in Silicon Valley .....	13
Prospects and Recommendations for ICT Job Seekers.....	23
<b>Part II: ICT and Silicon Valley's Global Competitive Positioning</b> .....	29
Silicon Valley's Competitive Advantages.....	29
Silicon Valley's Competitive Disadvantages.....	32
Recommendations to Keep the Valley Competitive.....	34
<b>Part III: The Public Workforce System and its Partners</b> .....	38
Demonstration Opportunities .....	39
Job Search and Resume Services.....	40
Provide Flexibility Training .....	40
Provide Real Value to Employers .....	41
Develop New Pathways for Successful Job Placement .....	41
Increase Public Workforce System Connections to ICT Employers .....	42
Build on Recent Efforts for the Workforce Boards to Collaborate .....	43
<b>Conclusion</b> .....	45
<b>Appendix A: Tech Resumes 2.0: An Employers Perspective</b> .....	46
<b>Appendix B: Key Messages for Silicon Valley Job Seekers</b> .....	52
<b>Appendix C: Key Messages for Silicon Valley ICT Employers</b> .....	53
<b>Appendix D: Key Messages for Silicon Valley Economic Development Stakeholders</b> .....	54
<b>Appendix E: Key Messages for Silicon Valley Educators</b> .....	56
<b>Appendix F: Key Messages for Workforce Investment Boards</b> .....	57
<b>Appendix G: Venture Capital and R&amp;D Data</b> .....	58
<b>Appendix H: Real Estate Costs</b> .....	69
<b>Appendix I: Occupation-Specific Technical Skills</b> .....	71
<b>Appendix J: Survey Methodology</b> .....	72
<b>Appendix K: Employer Survey</b> .....	75

## List of Figures

<b>Figure 1:</b>	ICT Growth Returning to the Silicon Valley Economy .....	11
<b>Figure 2:</b>	Silicon Valley VC Funding .....	12
<b>Figure 3:</b>	Percentage of Firms Employing Workers in Eight Common ICT Occupations in their Silicon Valley Offices .....	15
<b>Figure 4:</b>	Average Employment Per Location .....	16
<b>Figure 5:</b>	Current Employment, Number of Employing Firms, and Anticipated 12-month Growth .....	17
<b>Figure 6:</b>	Employer-Reported Difficulty of Hiring for ICT Occupations .....	18
<b>Figure 7:</b>	Silicon Valley Occupational Distribution .....	20
<b>Figure 8:</b>	Flexible Candidates v. Candidates with Stronger Job-Specific Skills .....	22
<b>Figure 9:</b>	Median Home Prices in 2010 .....	33

# Executive Summary & Key Findings

---

**S**ilicon Valley, the high-tech hub of the world, is led by the Information and Communications Technologies (ICT) cluster. The goal of this study is to better understand this critical cluster, which includes firms in computers, chips, software, networking, telecommunications, and the Internet, and to develop recommendations for job seekers, workforce development organizations, and business and community leaders in the Valley.

The key findings speak to three broad themes—**opportunity, change, and challenge**.

The ICT cluster is emerging from recession into a new period of growth and opportunity. Major ICT companies have added 13,000 jobs since December 2009, and executives interviewed during this study were confident of additional gains during the next year. Their interviews are supported by announcements from Google, Facebook, and many other ICT companies in the Valley concerning immediate and future job growth. Venture capital funding is rising again and the recent IPO for LinkedIn is the tip of a wave of ICT initial public offerings expected during the next year.

But these opportunities will come amidst enormous change and challenge—change in and for the ICT workforce, and challenge for the Valley in remaining competitive and for workforce boards and their education and training partners in preparing workers to meet employer skill demands.

## Part I: Silicon Valley's ICT Workforce

---

### *The ICT Cluster in Transition*

The researchers identified three large transitions taking place in the Valley's ICT cluster. Understanding these shifts is of critical importance to anyone hoping to take advantage of the new career opportunities being created by the economic recovery.

The ICT cluster is in the midst of a **transition from recession to growth**. Employer surveys revealed that 60% of the Valley's ICT employers expect to have more full- and part-time employees 12 months from now, and a conservative reading of the data suggests that cluster employment will grow by 15% over the next two years. Silicon Valley's employment of software engineers and project managers is expected to increase by 10.8% over the next 12 months, while the employment of field applications engineers will jump more than 20%, and quality assurance engineers will see 12.3% growth over the same period.

Demand for these occupations is, in fact, already high, with a majority of employers reporting that they already have at least some difficulty finding qualified candidates to fill jobs in most of these occupations. This difficulty will only be exacerbated by growing demand, baby boomer retirements, and the education system's failure to produce adequate numbers of bachelor's, master's, and doctoral graduates in the relevant disciplines.

For these reasons, a talent shortage is inevitable unless major policy changes are made. While these opportunities will help ICT workers hurt by the recent recession, a talent shortage will substantially weaken the Valley's competitive position since just-in-time access to talent is the main reason why ICT companies locate in the Valley.

Another important change taking place in Silicon Valley's ICT cluster is the **transition in employers' skill and attitude requirements**. Experience was strongly desired of all candidates, and experience at name-brand firms was deemed particularly valuable. Employers also showed a strong preference for workers who demonstrated flexibility and an entrepreneurial spirit. Though employers still rate technical skills as the most important qualifications for tech job seekers, when asked whether they would prefer a candidate with better technical skills or one who is more adaptable, able to learn quickly, and ready to take on new tasks, employers generally chose the latter.

A third change happening in Silicon Valley's ICT cluster is a **transition in job searching and hiring**. ICT employers rarely use workforce one-stop centers to identify and recruit new employees; rather they use in-house and external recruiters. Job seekers are increasingly finding job openings on private Internet-based services such as LinkedIn, craigslist, and Monster.com. These changes pose challenges for job seekers and career counselors who must adapt to new ways of job searching as well as the changing employer expectations discussed above.

Several resume panel surveys were conducted for this study. They provided useful insights into what ICT employers are seeking and how one can avoid having his or her resume tossed into the "immediate no" pile. Based on these surveys, recommendations were developed for ICT job seekers.

### ***Prospects and Recommendations for ICT Job Seekers***

Several specific strategies were identified: Job seekers in the current market should know **which technologies excite them** and focus their job searches accordingly. They should **take advantage of networking opportunities**, including reaching out to industry friends and colleagues, attending industry events, and creating an online networking presence. It is important they **know the type of company for which they plan to work** and the recruiting tools most likely used by companies of that nature. They should **develop a targeted and specific resume** that highlights the skills and experiences most relevant to the opportunity at hand. And job seekers should always be looking for opportunities to **highlight problem solving skills, especially in interviews**.

One of the strongest signals from employers is that they expect job seekers to "show, not tell." A resume cannot simply be a list of skills and proficiencies but must illustrate how the candidate has used those skills to solve problems in the past. Even more important, candidates need to show how their proven skills can be used to solve problems that are relevant to the target position and the target employer.

This is a particular challenge for job seekers who are older, unemployed, or seeking to transition into ICT from other industries. They must show that they have up-to-date skills, are passionate about technology, and are eager to learn.

Recommendations for how workforce development partners can help job seekers meet the challenges of change are included below in Part III.

## Part II: ICT and Silicon Valley's Global Competitive Positioning

The researchers interviewed ICT executives and reviewed recent studies about the pros and cons of conducting business in the Valley with the goal of developing a set of recommendations that could help local leaders foster the region's advantages and keep the Valley competitive.

### *Silicon Valley's Competitive Advantages*

Silicon Valley's top competitive advantage is its **highly skilled pool of talent**. Executives interviewed for the study say there is nowhere else in the world with such a concentration of highly skilled tech professionals, which is essential for businesses that require a steady stream of talent. The Valley's **high quality of life**—including beautiful weather, excellent schools, and the ability to live and work in the suburbs—was another major advantage, making CEOs want to locate their companies there and attracting talented workers and their families. **Proximity to savvy customers**—both business and consumer—was another key advantage, as it facilitates sales and aids in product development. **Access to capital** was also cited as an advantage, especially for the start-ups that are such an important driver of the region's economy.

All of these competitive advantages were also cited in the 2011 CEO Business Climate Survey conducted by the Silicon Valley Leadership Group.

### *Silicon Valley's Competitive Disadvantages*

Silicon Valley is an expensive location for businesses and residents alike. Average salaries here are the highest in the nation and even higher in the ICT sector, averaging over \$150,000 a year. Land and housing costs are high, with median Silicon Valley housing prices three times higher than the US median and even higher in comparison to Austin and Phoenix. Executives repeatedly told researchers they only keep activities in the Valley that cannot be performed as well elsewhere. And while no executive interviewed for this study mentioned **taxes and regulations** as constraints on their ability to conduct business in the Valley, other studies cite these as potential challenges to competitiveness.

### *Recommendations to Keep the Valley Competitive*

Overcoming the high costs of living and working in the Valley requires policies that respond not only to the challenges facing businesses, but also the challenges that must be overcome to attract talented entrepreneurial workers and their families to make the Valley their home.

The first recommendation is to take steps to **maintain a world-class ICT workforce**. These steps should include strengthening the K-12 science, technology, engineering, and math (STEM) pipeline and improving the number of higher education students graduating with STEM degrees; supporting non-rote experiential learning in public schools by ensuring the availability of non-technical classes, such as art and music; and advocating for immigration reform to make it easier for talented foreign workers to bring their skills to the Valley.

The second recommendation is to **maintain and improve the Valley's quality of life** so that CEOs want to locate companies there and workers find it an attractive place to raise their families. Steps for accomplishing this include investing in children and the current workforce through better schools and

universities; investing in infrastructure, including improvements in public transportation; and increasing the availability of housing so that more workers can afford to make their homes in the Valley.

It is important to remember that ICT firms depend on more than just highly skilled ICT employees, and ICT workers want to live in an area where they can benefit from the services of first-class teachers, nurses, firefighters, auto repair mechanics, and plumbers. The Valley's K-12 education system, now under years of financial stress, must be not only a launching pad for future ICT workers, but also the catalyst for a world-class workforce throughout the economy.

The Silicon Valley Leadership Group 2011 CEO Business Climate Survey<sup>1</sup> voiced a similar conclusion:

*Increasingly it is difficult for Silicon Valley companies to compete against other centers of innovation and entrepreneurship—both domestic and abroad. Among the unique challenges are globalization and the international competition for talent. A deteriorating state infrastructure in areas ranging from public education to public transportation has added to the difficulties of recruiting the best workforce, finding them available housing, and educating their children to be tomorrow's world-class workforce.*

The need to invest comes at a time when public budgets in California and Silicon Valley are struggling to maintain even basic services as the recession has reduced revenues while service demands grow. There are no magic bullets to finance these critical investments. Yet, to postpone investing goes against one of the founding principles of success for Silicon Valley companies: “invest or die.” What is right for our companies is right for our public sector as well. Later is simply not good enough when it comes to making the investments that will keep the Valley attractive to entrepreneurs and talented workers and their families.

## Part III: The Public Workforce System and its Partners

A third goal of the study was to develop a set of recommendations to help workforce investment boards (WIBs) and their partners better assist their job-seeking customers and serve the evolving needs of employers during this time of transition in the ICT cluster.

The first recommendation to the WIBs is to provide job seekers with **demonstration opportunities**, such as portfolio learning laboratories in which customers would be divided into interdisciplinary teams and given a project to complete—ideally a project that would serve the tech needs of a local non-profit. This would give job seekers a tangible product to show employers that would highlight both their technical and teamwork skills.

WIBs should also provide **job search and resume services** that help customers implement the job search strategies outlined in Part I of this study, and they should provide hands-on **flexibility training** that teaches the problem solving, entrepreneurial, and flexibility skills today's employers demand.

Another way WIBs can increase their value to the Silicon Valley community is by strengthening ties with local employers. Employers interviewed for the study report said that they do not generally hire

<sup>1</sup> Available at [http://svlg.org/docs/2011BusinessClimate\\_digital.pdf](http://svlg.org/docs/2011BusinessClimate_digital.pdf)



applicants from WIBs, and they seem to undervalue the services WIBs offer. One way to change that is to **provide employers with greater value**, such as developing opportunities for employers to engage with financiers, legislators, or bureaucrats at quarterly leadership meetings.

WIBs must also **develop new pathways for successful job placement**, shifting their focus from providing narrowly defined occupation-specific training to helping workers become the flexible problem solvers employers look for today. This will require judging WIBs' success by their ability to instill in job seekers the qualities sought by employers in the modern workplace.

**Increasing the connections of the public workforce system to ICT employers** is also of critical importance. ICT employers are increasingly the best source of information on rapidly changing trends in job growth, occupational demand, and the evolving nature of work roles, and this information is of great importance to WIBs as they help job seekers prepare for and find opportunities.

The Silicon Valley ICT sector is spread over several counties served by multiple workforce boards and education and training partners. Workers who live in one county may work in another county. Employers in one part of the Valley search for and find workers throughout the entire Silicon Valley region.

As a result, it is critical that Silicon Valley's four **workforce investment boards build on their recent historic efforts to collaborate**. Collaborations, such as this study, allow the WIBs to serve the Valley economy better by providing targeted, coordinated services with minimal duplication of effort. In doing so, the Silicon Valley WIBs can serve as a model for other regions and help transform job-seeker services to meet the demands of the new world of work.

In 2010, Joint Venture: Silicon Valley Network looked at regional workforce collaboration among Silicon Valley workforce boards. Their report reached the following conclusion:

*In short, this report makes the case for a regional workforce plan for Silicon Valley...Silicon Valley's response to these workforce challenges will play a critical role in the continued economic prosperity of the Bay Area and California as a whole. So often our region is a bellwether, showing the world new trends and technologies...Can Silicon Valley also provide the world a new model for skill building, adult learning and workforce transitions? <sup>2</sup>*

This ICT study points the way to making this hope a reality.

---

<sup>2</sup> Joint Venture: Silicon Valley Network, A New Foundation of Collaborative Workforce Development in Silicon Valley (2010), available at [https://novaworks.org/Portals/3/Nova/Docs/LMI/JVSV\\_WorkforceStudy\\_0610.pdf](https://novaworks.org/Portals/3/Nova/Docs/LMI/JVSV_WorkforceStudy_0610.pdf)

# Introduction

**S**ilicon Valley, the world's preeminent innovation factory, is home to a staggering array of iconic technology corporations. Once a center for fruit orchards, defense contractors, and large-scale silicon chip production, the constantly evolving Silicon Valley economy today spreads to the west, south, and east of San Francisco Bay.<sup>3</sup>

Silicon Valley is synonymous with innovation. Wave after wave of creativity, technical invention, and entrepreneurship has defined the region as the world's high-tech hub. With each new technology and industry transformation, other regions clamor to become "the next Silicon Valley," but more often than not, they end up following the Valley's lead.

"Silicon Valley stays on top because [it]...keeps evolving," one tech executive said. "It has evolved from computers and semiconductors to software, biotech, and social networking. It keeps reinventing."

Silicon Valley is a place where ideas, attitude, and funding meet to produce world-leading technologies, companies, and industries at an accelerated pace. The hallmark of the Valley's innovation culture is "creative destruction," a process by which new innovations regularly consume their predecessors to produce new and often superior creations. This process brings with it economic peaks and valleys, but it is a key ingredient of what allows Silicon Valley to lead the innovation economy.

Of all of the innovative technologies, companies, and industry clusters in Silicon Valley—including clean energy and life sciences—none is more emblematic or successful than Information and Communications Technologies (ICT), comprised of all firms working in computers, chips, software, networking, telecommunications, and the Internet.

The purpose of this study is to examine the current state of the ICT cluster in Silicon Valley. The study reviews the competitive advantages and disadvantages for Silicon Valley ICT companies, provides a glimpse into the future of ICT in the Valley, makes recommendations for local ICT job seekers, and offers recommendations for maintaining the Valley's competitive position and for the public workforce organizations tasked with supporting job seekers and employers.

The workforce components of the study focus on those fields that are at the core of ICT innovation. Though it is undeniable that many opportunities exist in lower-skill ICT occupations across every sector and with employers of all kinds, this study only focuses on those higher-skill occupations at ICT firms in Silicon Valley because they are the most likely to drive the sector's ability to grow and flourish in the future.

More specifically, this study examines the major transitions facing ICT and the Valley: 1) the economy is moving from recession to growth; 2) the emphasis on workers developing job-specific skills is transitioning into an emphasis on cultivating workforce flexibility; and 3) the job search and hiring process are transitioning from the 20th century norm of filling solitary job functions to the 21st century model

---

<sup>3</sup> For the purpose of this study, Silicon Valley refers to all of Santa Clara County, including the City of San Jose and adjacent communities, all of San Mateo County, the northern part of Santa Cruz County, and the southern part of Alameda County.

of building teams with members possessing complementary and versatile skills. This study is intended to provide a roadmap to help workers, employers, workforce investment boards, and all who care about the health and vitality of the Silicon Valley economy to successfully navigate this turbulent time.

This is not your grandparents'—or even your older siblings'—Silicon Valley. Gone are the days of defined work roles, lifelong careers with a single company, and stable and steady employment prospects. Silicon Valley today represents the leading edge of the changes affecting the national economy and workforce, and frequent job changes, individual skill development, and professional responsibility are becoming the norm. In order to maintain employment in such a climate, workers must take charge of their careers and reinvent themselves so that their own personal development can keep pace with workplace innovation.

The era of defining oneself by an occupation may well be ending. Successful Silicon Valley workers view themselves as collections of skills that can be constantly assembled and re-assembled to solve problems across job functions and industries. Though this is clearly happening faster in higher-skill positions, there is evidence that this way of looking at work is growing in importance throughout the career ladder in ICT firms and, in fact, throughout the economy as a whole.

Talent—entrepreneurial, inquisitive, and motivated—is the fuel powering the Silicon Valley innovation factory. Where iron ore and coal once fed the nation's industrial engine, brainpower is now the capital on which economic vitality depends.

## The Study Focus: The ICT Cluster

Information and Communications Technologies (ICT) is an umbrella term encompassing all computer, software, networking, telecommunications, Internet, programming, and information systems technologies. These rapidly evolving technology, business, and industry areas are interrelated and interdependent. Software does not do much without hardware. Hardware functionality is improved with software. And networking, telecommunications, and the Internet consist of combinations and applications of hardware and software. Together, these industries make up the ICT cluster—perhaps the most vibrant piece of Silicon Valley's vibrant innovation economy.

These quickly emerging, evolving, and converging areas go together, and there are benefits to thinking of them in this way, especially for the purposes of economic study and strategic and educational planning. For the purposes of this study, ICT will be defined as the core primary industries identified by the California Community Colleges and the Mid-Pacific ICT Center's Phase Two ICT Report.<sup>4</sup>

The public workforce system is a network of organizations focused primarily on connecting workers with employment opportunities and employers with workers. Funding comes from many varied sources, with basic funding being provided through the federal Workforce Investment Act (WIA) administered by the US Department of Labor. Silicon Valley workforce boards must supplement WIA funding with other sources, including grants and foundation support, to provide a full range of services to job seekers and Valley companies.

---

<sup>4</sup> Available at <http://www.mpict.org>

Most of the programs are designed, developed, deployed, and evaluated through locally controlled partnerships between counties and/or municipalities and workforce investment boards (WIBs) that represent local employers, non-profits, educators, labor unions, and other workforce development stakeholders. The Valley workforce “system” also includes education and training partners, such as community colleges, and active participation from the business community, which enriches the development and delivery of services. With the ICT cluster being such a critical employer in the Valley, the reasons for the WIBs’ interest in ICT are obvious.

The four Silicon Valley WIBs that collaborated on this study are:

- **the NOVA Workforce Board**, which addresses the workforce investment needs of Silicon Valley through **NOVA**, a workforce development agency hosted and administered by the City of Sunnyvale, and CONNECT, a collaborative of workforce development organizations;
- **work2future**, which addresses the workforce and economic development needs of Silicon Valley from within the City of San Jose Office of Economic Development through one-stop center services and resources;
- **the San Mateo County Workforce Investment Board**, which oversees the **PeninsulaWorks One-Stop Career System**, bringing together the many federal, state, and local employment, training, development, and educational services in one location;
- **the Santa Cruz County Workforce Investment Board**, which is dedicated to helping Santa Cruz job seekers access the tools they need to manage their careers and to helping local employers find the skilled workers they need to compete and succeed.

These four workforce boards recognize that the economic and workforce vitality of the Valley is a regional effort. The workforce boards serve three major components of the Silicon Valley economy: job seekers, businesses, and—by meeting the needs of job seekers and businesses—the community at large. All three groups are audiences for this study.

Of primary importance to the WIBs is providing actionable recommendations to job seekers and those institutions that support them. But the WIBs also provide key information to economic developers, policy makers, employers, educators, labor unions, and workforce professionals. By taking a regional approach and leveraging the assets of all four organizations, the workforce boards of Silicon Valley have developed findings that address the needs of the rapidly changing economic and workforce environment in light of macro-economic trends, globalization, and technological advancement.

## The Study Methodology and Report Structure

This study is the culmination of eight months of research that included primary and secondary research and extensive participation of the workforce board sponsors.

Primary research techniques were employed to gather information on evolving cluster trends, employer opinions and expectations, and other less-tangible qualities of the ICT economy. These research techniques included:



- 53 executive-level interviews with major employers and thought leaders in the region, typically 20-30 minutes in length and covering strategic viewpoints and economic and workforce issues facing ICT employers in the Valley;
- two resume panels with a total of 27 recruiters and hiring decision makers from ICT firms gathered specific skill information on key occupations and provided input on how job seekers can best present themselves for employment;
- a 15-minute survey of 251 ICT companies in Silicon Valley, drawn from a random sample of firms by size, technology type, and geography, focused on hiring patterns and preferences.

In order to maximize participation and candor, employers that participated in the study were offered confidentiality. As a result, no individual company names or identifying information is published in this study.

The secondary research included existing financial data from the PricewaterhouseCoopers/ National Venture Capital Association MoneyTree™ Report and the Franchise Tax Board and internal R&D budget data from Schonfeld & Associates, Inc. Secondary research also included a review of existing workforce data from the California Employment Development Department (EDD) and Economic Modeling Specialists Inc. (EMSI).

The study findings are presented here in three parts reflecting the three main audiences for the research findings and recommendations. Part I, entitled “Silicon Valley’s ICT Workforce,” is oriented to both job seekers and workforce stakeholders. It examines transitions occurring in ICT—namely the transition from recession to growth, transitions in employers’ skill and attitude requirements, and transitions in job searching and hiring—and the impacts these transitions are having on the sector’s workforce. Practical recommendations are offered to help job seekers navigate these changes and answer questions such as:

- What Types of Jobs Should I Pursue?
- What Types of Companies Should I Approach?
- What Skills Do I Need?
- How Should I Conduct My Search?
- How Do I Get the Job?

Part II, entitled “ICT and Silicon Valley’s Global Competitive Positioning,” is oriented to residents as well as business and community leaders and provides conclusions and recommendations to support the continued success of Silicon Valley as an ICT hub. These findings include a review of Silicon Valley’s current competitive advantages and disadvantages as well as ideas for supporting the region’s leadership in ICT.

The third and final part of the study, “The Public Workforce System and its Partners,” is oriented to workforce boards and career counselors and offers specific findings and recommendations to assist them as they work to remain relevant in the face of the transitions in the economy. This section is followed by appendices with additional detailed information from the research as well as a series of how-to manuals for job seekers and others looking to navigate the Silicon Valley tech economy.

# Part I: Silicon Valley's ICT Workforce

## The ICT Cluster Transition

There are 7,460 ICT establishments in the Silicon Valley region.<sup>5</sup> These firms employ 215,609 workers, almost exactly one-third of all employment at ICT firms in the state. These firms pay workers an average wage of over \$182,000 per year<sup>6</sup> and include many name-brand companies such as Apple, Google, Hewlett-Packard, Facebook, Cisco Systems, and Intuit. It is important to note that the median wages included here are based on the average wage paid across all employees within the cluster, rather than for specific occupations, which are referenced later in the study.

Over the past few years, Silicon Valley's ICT cluster has suffered through the global recession, which lowered demand, caused a pause in new entrepreneurial activity, and reduced investors' appetite for risk. As a result of the economic slowdown, venture capital firms had to be more patient, tying up capital in companies longer than they had planned or have had to historically. Many had to make follow-on investments to sustain their portfolio companies through the recession, further reducing the capital available for new start-ups.

However, the region's economic fog is beginning to lift. There is an overall optimism that the economy has turned the corner and that markets will exist for new products and services in the near future. Employers surveyed for this study report increasing optimism in hiring new employees. The acquisition trends of larger and emerging technology companies have created increased opportunities for investors and greater confidence in the rebound. All of this is reflected in a marked rise in the Silicon Valley Venture Capital Confidence Index, which surveys a wide range of investors and analysts and tracks their outlook over time.

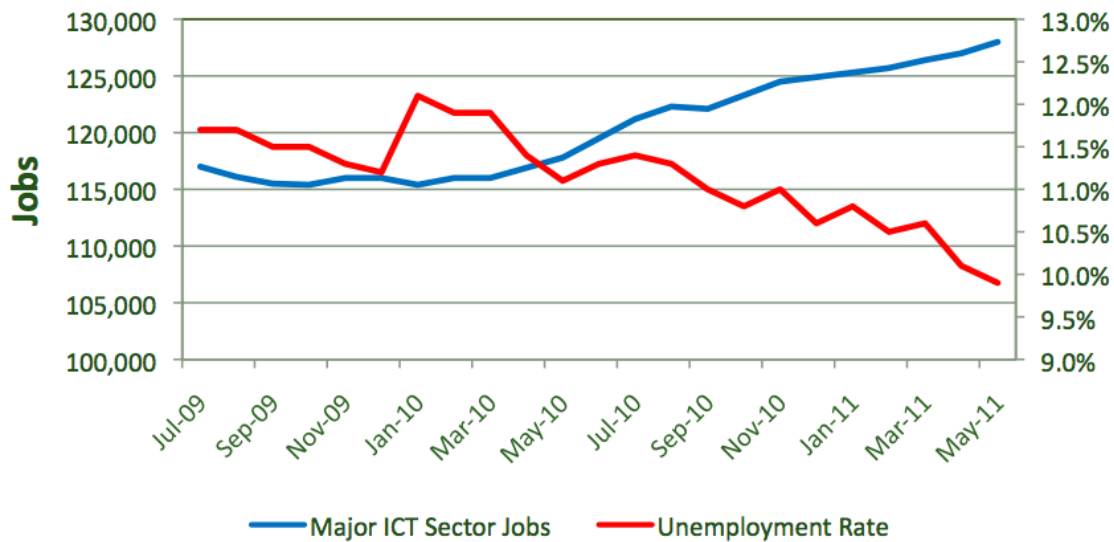
Recent employment trends in the Valley's key ICT industries confirm that there is strong potential for job growth. Since December 2009, San Jose Metropolitan Statistical Area (MSA) employers have added 4,100 jobs in computer and electronic product manufacturing, 6,300 jobs in software and Internet-related industries, and 2,800 jobs in computer systems design. These job gains have helped move the Valley's unemployment rate from a high of 11.7% in July 2009 to 9.9% in May 2011.<sup>7</sup>

5 EMSI data were unavailable for Southern Alameda County.

6 EMSI, EMSI Complete Employment 2011.2, available from <http://www.economicmodeling.com/>

7 California Employment Development Department, Employment by Industry Data, available at <http://www.labormarketinfo.edd.ca.gov/?pageid=166>

**Figure 1: ICT Growth Returning to the Silicon Valley Economy<sup>8</sup>**

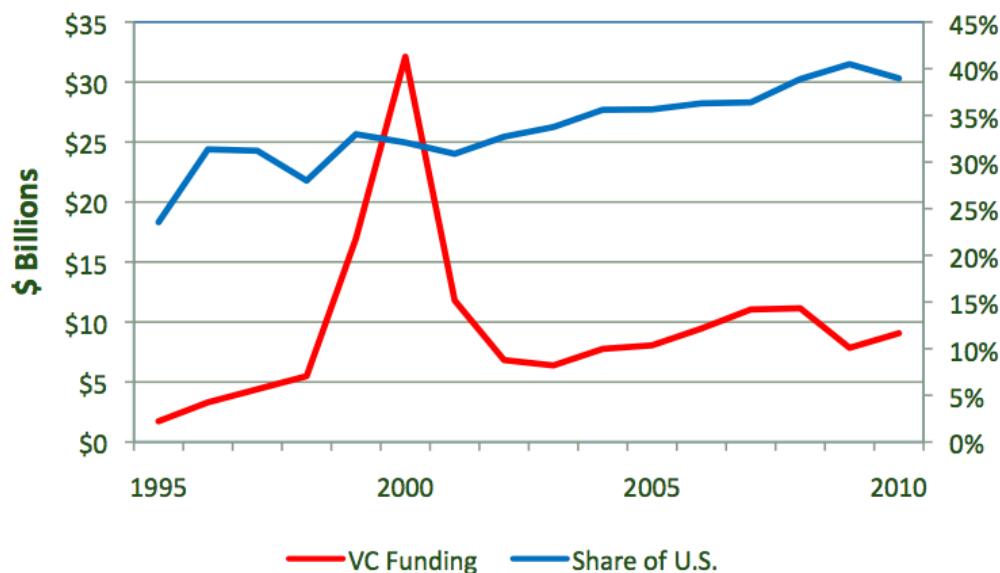


Thanks to this increased confidence, venture capital enthusiasm and robust activity are returning to Silicon Valley, bringing new growth, an explosion of start-ups, and new opportunities for workers. The technology sector is entering the economic recovery sooner than other industry sectors thanks to the strong demand to make the capital and R&D technology investments that were put off during the recession. This capital infusion is providing resources for emerging companies and allowing larger, established firms to make the acquisitions they need to remain competitive and diversify their offerings.

Overall venture capital (VC) funding, a major part of which comes from the ICT cluster, is growing again with Silicon Valley (including San Francisco and Berkeley) capturing 40% of national funding. VC funding in Silicon Valley was up 43% in the first quarter of 2011 compared to the first quarter of 2010, outpacing the nation's 14% increase.

<sup>8</sup> PricewaterhouseCoopers/National Venture Capital Association, *MoneyTree Report*, available at <https://www.pwcmoneytree.com/MTPublic/ns/index.jsp>

**Figure 2: Silicon Valley VC Funding<sup>9</sup>**



The resurgence of growth in the ICT cluster is allowing companies like LinkedIn to go to market with initial public offerings (IPOs), which in turn makes it more attractive for investors to support new ICT ventures in the Valley.

This resurgence is a product of Silicon Valley’s ability to continually innovate, anticipate “the next big thing,” and generally stay ahead of the curve better than any other region. One example of the region and the industry benefiting from this unique ability to marry technological innovation with an intuitive grasp of market demand can be found in the successful shift from a primary focus on business customers to a broader focus on consumers.

The research conducted for this study found that, for decades, new information technology tools, devices, and systems were initially adopted at the large enterprise and academic level before they were of interest to consumers. PCs, email, faxes, and cell phones all were ubiquitous in business before they ever reached the consumer, and most people over the age of 40 most likely saw their first computer or even VCR in a classroom long before they ever saw one in their home. Now, much of new technology—smartphones, web video, social media, even cloud storage—seems to begin with the consumer and migrate “up” to industry.

Consumers are using apps, sharing video, using Skype, storing photos remotely, and connecting on Facebook well in advance of businesses fully recognizing the value of each. It will be interesting to see the implications of this as new products are targeted first to price-sensitive consumers (iPad fans notwithstanding) rather than companies and schools with robust IT budgets available to try out new products. Silicon Valley is at the forefront of this transformation, which is why consumer-focused companies like Facebook will continue to choose to locate their headquarters in the Valley.

<sup>9</sup> ibid



# The Changing Face of ICT Employment in Silicon Valley

The transitions taking place in ICT are changing the very nature of employment in the cluster. In particular, the transition from recession to growth, the transitions in employers' skill and attitude requirements, and transitions in job searching and hiring are revolutionizing the way job seekers need to go about identifying opportunities, developing and presenting their skills, and pursuing specific job openings.

## *Transition from Recession to Growth: Identifying the new opportunities*

### **Finding #1: ICT firms in the Valley are growing**

It is a promising time for higher-skilled tech job seekers in Silicon Valley. In a survey of 251 Silicon Valley ICT employers, 60% say they expect to have more full- and part-time permanent employees 12 months from now. A conservative reading of the data suggests a 10.7% growth in cluster employment over the next year and a nearly 15% increase two years out. Opportunities for temporary and contract employment are also looking up with 25% of firms expecting to increase these hires in the next year, increasing these positions by 6.5%.

As referenced earlier, financial data also show improved conditions for workers and can help to identify sectors with potential for greater future growth. Higher-skilled job seekers should feel most confident in the software and IT services sectors, both of which look to have rebounded significantly from the lows of the recession. Semiconductors and telecommunications, on the other hand, look to be rebounding more slowly.

This growth also presents challenges and difficulties for employers, because the ability to hire new workers in a timely fashion is critical to the continuous innovation that is the hallmark of the Valley. As one executive stated, “[If we cannot hire in a timely fashion, we] can’t start the project, leading to a lost opportunity. The costs are hard to quantify—maybe a few million dollars—and we define ‘timely fashion’ as half a year.”

### **Finding #2: Software, hardware, and telecommunications firms are growing fastest**

Though the ICT cluster is growing, the five principal subsectors of ICT are not sharing equally in the rebound. Not surprisingly, employment and investment data show that software, and to a slightly lesser extent hardware and telecommunications, are growing faster than their counterparts. It appears that much of this growth is driven by expansion of mobile and wireless technologies, cloud capabilities, app development, and Voice over Internet Protocol or VoIP. Of course, given the rapid pace of the convergence of these technologies, many of the lines between these three categories are blurring.

The simple example of a smartphone illustrates this point. Is a smartphone classified as a telecommunications device because it is a phone? A hardware device because it has a computer? A software device because it runs applications on a platform? A cloud computing device because it accesses hosted services remotely? When the answer to all four is “yes,” how should we classify a company that makes smartphones?

Not surprisingly, the majority of firms now report being involved in more than one of these technology

areas. In fact, such firms are expected to experience the strongest employment growth over the next 12 months. Given the strong growth and pace of convergence, workers will be expected to be familiar with multiple technologies and platforms.

Semiconductors and networking and equipment, on the other hand, are still strong clusters in the Valley, but they continue to experience steady declines in both employment levels and private investment, and there is little evidence to suggest a significant turnaround in either cluster. For a detailed review and analysis of investment data in the region, please see Appendix G.

### **Finding #3: Mid-sized firms are growing fastest**

Contrary to expectations, the research determined that medium-sized firms—those with 11 to 99 employees—are the most likely to increase employment in the next 12 to 24 months. This result was surprising because smaller firms and start-ups are generally expected to do the most hiring, but medium-sized firms are expected to enjoy the most growth in Silicon Valley over the next two years.

### **Finding #4: Engineers and project managers are in greatest demand**

The research sought to determine which of Silicon Valley's high-skilled ICT occupations present the best opportunities in ICT firms for ICT job seekers. After a review of secondary data and executive interview responses, eight of the most common high-skilled ICT occupations were selected for in-depth review during the resume panels and survey work. The following occupations were selected:

- software engineers
- field applications engineers (FAEs)
- quality assurance engineers (QAEs)
- project managers
- web developers
- graphic designers
- user interface designers
- hardware engineers

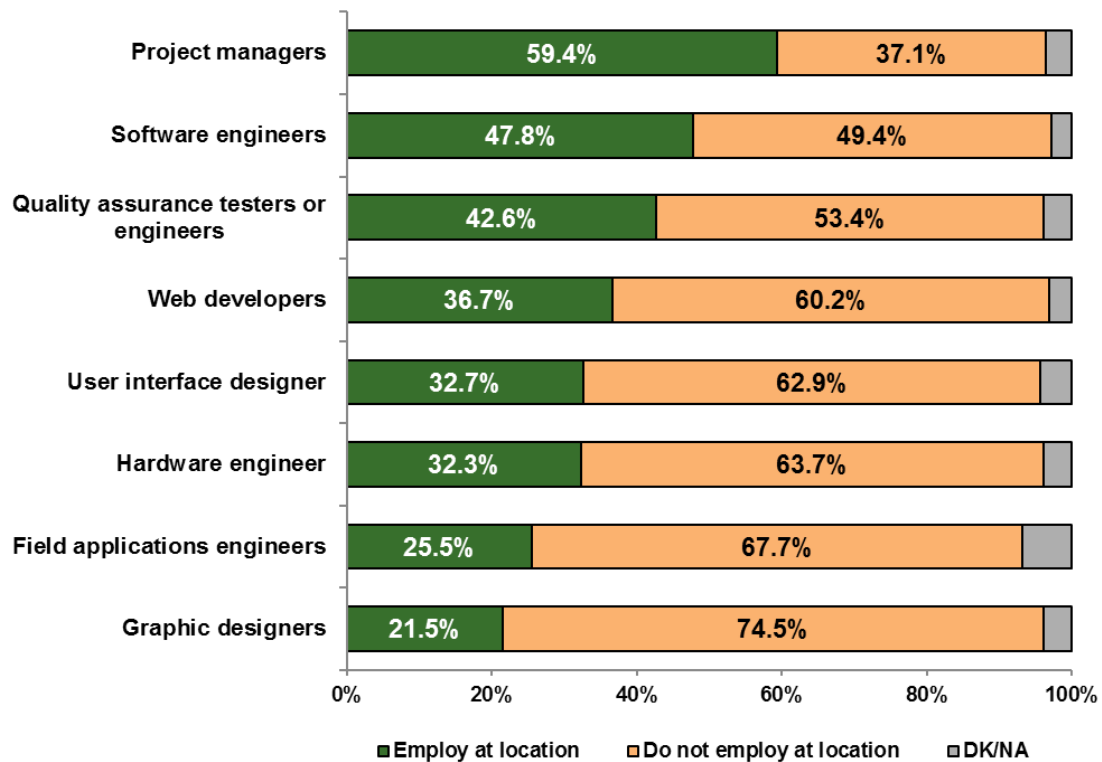
These occupations were chosen because they were identified as some of the most important to the continued strength of the Valley's ICT cluster. In addition, these occupations capture the most innovative workers—the talent that drives companies—and are most unique to Silicon Valley.

Next, representatives at 251 ICT firms were asked about their experiences employing workers in these occupations.<sup>10</sup> They were first asked whether their Silicon Valley offices employ professionals in any of these eight common ICT occupations. All eight occupations were well represented within the surveyed firms with more than half employing project managers, more than one in five employing graphic designers, and the remaining occupations falling somewhere in between.

---

<sup>10</sup> Participants were instructed that the occupational titles used by the researchers may differ from those the firms use internally, and they were asked to try to equate their organizations' specific position titles with the more general titles used by the researchers.

**Figure 3: Percentage of Firms Employing Workers in Eight Common ICT Occupations in their Silicon Valley Offices**

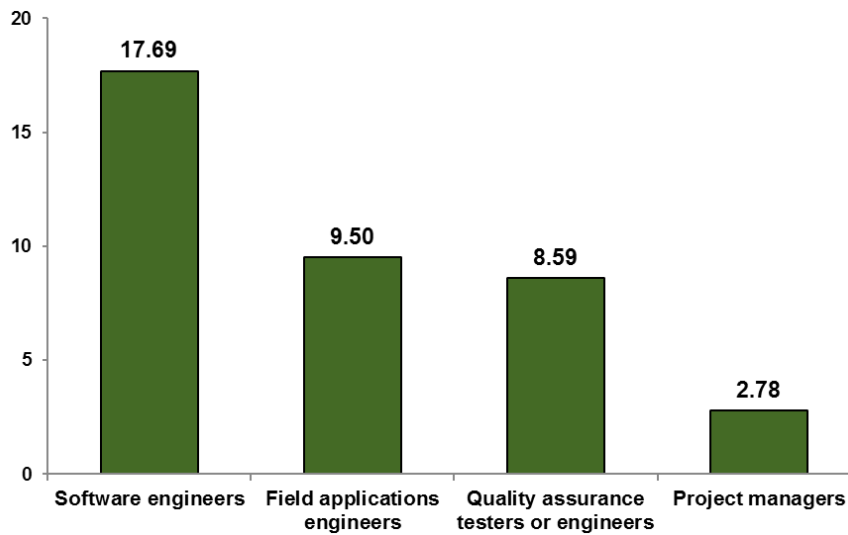


This result is consistent with the research team's conversations with executives. The high employment percentages also underscore the importance of these occupations to the Valley's ICT cluster.

Participants were next asked how many workers they employed in each occupation, and it became apparent that software engineers, field applications engineers, quality assurance engineers, and project managers enjoy the most employment opportunities among the eight occupations considered.

Locations that employ software engineers average more than 17 per Silicon Valley location. Locations employing field applications engineers and/or quality assurance engineers have, on average, approximately nine workers in each occupation. Employers of project managers and hardware engineers averaged approximately three workers per location, and the remaining three occupations averaged only one worker per occupation per Silicon Valley location.

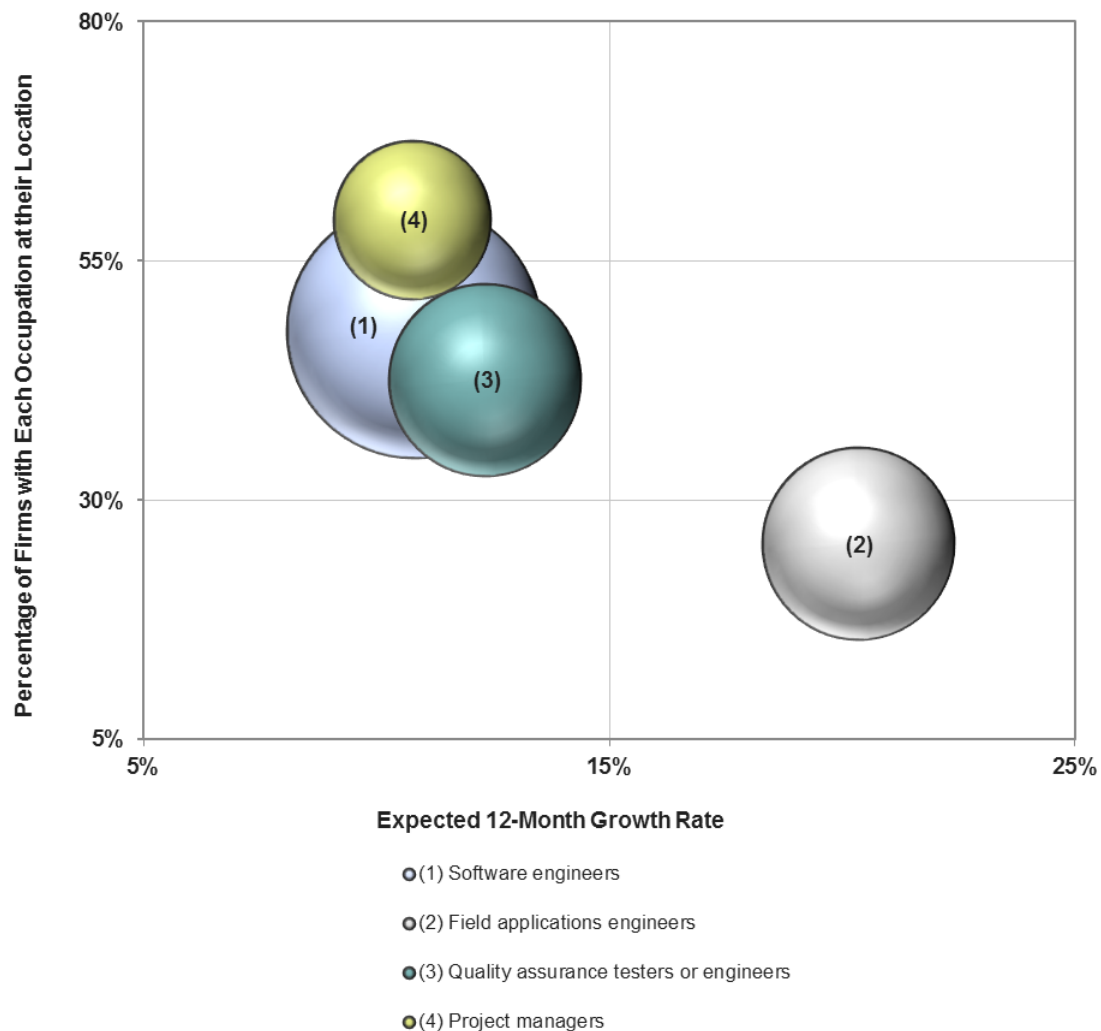
**Figure 4: Average Employment Per Location**



These four occupations not only represent the lion's share of high-skilled tech jobs in Silicon Valley's ICT cluster, but jobs in these occupations are expected to grow at an impressive rate. The chart following illustrates each occupation's average current employment at each employer's Silicon Valley location (bubble size), the percentage of firms currently employing people in these occupations at their Silicon Valley location (Y axis), and the expected Silicon Valley growth rate for each of the occupations over the next year (X axis).



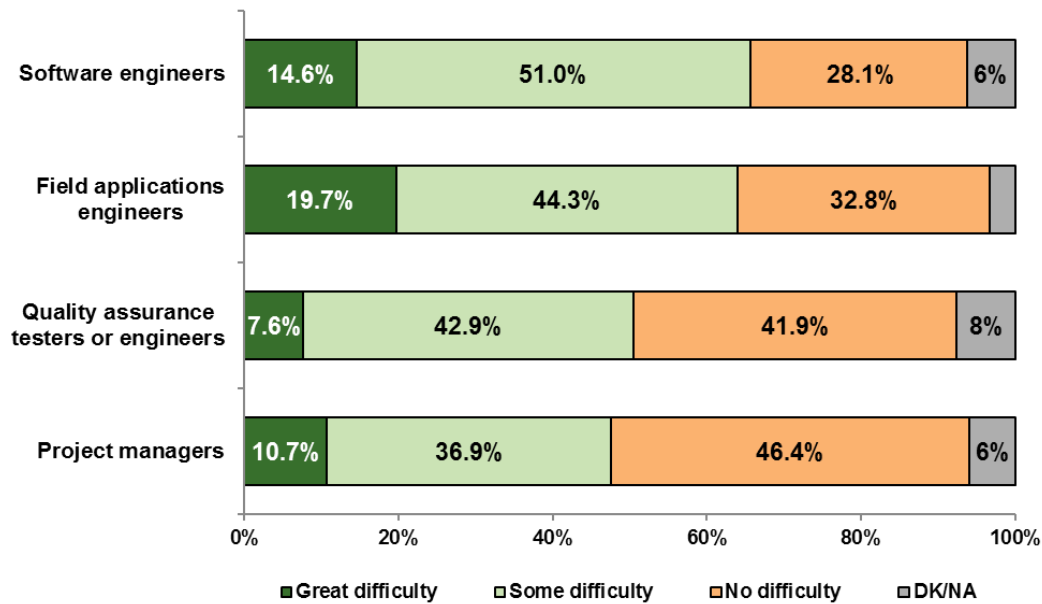
**Figure 5: Current Employment, Number of Employing Firms, and Anticipated 12-Month Growth**



Over the next 12 months, Silicon Valley's employment of software engineers and project managers is expected to increase by 10.8%. Field applications engineers' employment will increase by more than 20%, and quality assurance engineer positions will grow by 12.3%.

Opportunities for professionals in these occupations look even brighter when one considers that employers are already finding it difficult to fill jobs in these fields, with most employers reporting at least some difficulty finding candidates that meet the requirements of their firm. Close to two-thirds of employers report at least some difficulty finding qualified software engineers and field applications engineers, and roughly half have at least some difficulty filling jobs for quality assurance engineers and project managers. This difficulty will only be exacerbated by the rapid growth expected in these occupations.

**Figure 6: Employer-Reported Difficulty of Hiring for ICT Occupations**



With high numbers of workers already employed in these occupations, a steady rate of growth expected, and employers reporting that these jobs are already difficult to fill, qualified software engineers, quality assurance engineers, field applications engineers, and project managers should expect excellent job prospects in Silicon Valley's ICT cluster.

While this study focused on the near-term growth prospects for firms and job seekers, the potential skills shortage (and opportunities for well-trained workers) will become even greater as increasing numbers of baby boomers retire over the next three to ten years. CA EDD occupational projections show that many fast-growing ICT occupations will have nearly one job opening from the retirement of an existing worker for every new job created. And many more ICT occupations—particularly in engineering—will find the majority of job openings being created by the retirement of existing workers. The retirement of so many baby boomers creates challenges and opportunities for job seekers and workforce preparation organizations.

### **Finding #5: A talent shortage is likely**

With employers currently reporting difficulty finding enough qualified ICT workers in the Valley and the demand for ICT talent expected only to increase, an ICT talent shortage seems imminent without a change in national education success.

When a majority of employers require a master's degree for many of the most difficult-to-fill jobs, it is critical that the higher education system produce enough graduates to meet the need. Yet today, the growth in need for highly trained ICT workers far outpaces the current graduation rates of local and national institutions of higher education.

Changing immigration policy to make it easier for trained foreign-born ICT talent to locate in the Valley could help fill part of the growing talent gap. However, the majority of new ICT workers will be “homegrown” as industry growth and baby boomer retirements raise demand and the growing ICT clusters in places like China and India increase the competition for foreign-born workers.

### ***Transitions in Employers' Skill and Attitude Requirements: What employers are looking for now***

#### **Finding #6: Higher-skill jobs are growing, lower-skill jobs are declining**

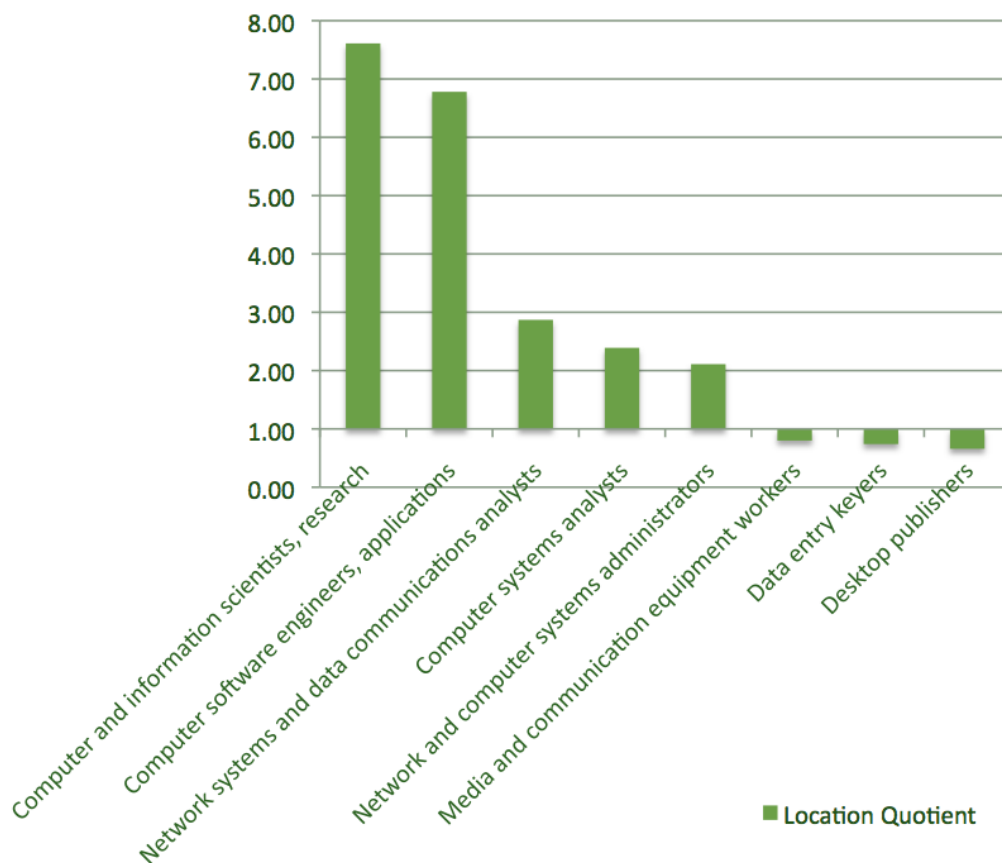
In order to understand more fully the workforce challenges of Silicon Valley, it is useful to compare the region to its counterparts throughout the state. The comparisons show that Silicon Valley has a disproportionately high number of high-skill, high-wage tech jobs such as engineers, scientists, and programmers, and a disproportionately low number of lower-skill, lower-wage tech industry jobs.

For example, though the San Jose MSA has only about two-thirds the workers of the San Diego MSA, it boasts nearly five times the number of computer software engineers (applications), according to EMSI data. However, San Diego has approximately twice the number of media communications and equipment workers, more than double the number of switchboard operators, and about 85% more desktop publishers.<sup>11</sup>

Figure 7 below illustrates the relative concentrations of various ICT occupations in Silicon Valley as compared to the rest of the state. A number greater than one means that the region has a greater per capita concentration of jobs than the state average, while a number below one shows that it has fewer.

<sup>11</sup> EMSI, *supra* note 6.

**Figure 7: Silicon Valley Occupational Distribution**



This figure clearly illustrates that Silicon Valley’s strongest employment concentrations are in higher-skill jobs, while lower-skill occupations are more likely to be found in other parts of the state.

**Finding #7: Most ICT jobs that will remain in Silicon Valley are those that cannot be performed elsewhere**

With many employers indicating that they only house functions in Silicon Valley if they cannot find the talent to perform them elsewhere, the skew toward high-skilled jobs should only grow more pronounced. As one employer noted, “Over the past ten years, there’s been a move more and more upstream. Technical jobs that require less [sic] skills have been outsourced. Only higher skilled people can stay. So if people can’t match [skill demands], they will be outsourced.”

As an example, one employer interviewed for this study listed numerous operations that were sent out of the region over the last 15 years. Some of the operations went overseas while some went to other regions of the United States. Due to the success in lowering costs, the firm considered moving its engineering and design work out of the region as well, but could not do so because there were simply not enough talented professionals outside of the region to meet their needs.



This finding does work both ways. In perhaps the most telling example, Walmart, with its headquarters in Bentonville, Arkansas, established its global eCommerce center in Brisbane, just south of San Francisco.

### **Finding #8: Where workers got their experience matters**

Silicon Valley's technology community has grown tremendously in the last 25 years, but it is still a geographically small and well-connected community. Employers often rated job candidates exclusively by the caliber of firms at which they had previously worked. Job candidates who worked for elite firms—those firms that are market leaders in growing industries—were quickly identified as warranting further consideration. Those who worked for firms that the hiring decision maker had not heard of were less likely to be considered when all other factors were equal. Furthermore, large firms have found it is faster, easier, and less risky to hire talent away from their competitors rather than hiring and cultivating less experienced workers or workers whose only experience comes from smaller companies. Workers who are able to list name-brand firms on their resume enjoy—and will likely continue to enjoy—a sizable advantage.

For those workers without an extensive work history, hands-on education is still critical. As one employer put it, “We want college students with experience building things in labs, not just writing papers.” The ability to demonstrate having done important work can be the differentiator that leads to successful employment.

### **Finding #9: Employers seek flexible and entrepreneurial candidates**

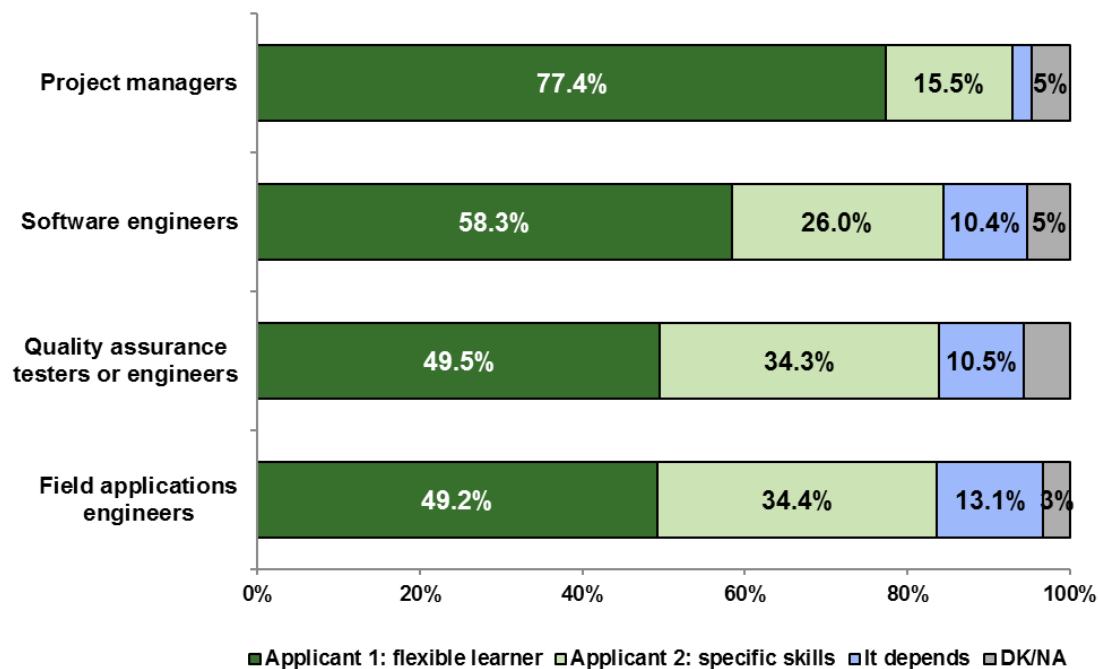
Of all the comments received from local executives, one best summed up the region's preference for flexible workers over those who have received traditional training.

*Humans are not machines. The problem is these people have been stuck in [the] old world. They have to start from scratch to get into [the] new world, but it's hard to get them to be motivated, passionate, and driven. It's positive destruction. Without it, Silicon Valley would not be how it is today...That's capitalism.*

This is not to say that technical skills are no longer important: from a quantitative standpoint, when asked what criteria they consider when evaluating candidates for ICT jobs, employers still reported technical skills as the single most important credential for nearly all of the occupations presented.<sup>12</sup> When given a hypothetical scenario, however, employers tended to prefer an applicant who has a demonstrated ability to *learn quickly, adapt to new objectives, and take on new tasks and responsibilities* over a more experienced candidate who might be *less flexible, less adaptable, and less entrepreneurial*.

<sup>12</sup> For a summary of the technical skills employers say they prefer in candidates for each of the highlighted occupations, see Appendix I.

**Figure 8: Flexible Candidates v. Candidates with Stronger Job-Specific Skills**



In the current loose job market, technical skills are assumed, but flexibility and entrepreneurship are prized. A job candidate who can demonstrate these qualities in addition to the required technical skills will be at distinct advantage. Based on discussions with executives in the region, this finding is true across nearly all job functions and throughout the entire career ladder, a finding also supported by a recent ManpowerGroup report entitled *The Human Age*.<sup>13</sup>

When asked what skills and attributes are important, one employer said, “communication, passion for technology, critical thinking, and ability for cross-group collaboration...You need to be strong in the face of ambiguity.”

## **Transitions in Job Searching and Hiring: the changing nature of ICT jobs**

### **Finding #10: Innovation requires teamwork**

Increasingly, employers are developing new products in team settings. As a result, employers approach the hiring process by reviewing their existing teams and filling in talent gaps with new workers. As technologies converge, this only becomes more important. Job seekers need to be able to show experience with teamwork and should be prepared to explain how their skills could fill gaps in the firm’s workforce.

<sup>13</sup> Available at <http://manpowergroup.com/humanage/index.html>.

## Finding #11: Occupational titles have limited value

This finding helps to explain why, in recent research conducted by the Mid-Pacific ICT Center, one standard ICT occupation had 2,100 job openings with 1,700 unique job titles. More than ever, candidates for openings are evaluated primarily by their skill sets (technical and non-technical) and less by their previous titles. As a result, workers are no longer defined by their occupational titles but rather their specific skills. This only further demonstrates the value that employers place on what workers can do rather than what they are called.

## Prospects and Recommendations for ICT Job Seekers

Based on the executive interviews, employer surveys, and resume panels conducted for this study, the researchers have assembled a set of recommendations to help job seekers find success in this new world of work. The most important point to take away is that employers have been very clear that job candidates need to change their approach. As noted earlier in the study, there is already a strong demand for workers in many high-skill occupations. Candidates currently seeking work in those occupations need not wait for the predicted job growth to occur, but may be able to find success sooner simply by changing their job search strategy.

For example, the research found there is currently a high demand for software and field applications engineers, especially among software firms. In fact, as of June 22, 2011, Indeed.com listed 3,164 current job postings for field applications engineers in the three-county area and 2,981 postings for software engineers. These are jobs that are available right now. Yet there are hundreds, if not thousands, of unemployed or underemployed field applications and software engineers in the area. It is a reality that must be enormously frustrating for the many job seekers who are unsuccessfully looking for work in these occupations as well as the WIB professionals trying to help them find jobs.

So, how can this be? Employers say that, while there are many applicants who meet the technical skills requirements of these jobs, those applicants are not demonstrating other important qualities that employers want. That is to say, they have not successfully shown the flexibility, willingness to learn, and entrepreneurial spirit that are demanded of candidates in today's complex job market.

As discussed above, employers are taking technical skills for granted in this market, which is flooded with technically qualified applicants. Increasing in importance across all occupations are passion for technology, flexibility, an entrepreneurial spirit, and perhaps most important, a focus on problem solving. Job seekers must therefore adjust their approach to demonstrate those qualities to the maximum. Specifically, based on the research, job seekers will enjoy the most success when they **know which technologies excite them, network in the right circles, conduct a targeted job search, develop an industry- and employer-focused resume**, and **highlight problem-solving skills**, especially during interviews.

## ***Recommendation 1: Know which technologies excite you***

Silicon Valley is the global epicenter of innovation and at the leading edge of the 21st century economy. Regardless of how many locations a company may have, its Silicon Valley location likely houses the very heart of the business. It is the place where the firm's leaders and most passionate innovators come to work every day, and they want to be surrounded by workers who share their passion for the technology and for the industry.

One common theme employers repeated again and again was that demonstrating passion for the relevant technology field makes a candidate stand out from the crowd. This does not mean that applicants should state on their resume, "I am passionate about [technology X]," but that they need to have an awareness of which technologies are of personal interest to them and be able to communicate how they have used that technology to solve problems.

Identifying passions is also important because it empowers job seekers to make proactive decisions about what they want to accomplish and avoid the trap of trying to be all things to all hiring managers. Being able to identify and focus on the technologies about which one is passionate will not only make the job candidate more successful in his or her search but will lead to a more enjoyable and rewarding career.

## ***Recommendation 2: Network in the right circles***

Many employers report that networking is among their most important tools for finding qualified applicants, yet too few job seekers take advantage of this valuable—and often free—career-building strategy. Networking encompasses a wide range of activities that may include connecting with one's industry friends and colleagues to tell them about the job search, attending industry events, and establishing a social networking presence. Ideally, a candidate will incorporate all three methods into the job search.

Networking should be tailored to the applicant's strengths, and the job seeker should focus on making connections that are related to the technologies in which he or she has demonstrable strength and with firms that are looking for workers. Potential applicants should be sure to demonstrate a genuine interest in and knowledge of the contact's company and its products as well as an interest in finding solutions to the challenges facing the contact's firm. Particularly at industry events, candidates should not shy away from seeking out decision makers. As one executive stated, "The problem is that people looking for jobs hang out with other unemployed people at events. Instead, they need to go meet the people doing the hiring."

Social media is also becoming a very important component of the job seeker's tool kit. In particular, 74% of firms that report using social media for recruiting indicate that they use the social/professional networking site LinkedIn.<sup>14</sup> Creating a LinkedIn profile should only take an hour or two and is a good way to establish an online presence. In addition to making the job seeker's resume available to employers, the site allows users to build a network of colleagues and search that network (and their colleagues' networks) for job opportunities and contacts that may be able to make introductions to hiring managers. There is probably no downside to having a well-written, professional presence on such networking sites, and their importance will likely only grow in years to come.

---

<sup>14</sup> Nova Workforce Board, Social Media in Silicon Valley (2010), available at <http://novaworks.org>

### ***Recommendation 3: Know the type of company you plan to work for and target your search accordingly***

Relevant experience at top companies is highly valued in the Valley's job market. While this obviously bodes well for technology workers who have name-brand firms on their resumes, it should be a cautionary sign to workers whose experience comes from lesser-known firms, those considering pursuing additional training in the hopes of landing a large firm job, and workers who are currently unemployed. These workers would do best to focus on small- and medium-sized firms, which will have more interest in their particular skills and experiences, even if those experiences were not obtained at an elite firm. And, regardless of the size of the firm to which one is applying, it is always a good idea for job seekers' resumes, interviews, and job-search conversations to emphasize any connection their previous work may have had to elite firms or their products.

Knowing the type of company most likely to hire someone with the candidate's background is also useful in determining the best job search methods for that candidate. Companies of different sizes behave differently, and the process that Google uses to identify and hire new talent is very different from the process a small software start-up will follow. Larger firms are likely to be actively seeking qualified job candidates and will hire recruiters or use their internal human resources specialists to search their professional networks to find candidates for open positions. Smaller employers, on the other hand, are less likely to actively seek candidates and may rely on craigslist and other job-posting services to find qualified candidates. Knowing the type of firm for which the job seeker wants to work, what type of firm is most likely to hire candidates with the job seeker's credentials, and how those firms are most likely to go about recruiting candidates will be an enormous help in creating a properly targeted job search.

### ***Recommendation 4: Develop a targeted and specific resume***

Employers report being bombarded with inquiries and resumes, many of which are not appropriate for the position listing. This not only wastes employers' time, but suggests that job seekers are wasting their own time as well, investing their energies in simply blanketing technology firms with resumes when they would achieve far better results by determining what types of jobs and companies they should be seeking and focusing their efforts accordingly.

Given the regional unemployment rate of nearly 10% at the time this study was published, job seekers are facing tremendous competition for every opportunity and adopting a strategic approach to one's application has never been more important. A strong, well-crafted resume that properly demonstrates the skills referenced in the previous section of this study is essential if the candidate hopes to stand out from the crowd. In resumes—and ultimately in interviews—it is critical for candidates to remember to demonstrate how they can solve the employer's problems using technology and always “show, not tell” how their skills are a good match for the employer's needs.

#### **Resume tip #1: Tailor your resume to specific companies and opportunities**

Employers were quick to point out that they could almost always differentiate between resumes that had been tailored to the specific opportunity and those that had not, and human resources professionals report that this is one of the first filters they use in determining which resumes merit further consideration.



Job seekers should spend enough time researching the employer and the position at hand to understand how their career experiences match the requirements of the job and how they can best apply their skills to that position. This research should be reflected in the resume. In fact, the resume should read as if the targeted job were a natural next step in the job seeker's career progression. Furthermore, taking the time to tailor a resume to a specific opportunity at a specific company is an excellent way to demonstrate passion and the entrepreneurial and critical thinking skills so strongly favored by Silicon Valley employers.

During one of the executive interviews, an employer noted that a recent applicant had provided several examples of projects he had led that were similar to a new campaign of the firm. This employer was very impressed that the applicant had taken the time to research the firm's direction and demonstrate how his abilities were relevant to solving the challenges associated with that specific campaign. In that instance, the extra work led to an interview.

### **Resume tip #2: Tell a consistent story**

The cover letter and resume—as well as any resulting interviews—should tell a consistent story about the candidate's skills and the employment environments in which the candidate thrives. Employers want to be able to describe a job candidate in a few sentences, and a good resume will consistently emphasize the key skills, abilities, and areas of knowledge that provide the foundation for doing so. Employers are more likely to hire those candidates they can describe with some confidence and less likely to consider those they do not feel confident in describing.

### **Resume tip #3: Show, don't tell**

A resume cannot simply be a list of skills and proficiencies, but must illustrate how the candidate has used those skills to solve problems in the past. Even more important, candidates need to show how their proven skills can be used to solve problems that are relevant to the target position and the target employer.

Furthermore, hiring decision makers stated that they do not like resumes that claim specific skills that are not substantiated, so any skill claimed must be demonstrated in the resume's narrative.

### **Resume tip #4: Keep it neat and organized**

Though it may seem like a small thing, it is extremely important that the candidate's resume have a neat and professional appearance. In fact, some employers felt that the resume's presentation and formatting were just as important as content because if the resume does not look professional it most likely will not be read.

Resumes and cover letters must be carefully checked to guard against spelling and grammatical errors. The formatting and layout should be simple and easy to follow. Sloppy formatting, inconsistent layout, and the overuse of symbols and obscure fonts can all make a resume difficult to read. Commit any of these offenses and the job seeker runs the risk of frustrating employers and having his or her resume ignored.

In addition to being neat, the resume should be well organized. It should be no longer than two pages and the most critical information should be easily found on the first page. Items that should always ap-

pear on the first page include an objective or mission statement, a summary of the work experience(s) most relevant to the position to which the candidate is applying, and examples of how the candidate has served as a problem solver in previous positions.

### ***Recommendation 5: Highlight problem-solving skills, especially in interviews***

Hopefully, the well-written resume will lead to an interview, a critical opportunity for the job seeker to demonstrate his or her abilities. In interviews, it is important for job seekers to show that they have a problem-solving mindset and to consistently use examples of how they solved problems for previous employers.

During one executive interview, an employer mentioned that he recently asked a candidate about her familiarity with a specific software package. She told him that she had no specific experience with that software, but then asked what problems he would want to solve with it in case she had knowledge of a different tool that could do the same thing. The employer stated that had she left the answer as “no,” he probably would not have hired her, but her ability to focus on problem solving got her the job.

### ***Special recommendations for the long-term unemployed, older job seekers, and workers transitioning into ICT from other industries***

Job seekers who are older, have been unemployed for an extended period, or are coming from industries other than ICT face additional—but not insurmountable—challenges. Their task is not much different from that of other job seekers in that they must show that they have the necessary skills and are passionate about what they do. They may, however, have to work harder to prove these qualities to employers.

#### **Unemployed job seekers**

When asked to give advice for the unemployed, employers primarily focused on the need for unemployed candidates to demonstrate that they have kept their skills current. While this is important for any job seeker, it is even more critical for unemployed candidates as they will often face a presumption that their skills have gone stale since leaving their last job. Most employers said that they are willing to hire a worker who has been unemployed for an extended period if the candidate can demonstrate that he or she has continued to learn and develop skills through education, volunteering, or other related activities. This not only helps employers to see the candidate applying his or her technical skills, but also demonstrates a passion for technology and continuous self-improvement—both qualities that are highly desired in Silicon Valley. One regional employer gave an excellent example of how to approach this practically. “Too often,” said the employer, “unemployed job seekers tend to spend all of their time conducting Internet job searches or mailing out resumes. Much better would be if they grabbed a book on a software language, headed over to a coffee shop, and programmed something cool they could show [an employer] in an interview.”

#### **Older workers**

When asked to make suggestions for older job seekers, employers restated the need for applicants to show that their skills are current and reemphasized the importance of demonstrating passion and flexibility. Researchers were told that the bias against older workers has less to do with the idea that they

lack necessary skills than the perception that they are inflexible, lack passion, or are unwilling to learn new things. If an older job seeker can demonstrate passion and adaptability, he or she will find that much of this bias is neutralized. In the words of one executive, “It’s really important that the resume of an older worker shows that they ‘get it’...The resume needs to show excitement for the new and the different.” He concluded that, “When you find an experienced worker who meets these standards, you’re getting an incredible bargain.”

The advice for how older workers can demonstrate their skills and passion is much the same as the advice given to the unemployed: use education, volunteer work, or self-teaching to demonstrate the qualities employers want. One executive advised older workers that, “You could go back to school, of course. But you can also adopt a new technological trend that is interesting to you and teach yourself. . . In the process, you will learn new skills, and if you choose wisely, you will be employable again.” He went on to suggest that working with iPhone or iPad applications or open source projects would be excellent ways to demonstrate passion and teach oneself employable skills.

### **Workers transitioning into the ICT industry**

Industry experience is among the top qualifications employers seek when hiring for ICT jobs. In fact, this is frequently a requirement for all but the most entry-level positions, and some employers stated it was next to impossible to transition from an industry outside their own.

Still, all is not lost for workers hoping to make the switch to the ICT cluster. There are employers willing to consider candidates from outside the industry. These employers tend to find value in having a diverse staff with mixed backgrounds and an environment in which new employees can contribute fresh ideas or abilities to jobs that have been difficult to accomplish or problems the company has had trouble solving. Such employers indicated that internships, a resume highlighting how the candidate’s current experience relates to ICT, and a willingness to start at a lower-level position while gaining industry experience are all valuable strategies that can help facilitate the transition.

# Part II: ICT and Silicon Valley's Global Competitive Position

---

**S**ilicon Valley is an unrivaled technology hotspot, leading the nation in innovative new devices, software, and other high-tech inventions. A potent mix of venture capital and an abundance of entrepreneurs, engineers, scientists, consultants, legal professionals, and other highly talented workers have led to Silicon Valley's emergence as the high-tech capital of the world. Silicon Valley solidified this position in the 1980s and has maintained a dominant position since.

A major goal of the study was to determine what, if any, strategic advantages exist for basing ICT-related workforces in Silicon Valley. At the outset, the research team conducted a brief review of existing literature and found the topic to be fairly well discussed. The most prominent themes in previous studies suggest that the advantages of conducting business in Silicon Valley are primarily access to high-level talent, abundant capital, and high-quality lifestyles. The primary disadvantages are generally listed as taxes, regulations, labor costs, and property costs.

Drawn from discussions with over 50 executives in the Valley, this report offers a more nuanced portrait of the pros and cons of operating in the Valley. The description of the Valley's competitive strengths and weaknesses recorded in our executive interviews is consistent with the findings of the Silicon Valley Leadership Group's (SVLG) 2011 Business Climate Survey, which conducted interviews with 175 Valley CEOs.

Generally speaking, the evidence gathered for this study applies to emerging start-up businesses as well as established firms. Of course, there are some fairly obvious differences among firms based on their age and place in the life cycle. Specifically, younger firms are more interested in access to venture capital, while firms with a large employee base (and lots of openings) are more focused on the availability of talent. This review is also based on the nearly universal statement from employers of all sizes that they prefer to conduct only those operations in Silicon Valley that cannot be done more cheaply or as well elsewhere. This constraint on the region's growth opportunities necessitates a strong commitment to fostering the region's numerous advantages in order to reduce outsourcing and keep the Valley competitive.

## Silicon Valley's Competitive Advantage

---

The interviews of ICT executives conducted during this study and the SVLG 2011 survey paint a consistent picture of the competitive strengths of Silicon Valley. In both studies, the highly skilled pool of talent, excellent quality of life, proximity to savvy customers, and access to capital were rated as the Valley's greatest attributes.

## A Highly Skilled Pool of Talent

The most oft-cited advantage of conducting business operations in Silicon Valley is the access to high-level talent. According to the executives interviewed for this study, there is simply no other place in the world with such a concentration of engineers, scientists, entrepreneurs, and other highly skilled professionals. This pool of talent allows smaller companies to hire faster, quickening their time to market and increasing their overall efficiency. For larger firms with multiple openings, Silicon Valley remains the only region with sufficient numbers of high-skilled workers to meet their current and future needs.

According to the 2011 SVLG survey, the number one advantage of locating in Silicon Valley is “access to skilled labor” while the number two advantage is the “entrepreneurial mindset.”

The rich talent pool in Silicon Valley has also created a diverse and interactive innovation ecosystem, which improves the quality of the labor force. This ecosystem includes engineers, consultants, user interface designers, university professors with one foot in academia and one foot in industry, and the specialized recruiters, accountants, and attorneys who support the innovators.

One employer described the value of this ecosystem by comparing conversations at coffee shops inside and outside of Silicon Valley:

*Here, you have a collection of passionate techies who are always hatching new ideas with one another over a latte. And, chances are, those people can immediately identify the right people to partner with to make it happen. That kind of thing just doesn't happen anywhere else that I've been...*

Another employer cited the movement of talent as an important component to the availability of talent. Highly skilled consultants often move from company to company, bringing their knowledge, experience, and new ideas with them. This flow of talent breathes new life into creations at ICT firms throughout the Valley.

## Quality of Life

The second most frequently cited reason for operating in Silicon Valley was the high standard of living and general satisfaction with quality of life in the area. Several specific attributes were mentioned, including (in order of frequency) weather, schools, ease of commute (the ability to work and live in the suburbs), and social activities.

These qualities impact the Valley in several ways. Multiple executives noted that their firms continue to operate in Silicon Valley because it is where the leadership wants to live. Simply put, if the CEO wants to live in the Valley, the headquarters will remain there. In terms of start-ups, entrepreneurs noted that Silicon Valley's culture of innovation and its open, inclusive, and friendly nature make it a terrific place to live as much as it creates a valuable work culture.

But CEOs are not the only workers drawn to the Valley by its high quality of life. One implication of “access to talent” being Silicon Valley's number one competitive advantage is that the quality of life must be kept high enough to continue to attract talented workers and their families—despite the area's high housing costs and the uneven quality of the Valley's K-12 schools. As one interviewee commented:



*The key to maintain[ing] that advantage [of a quality talent pool] is to maintain the nice environment. That's the key. Improved infrastructure and schooling are important factors to keep [Silicon Valley] a family-friendly place. Then the top talent who will continue to innovate and perpetuate [Silicon Valley's] competitive advantage will be attracted here.*

### **Proximity to Savvy Customers**

Employers noted that Silicon Valley remains a good place to do business because they can remain close to their customers. The survey data clearly illustrate that sales operations are very important drivers of the region's economy, and the high level of business-to-business outfits in the area suggests that the tech ecosystem provides strong opportunities for sales. Beyond the importance of proximity to making sales, many executives noted that having a sophisticated user base nearby (both business and consumer) allows for better development of new products, more efficient user-interface design, and better feedback on existing products.

The SVLG survey ranks proximity to customers and competitors as the number three competitive advantage for the Valley.

### **Access to Capital**

One executive summed up this advantage well: "Anyone with a good idea can get a million dollars in Silicon Valley..." While this is clearly a bit of hyperbole, Silicon Valley is a place where capital flows, and this access to capital is critically important to the start-up activity that remains an important driver of the region's economy. Also of note, several executives stated that this access is less dependent on having locally situated investment houses than on continuing to innovate so that investment houses all over the country still look to invest in Silicon Valley. In other words, companies do not care whether their capital comes from Sand Hill Road in Menlo Park, San Francisco, New York, or Boston.

The SVLG survey ranks access to venture capital as the fourth most important competitive advantage for the Valley.

### **Proximity to High-Quality Universities**

Silicon Valley is served by Stanford University, the University of California, Berkeley, University of California, Santa Cruz, Santa Clara University, San Jose State University and other schools in the California State University (CSU) and California Community College systems. These institutions educate and train ICT workers and other workers needed to sustain a high quality of life. In addition, these institutions can help attract the families of ICT entrepreneurs and workers who are making decisions about working and living in Silicon Valley.

The SVLG survey ranks world-class universities as one of the five leading competitive advantages for Silicon Valley.

## Silicon Valley's Competitive Disadvantage

Both the interviews conducted for this study and the SVLG survey see the Valley's competitive weaknesses as broader and more nuanced than the common perception of high taxes, onerous regulations, and excessive business costs. In fact, despite their extensive mention in existing literature, not a single executive interviewed for this study listed taxes or regulations as disadvantages to conducting business in Silicon Valley. Though this may be due to any number of reasons, it is still significant. During this study, employers universally named labor costs and ground rent or property costs as their reasons for outsourcing operations from the region.

### *Labor Costs are High and Lead to Outsourcing of Lower-Skill Jobs*

Labor costs were presented as the single greatest obstacle to keeping business units in Silicon Valley. Though one interviewer noted that cost savings related to outsourcing to India had decreased (from one-eighth the cost of operating locally to one-fourth), many lower-skilled jobs can be housed elsewhere much more cheaply than they can be housed in the Valley. In fact, reviewing wage data of primary ICT occupations<sup>15</sup> illustrates the incredibly high cost of labor in the region. The hourly median wage of \$50.27 for these occupations in the San Jose MSA is 27% higher than the state median, 33% higher than in the Los Angeles MSA, 34% higher than in the San Diego MSA, and 21% higher than the median in the San Francisco MSA. These discrepancies illustrate well the primary challenge of conducting business in Silicon Valley—especially given that the comparisons are made with areas that are not considered cheap labor centers. It also shows why employers are willing to outsource all but the most difficult-to-fill jobs in ICT.

Employee recruitment and retention costs are ranked number two in terms of competitive disadvantages for the Valley in the SVLG survey.

### *Real Estate Costs are High and Discourage Companies from Locating in the Valley*

Another potential disincentive for conducting business in Silicon Valley is the high cost of real estate. In fact, interview feedback suggests that real estate costs/ground rent is one of the largest cost drivers in the Valley.

While many elite firms have prided themselves on constructing large, elaborate campuses, the high cost of construction and the need to be prepared for quick expansion have led most Silicon Valley ICT companies to rent pre-existing space. Though Silicon Valley rents have not risen significantly during the recession, rates remain high. Companies have attempted to compensate by using their space more densely (increasing the headcount per square foot) and by moving into spaces that are already of high quality and so need little investment in improvement or modification.

In the cities, particularly along the Caltrain commuter rail line, rents will remain high. There is a premium to be paid at those locations, which provide access for young talent who want to live in San

---

<sup>15</sup> ICT Primary Occupations as defined by the California Community Colleges Center of Excellence/Mid-Pacific ICT Center Phase 2 Report, available at <http://www.mpict.org>

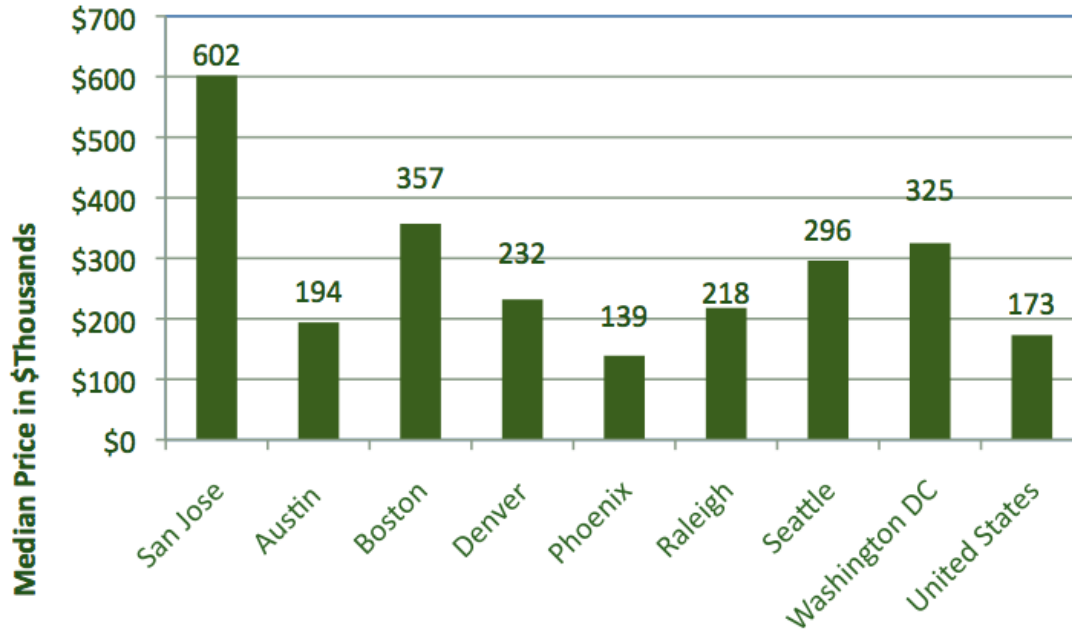
Francisco but work in the Valley. This is consistent with the premium companies are willing to pay for “quality” locations and facilities.

Start-up and early stage companies typically take smaller spaces and are key drivers of real estate. As Bill Kurfess, Senior Vice President for Grubb & Ellis Co. in San Jose, said in a recent article, “The sweet spot for [Silicon Valley] is 5,000 square feet and less...and those are the ones that ultimately feed the Valley.” Businesses renting space of this size tend to be more price sensitive than larger companies taking 75,000 square feet or more. This may be one reason interview feedback focused so much on rent costs.

However, commercial property costs are not the only or even the most important land cost challenge facing the Valley. The 2011 SVLG survey and previous surveys by the Bay Area Council rank high housing costs as the number one challenge facing companies when competing for talent. It is easy to see why when comparing the Valley’s 2010 median home price with prices in other tech locations in the US.

The median price of a Silicon Valley home in 2010 was \$602,000—more than three times the national median. Furthermore, it was three times the medians in Austin, Texas and Raleigh, North Carolina; up to more than double the median in other high-priced markets like Boston, Massachusetts, Washington, D.C., and Seattle, Washington; and more than four times the median home price in Phoenix, Arizona. The high cost of housing will continue to dissuade workers considering whether to move to—or even remain in—the Valley.<sup>16</sup>

**Figure 9: Median Home Price in 2010**



<sup>16</sup> National Association of Realtors, Metropolitan Median Prices, available at <http://www.realtor.org/research/research/metroprice>

## ***Taxes and Regulations***

While business taxes and regulations were not at the top of the list for respondents in the ICT study or SVLG survey, they were mentioned enough to merit consideration by state and local decision makers. The SVLG survey found business taxes to be the third biggest challenge for Valley businesses, following housing and labor costs. Business regulations were ranked in fifth place, following concerns about the state budget.

## **Recommendations to Keep the Valley Competitive**

Though workforce boards may not be able to remake public education, cool the housing market, improve infrastructure, or address many of the other challenges facing families and businesses wanting to locate in the Valley, the WIBs' membership is comprised of well-respected community leaders who can give voice to important workforce considerations. Additionally, the workforce boards can provide a forum for businesses and educators to work collaboratively to address workforce and economic development issues.

There are three major themes flowing through the recommendations for maintaining and improving the Valley's competitive position:

- Competitiveness must be viewed as a challenge facing both families (who must be attracted to live here) and businesses (who must be attracted to invest here), and Silicon Valley stakeholders should think broadly about what it means to be an attractive place to live and work.
- The Valley's ICT firms rely on many different types of workers—not just highly skilled ICT professionals—to keep their businesses running, and the Valley must be attractive to these support workers as well. Housing costs and the availability of housing near good schools are of particular importance to this population.
- Education and quality of life are the focus of this study's recommendations, as these are the two competitive challenges that were voiced in the study's interviews and in the SVLG survey. Though tax and regulatory issues are part of the broader competitiveness discussion, this study did not provide a basis for making specific recommendations regarding these areas.

### **Recommendation 1: Maintain and increase the valley's world-class workforce**

Employers overwhelmingly voiced the need for more qualified scientists and engineers to fuel the engines of innovation in Silicon Valley. The demand for workers with advanced degrees in these fields far outpaces the current output, and much of the discussion centers on an early and inclusive commitment to science, technology, engineering, and math (STEM).

#### **Strengthen the K-12 STEM pipeline**

There is broad agreement in the nation and in the Valley that we are not producing enough workers with a high-quality education in science, technology, engineering, and math. This is especially critical for ICT firms. While immigration can provide one source of STEM workers, the increasingly high cost

of living in the region and the impending retirement of baby boomers mean that Valley STEM needs will have to be filled primarily by workers born and educated in California. The first step is a sound foundation in math and science in the state's K-12 school system.

### **Strengthen the higher education STEM graduation rate**

The research indicates that there are very few ICT opportunities in Silicon Valley for workers without a university degree. Furthermore, the opportunities that do exist are far less stable and have been trending downwards for years. Candidates with bachelor's, master's, and doctorate degrees are clearly preferred by local employers and are critical to maintaining the competitive advantage of the region. While the University of California and CSU campuses have historically been leaders in graduating students with degrees in STEM fields (along with private universities like Stanford), the public university system is currently facing funding cuts that are leading to reduced enrollment and class offerings as well as higher tuition.

### **Support non-rote experiential learning**

Employers place a premium on workers who are creative problem solvers, and contextualized learning, critical thinking, and creativity are important to success in the new world of work. Promoting courses such as art, music, and other non-technical fields is critical to developing these skills in the next generation of workers. Also important is moving away from lecture-style teaching and rote learning and toward experiences more like those that will be faced in the real world.

### **Advocate for immigration reform**

While immigration is a highly charged and complex issue in the nation, there is broad agreement that the Valley and the nation are facing tougher competition for foreign-born talent, whether workers or entrepreneurs. More foreign students are returning home, in part as a result of better opportunities in their home countries, but also because the United States has restrictions and barriers in place that make it difficult for talented foreigners to stay. To remain competitive as an ICT innovation center, the Valley needs not only increased efforts to develop a homegrown STEM workforce but also policies that welcome foreign-born workers and entrepreneurs. As one employer noted, "Generally, the US still has the most open immigration policies...and Silicon Valley is one of the most welcoming areas." Making it even easier for talented immigrants to stay on our shores would sharpen the Valley's—and the nation's—competitive edge.

### **Recommendation 2: Maintain and improve the valley's quality of life**

A high quality of life is critical to keeping the Valley a place where talented workers and entrepreneurs want to live and work. One executive summed it up succinctly in our interviews: "It's important to make sure people still like working here through [providing] good infrastructure and good schools."

While maintaining and improving the quality of life in Silicon Valley presents a difficult challenge in a time of budget deficits and, often, political gridlock, one conclusion is clear: **To remain competitive, Silicon Valley must be competitive not only for companies and entrepreneurs but also—and this is often overlooked—for talented workers and their families.**



The SVLG's 2011 CEO Business Climate Survey reached a similar conclusion:

*Increasingly it is difficult for Silicon Valley companies to compete against other centers of innovation and entrepreneurship—both domestic and abroad. Among the unique challenges are globalization and the international competition for talent. A deteriorating state infrastructure in areas ranging from public education to public transportation has added to the difficulties of recruiting the best workforce, finding them available housing and educating their children to be tomorrow's world-class workforce.*

Because high labor costs and housing prices are a given, the Valley must compensate with other attractions. There is broad agreement on three such aspects of a quality-of-life agenda that can improve the competitive position of Silicon Valley.

### **Invest in our children and existing workforce**

The previous section looked at education and training with respect to providing a superior ICT workforce, but good schools and universities are also critical in the competition for other talented workers and their families. First, families who move to the Valley to work at ICT companies want great schools for their children; this is the essential quality of life issue for them. Second, an ICT company does not live on ICT workers alone: to locate here, companies must be assured that skilled workers in complementary occupations such as sales and finance are easily available. A quality education system gives them that assurance.

### **Invest in our infrastructure**

Caltrain, which runs from San Jose to San Francisco, is one example of an attempt to provide options for dealing with the region's notorious commutes. Several interviewees mentioned public transportation, including in this quote:

*Commute options to San Francisco would also help. A lot of my young coworkers want to live in the City. [My company] provides free Caltrain passes and a shuttle from the station, but it still takes a while. If there was something easier, that would be helpful in hiring.*

The bottom line is that world-class infrastructure—whether in transportation, broadband access, water, or energy—is essential when you are competing in an environment with high housing costs and often-long commutes.

The need to invest comes at a time when public budgets in California and Silicon Valley are struggling to even maintain basic services as the recession has reduced revenues while service demands grow. There are no magic bullets to finance these critical investments. Yet to postpone investing goes against one of the founding principles of success for Silicon Valley companies: “invest or die.” What is right for our companies is right for our public sector as well. Later is simply not good enough when it comes to making the investments that will keep the Valley attractive to entrepreneurs and talented workers and their families.

## **Increase housing availability**

Housing is a critical challenge that connects the interests of companies and workforce boards, both of which are striving to support the continued growth of ICT innovation and jobs in Silicon Valley. The SVLG survey ranked housing as the number one business challenge facing the Valley, and housing costs were frequently raised as a concern of the executives interviewed for this study.

Local communities must come to understand what business leaders and economists have been saying for a long time: more (and more affordable) housing is critical to support continued growth and prosperity in ICT and the broader technology sector. The Valley's ICT cluster will not thrive if great schools and public services are only available to workers who can afford million dollar homes in Palo Alto or Cupertino.

Housing approval decisions are made by local jurisdictions in California, and new housing developments and other related growth are often controversial among current residents. Yet there is broad evidence that young tech workers want to live in vibrant communities with first-class amenities and easy commuter access. If these workers find that their only housing options are in distant counties with long commutes, they may well choose more accessible cities, like Austin, over Silicon Valley.

# Part III: The Public Workforce System and its Partners

---

**T**he four workforce boards that sponsored this study are part of a broad set of organizations that together constitute the Silicon Valley workforce system. The workforce boards and their one-stop centers<sup>17</sup> provide job search assistance, career counseling, and training to job seekers and serve business customers who are seeking qualified applicants. The boards and Valley businesses depend on a broad range of education partners in the Valley, from pre-schools to graduate programs. These education and training partners are complemented by the training efforts of labor unions and other non-profit organizations. All of the education and training partners benefit from labor market information collected by the workforce boards, by California EDD and the U.S. Bureau of Labor Statistics (BLS) and, increasingly important, by the real-time labor market information provided by business partners, including companies and private job search partners such as LinkedIn and Monster.com.

Together, these partners provide an indispensable “workforce system” that serves job seekers, businesses, and the Valley economy.

Given the rapid pace of change in technology and the world of work generally, employers report frustration in finding workers who can meet their companies’ standards. This frustration leads to real costs for employers, lengthening their time to market, reducing their efficiencies, and eventually eating into their bottom lines. A review of higher education graduation forecasts suggests that our universities are not producing the quantity of bachelor-, master-, and doctorate-trained individuals needed to keep up with demand. At the same time, employers have noted the need for specific technical skills and a desire for candidates who are much better rounded, regardless of whether they are seeking a worker with a high school diploma, a certificate from a community college, or a degree from the University of California.

The findings from this study and other recent labor market studies completed this year by the four workforce board study partners are confirmed by a look into the nation’s future that was recently completed by the McKinsey Global Institute. This 2011 report entitled “An economy that works: Job creation and America’s future” states:

*[T]he configuration of the labor force will not neatly fit the requirements of employers. While company executives in interviews expressed their enthusiasm for the strength and productivity of the US workforce, they also indicated a strong need for workers with specific skills and educational requirements—which may be lacking in the labor force of 2020, absent changes in policies and institutions.*

---

<sup>17</sup> One-stop career centers are designed to provide a full range of assistance to job seekers under one roof. Established under the Workforce Investment Act, the centers offer training referrals, career counseling, job listings, and similar employment-related services. Customers can visit a center in person or connect to the center’s information through PC or kiosk remote access.

*A growing source of potential matching problems among workers with postsecondary education is the fields of study they choose. Many are not obtaining the skills that will be most in demand...Shortages are [also] likely in a number of specific vocations that students in community colleges and vocational schools could be training for...In general, workers of all ages need better information on which to base their educational and training decisions.*

As previously noted in this study, the costs are even greater for workers. Obsolescence is a real fear among the unemployed and underemployed in Silicon Valley, and some job seekers feel as though their prospects are limited. Many more workers feel lost and need support to navigate this ever-changing environment.

The public workforce partners must respond to these challenges. In 2010, Joint Venture: Silicon Valley Network completed a study of workforce challenges facing the NOVA, work2future, and San Mateo workforce boards. The Joint Venture study concluded:

*For more than 50 years Silicon Valley has been the epicenter of innovation and entrepreneurship...But the economy we built is a brutally churning one, with whole industries coming and going at a dizzying pace. The result is that Silicon Valley's workforce must adapt very quickly as the region's employers develop new technologies, create new business models and spawn new industries. These are difficult transitions to negotiate for our region's workforce and nothing about it is automatic.*

*This report argues that a regional skill building network would be a significant boost to our local workforce and to the overall economy.<sup>18</sup>*

This ICT study is one direct follow-up to the Joint Venture recommendations.

There are many specific ways that the public workforce system can respond to the challenges of the ICT cluster. These include providing workers with **demonstration opportunities**, providing **job search and resume services**, providing **flexibility training**, providing **real value to employers**, **developing new pathways for successful job placement**, **increasing the connection of the public workforce system to employers**, and **building on recent efforts for the workforce boards to collaborate**.

## Demonstration Opportunities

The workforce investment system is highly focused on providing classroom training specific to traditional occupations. ICT employers in Silicon Valley reported emphatically that such training lacked value and was irrelevant to their needs. These same employers reported that applicants—particularly those for higher-skill jobs—need to be able to provide real examples of work product. Too often, job seekers did not have practical solutions to offer employers during interviews and relied on statements of their abilities.

---

<sup>18</sup> Joint Venture Silicon Valley Network, A New Foundation of Collaborative Workforce Development in Silicon Valley (2010), available at [https://novaworks.org/Portals/3/Nova/Docs/LMI/JVSV\\_WorkforceStudy\\_0610.pdf](https://novaworks.org/Portals/3/Nova/Docs/LMI/JVSV_WorkforceStudy_0610.pdf)

In light of these employer preferences, workforce investment boards should consider offering their clients **portfolio learning laboratories**. In such a scenario, clients would be divided into interdisciplinary teams by their skill sets and given a project to complete. This simulation of how products are developed in the workplace provides examples to potential employers that illustrate the applicants' strengths in skill areas, passion and critical thinking, and the ability to work in teams.

This recommendation follows on Resume tip #3, “show, don’t tell,” and is particularly important for job seekers who must keep their skills relevant and up-to-date during periods of unemployment, when skills can fall behind the rapid pace of technological change.

To facilitate demonstration opportunities and provide an even greater social impact, WIBs could work with local nonprofits, which are often in desperate need of technical products—such as mobile applications—but do not have the resources to pay for those tools. The portfolio labs could meet these needs, providing valuable services throughout the community. Workforce boards can play a connecting role by soliciting technical project needs from local cash-strapped, non-profit organizations and matching them with job seekers who want a chance to maintain their skills and produce a product to show potential employers.

## Job Search and Resume Services

The findings of this study identified major changes in the way job search and recruitment is evolving in the ICT cluster and, more broadly, in the Valley and nation.<sup>19</sup> These findings are complemented by the findings of NOVA's recent study on the use of social media in job search and recruitment. ICT employers rarely use workforce one-stop centers to identify and recruit new employees; rather they use in-house and external recruiters. Job seekers are increasingly finding job openings on private Internet-based services such as LinkedIn, craigslist, and Monster.com. The resume panel surveys conducted for this study provide useful insights into what ICT employers are looking for and how one can avoid having his or her resume tossed into the “immediate no” pile. (See Key Messages for Job Seekers in Appendix B)

Career counselors at the Valley workforce one-stop centers can use the findings of these studies to help job seekers understand and become proficient in this new world of job searching and resume preparation.

## Provide Flexibility Training

Across all occupations, employers are seeking intangible non-technical skills that set applicants above their competition. In all facets of data collection, employers reported a desire for workers who are flexible and focused on problem solving. In fact, given the choice between more experience or more flexibility and entrepreneurial spirit, a majority of employers chose the latter. This compelling evidence shows that the culture of the workplace has changed and that workers should not expect to show up and be handed a list of tasks but should be thinking about constantly adding value to their companies.

---

<sup>19</sup> See *infra* pp. 13-23 (The Changing Face of ICT Employment in the Valley).

This type of thinking is quite different from 20th century notions of work, and job seekers need support from the workforce system to shift their focus from following orders to thinking in terms of problems and solutions. Furthermore, the pace of change in technology requires that workers across the career ladder be willing to learn new skills and have new duties added to their job descriptions.

One local firm interviewed for this report has developed a flexibility boot camp to provide just such training. This program is open to the public (for a fee) and provides both entrepreneurship and flexibility training to developing small businesses.

It is important for career counselors in the Valley's one-stop centers to make job seekers aware of the changing workplace expectations of employers. The next step is to help job seekers adapt to the new demand for flexibility in the ICT job world.

In order to meet these demands, **WIBs should develop hands-on training programs that teach problem solving, entrepreneurship, and flexibility.**

## **Provide Real Value to Employers**

The workforce investment system too often relies on the assumption that employers will engage WIBs because employer involvement will lead to a more robust pool of talented applicants. Given that the employers interviewed and surveyed for this report typically do not hire applicants from WIBs and generally regard their engagement with WIBs as nothing more than the fulfillment of a civic duty, this assumption is likely faulty.

Because of this attitude, maintaining consistent engagement with the types of employers that may hire WIB customers is challenging. To facilitate better relationships with employers, WIBs should consider developing engagement opportunities that are geared toward providing value to employers rather than merely seeking their inputs. For example, quarterly leadership meetings that bring important financiers, legislators, or government leaders together with employers might generate significant involvement and interest from the employer community. This more balanced approach would provide more opportunities for WIB professionals to network with employers and generate more trust among this important stakeholder community. With this trust, WIBs can develop dialogue in place of monologue and create innovative opportunities for partnership including resume panels, job coaching, blog participation, and other outreach.

## **Develop New Pathways for Successful Job Placement**

The workforce system has been successful in providing occupation-specific training to job seekers for decades. However, occupational titles in ICT have limited use and are so broad that they cannot adequately describe current job openings. In fact, a review of online job titles conducted by the Mid-Pacific ICT Center in San Francisco found that one standard occupational code had 2,100 regional openings listed online with 1,700 unique job titles. Each of these had slightly different requirements and descriptions, illustrating the Tower of Babel that exists among ICT jobs.



It seems that each new job requisition order is tailored to a specific need. For example, in new product development, a project or product manager will often review the current development team and seek new employees as needed based on the skill sets of the existing team members. With this approach, it is evident that a skill profile is an ever-changing issue and that having varied and complementary skill sets is critical.

As an example, a relevant skill in software programming is knowledge of the Flash multimedia platform. This skill does not trace directly to one occupation, nor is it sufficient for employment in any given occupation. The functions associated with Flash are valuable when that is the specific need of a product in development. As such, traditional metrics for success, such as “Did Flash training lead to a Flash job?” are obviously insufficient. Also, it is just as likely that the functional training will be used in the job three jobs from now as in the immediate term.

This challenge is not unique to ICT. In fact, many of the federally funded green training programs have met with criticism because jobs directly related to those skills did not materialize. Though some of this is certainly due to general economic conditions, part of it is because training was based on functions (e.g., HERS rating, weatherization, etc.), which are not jobs. One of these functions alone is not sufficient for full-time employment.

**Technical credentials may still have some merit for certain lower-skill fields but were overwhelmingly rejected by employers** when considering hiring employees in innovative ICT roles. These employers simply found no value in classroom training, industry-recognized credentials, or quantified technical abilities. Rather, the employers noted a preference for workers to be reconditioned to the realities of the new workplace.

Given this reality, **ICT job preparation must be decoupled from static occupational knowledge, skill, and ability metrics and must be analyzed by success in providing the many positive qualities that are sought by employers** (such as those provided in this report). By providing training for the attributes that employers want, WIBs will be able to better prepare workers for the many employment opportunities in ICT innovation and therefore have greater success in placing workers than if forced into providing classroom technical training. Of course, doing this will require ongoing relationships with employers and real-time labor market data that are not connected to Standard Occupational Classification (SOC) codes.

## Increase Public Workforce System Connections to ICT Employers

Workforce boards and ICT employers share the common interest of supporting the conditions for continued competitive advantage for the Valley’s ICT cluster, and closer connection between workforce boards and ICT companies in the Valley can bring mutual benefits.

Unfortunately, the research shows that nearly 70% of Silicon Valley ICT employers say they have never even heard of any of the local workforce investment boards, and nearly half report that they

have no interest in working with a WIB to identify candidates for a job opening. Yet by preparing a skilled workforce to fill the jobs that drive Silicon Valley's economy, the workforce boards help employers whether or not employers are aware of the boards' work.

Employers help the workforce boards, too. ICT employers are increasingly the best source of information to workforce boards on rapidly changing trends regarding: 1) where growth is occurring, 2) what occupations are in demand, and 3) the changing nature of skill demands and work expectations in the Valley. Research in innovative and emerging fields such as ICT can become obsolete much faster than in other fields, and occupational trend projections developed by public agencies such as CA EDD and BLS quickly fall out of date. To ensure access to the best and most recent ICT workforce trend data, it is critical that workforce boards build ongoing and sustainable relationships with employers.

These relationships can yield continuous feedback by allowing for informal resume, industry, and workforce panels to keep data and perspectives fresh. One recommendation already in place is for the research team to conduct a survey following up on this study in November 2011 to determine if any significant changes have impacted the findings. Such ongoing quantitative research is critical in rapidly changing industries.

This is particularly relevant given that the research for this report was begun during economic recession and that, even in the ten months during which the research was conducted, significant improvements have become evident. It is only rational that as the labor market tightens and firms increase hiring, their ability to be as selective is lessened. Keeping a finger on the pulse of the employer community, especially during these economic times, is imperative.

Critical to this effort, however, is for WIBs to recognize the need to provide value to employers in more tangible ways. Though most WIBs believe that their work in training unemployed or underemployed people is of great value to companies that are having difficulty finding workers, most firms who participated in this study did not find that to be of sufficient value. As discussed earlier in this section, WIBs should increase their role in their communities by facilitating events and dialogue of value to employers, such as providing access to government officials, facilitating networking opportunities with other companies or venture capital firms, or providing access to other individuals who are important to employers.

## **Build on Recent Efforts for the Workforce Boards to Collaborate**

The Joint Venture study continued a shift to coordination and non-duplication among the workforce board partners in this ICT study. Because Silicon Valley is a regional technology powerhouse that stretches across the service areas of at least four workforce boards, it is critical that these boards work together where possible to provide targeted local services that coordinate with and serve the Valley's economy as a whole.

Silicon Valley workforce boards can be a model for the nation of how to coordinate workforce service delivery in regions where multiple workforce boards serve sections of a broader regional economy.

The Joint Venture report concludes:

*In short, this report makes the case for a regional workforce plan for Silicon Valley...Silicon Valley's response to these workforce challenges will play a critical role in the continued economic prosperity of the Bay Area and California as a whole. So often our region is a bellwether, showing the world new trends and technologies...Can Silicon Valley also provide the world a new model for skill building, adult learning and workforce transitions?*

This ICT study points the way to making this hope a reality.

# Conclusion

---

**A**s **Silicon Valley's ICT cluster** emerges from the recession, the region, its workers, and its businesses face a challenging time, but one also full of opportunity. The Valley's ICT economy was built on talent, investment, and an ability to spot and respond to trends more quickly than any other tech cluster on Earth. Those qualities remain today and provide an excellent basis for future growth.

But new opportunities will only benefit those who are prepared to take advantage of them. The region's workforce, in particular, will have to adapt to numerous new realities in order to flourish in the post-recession environment. Rapid transitions in the economy, technology, and employer preferences are changing the very nature of work in the ICT cluster and requiring job seekers to rethink their approaches to developing skills, identifying opportunities, and pursuing specific job openings. Key to this is the ability of Silicon Valley's workers to augment their occupational skills and adapt to the flexible and entrepreneurial mindset required by today's employers. This is a task that is readily achievable for Silicon Valley's workforce, and with appropriate support, the region's workers will be able to take full advantage of the newly emerging opportunities.

Silicon Valley's community leaders also have an important role to play in helping the Valley's ICT cluster maintain its leadership position through this turbulent time. Operating in the Valley is and will continue to be very expensive in terms of labor, land, and housing, and it is important that other factors compensate to maintain and improve the Valley's competitive position. Civic leaders should concentrate on further developing the region's world-class workforce as well as maintaining and improving the Valley's quality of life in order to ensure that Silicon Valley remains a place that CEOs and workers alike want to call home. These investments and innovations in education, infrastructure, and the amenities of Silicon Valley will be challenging in a time of fiscal stress, but Valley leaders face the same reality that our companies face: it is an invest-or-die world and opportunities will turn into success for regions and countries that invest for future prosperity.

Finally, Silicon Valley's public workforce system and its partners have a vitally important role to play in helping the region's workers and businesses thrive in the new economy. Preparing workers to navigate the rapidly changing ICT cluster and increasing the value businesses receive from the workforce investment boards and their education partners are among the most important ways that the public workforce system can help respond to the challenges of the evolving world of work.

Thirty years ago, Silicon Valley was just one of many regional tech clusters looking for a foothold in the exciting new frontier of digital technology. Now, it is the world's tech leader, amidst a world of fierce competition to get to the future first. By working together to bolster the area's strategic advantages and create new opportunities for workers, Silicon Valley's businesses, citizens, civic leaders, and public workforce system can help ensure the region continues to enjoy the many benefits that have accrued from past investments in infrastructure, talent attraction and development, and community wellbeing.

# Appendix A: Tech Resumes 2.0 — An Employers Perspective

---

## Introduction

---

As part of the regional workforce study on Silicon Valley's technology community, the research team completed in-person (February 27th, 13 participants) and online (May 3rd through 17th, 14 participants) resume panel interviews with 27 hiring specialists, recruiters and managers from separate Silicon Valley technology companies. The purpose of the interviews were;

1. To better understand how technology employers recruit and evaluate talent.
2. To determine what technology employers are looking for when considering applicants and how they prioritize different factors within the hiring process.
3. To identify and prioritize the key components of a resume.
4. To evaluate resumes in four technology occupations to better understand the key components of a successful resume.
5. To help specific job seekers improve their marketability with tech companies and provide insights for regional workforce board career advisors who work with dislocated job seekers.

The findings from these interviews were organized into three sections, the first section describes what every job seeker should know about Silicon Valley's technology employers. The second section describes some of the key differences between technology employers that job seekers should be aware of as they look for employment and the third and final section describes more detailed information on four occupations (software engineers, project managers, quality assurance or QA engineers and field applications engineers or FAEs) and ten redacted resumes that were evaluated as part of the interviews.

## I. Lessons for Silicon Valley's Job Seekers in the Technology Community

---

The following lessons are meant to summarize the key findings from the resume panel research and provide technology job seekers with universal recommendations when seeking employment in Silicon Valley.

**LESSON ONE: A resume should be targeted and specific to each employment opportunity you are considering.**

Employers were quick to point out that they could almost always differentiate between those job can-

didates who tailored the resume for the position to which they were applying and those job candidates who did not. This was one of the first filters recruiters and human resource professionals will often use in determining those resumes they will consider and those that they will not. Job seekers should spend enough time researching the employer and the related position to better understand how their career experiences match the job requirements and how they can best apply their skills to the position to which they are applying. In fact, the resume should read as if the targeted job is a natural next step in the job seeker's career progression.

*"How well do their (the applicants) specific skill sets match our core competencies?"* Human resources manager of medium-sized hardware firm on what they look for in a resume.

## **LESSON TWO: Be concise.**

Recruiters spend as little as 15 to 30 seconds reviewing each resume. Make sure your resume conveys an accurate, clear and compelling portrait of you in as few words as possible.

*"Five or six pages long...? It's like writing a book; way too long. Way too long to be reviewed. Need only one or two pages."* Owner, software company, on weakness of a reviewed resume.

## **LESSON THREE: There are four key ingredients for the first page of your technology resume.**

While technology employers do not always agree on how long a resume should be, several hiring decision makers advocated for one or two pages maximum, while recruiters were often willing to consider resumes that were considerably longer. Employers did agree, however, that the first page of the resume, and in particular the top one-half of the first page should be strong enough to grab attention so employers take the time to consider the remaining components of the resume and determine whether to interview the candidate or not.

*"The first thing I look at on a resume is the summary, the first three to five sentences at the top of the resume."* Hiring decision maker for medium-sized technology firm

1. A strong objective, summary, or mission statement is critical for most reviewers of resumes. In addition to formatting and presentation, a resume is less likely to be reviewed in its entirety if it does not begin with an objective/summary that stands out and clearly shows that an applicant knows who they are, what they are doing, and gives the reviewer reason to believe there is significant alignment between the applicant and the job.
2. Work experience that demonstrates key skills, familiarity with relevant industries and an understanding of the position to which you are applying. You do not have to include your entire work history on the first page of your resume, but you should describe the work experience that best parallels the occupation, industry and employer to which you are applying.
3. A clean, well-formatted resume that is easy to review and allows the employer to quickly describe your strengths.
4. A track record of innovation. You should show how you have been a problem-solver in your previous positions.



*“Nice and neat, professional, border around it, good overall appearance, bullet points are good, job description well-written. Can clearly see name and phone number on each page. Descriptions seem to be appropriate... even specifies numerically the results of [the] projects.”* Resume strengths noted by a software company owner.

#### **LESSON FOUR: Technical skills are necessary but not solely sufficient for employment in Silicon Valley.**

Technical skills specific to the position generally are essential but employers also require flexible learners who are willing to take on new and increasingly complex projects. Your resume and interview should communicate your relevant technical skills but it should also communicate the underlying skills and attributes that will make you a valuable contributor to a team. These include your presentation skills, adaptability, flexibility and ability to work in teams with a wide range of people or your ability to learn and/or teach new skills to other teammates.

*“You get to a point where you are reading so many resumes that it is very difficult to get excited by someone unless that excitement is portrayed in the writing of their resume. ... My passion is xyz it does not do anything for us, it is really old. (The key question is) how do they frame that passion or demonstrate that passion in the writing of the resume?”* Hiring decision maker for large technology firm

#### **LESSON FIVE: Periods of unemployment and gaps in individual history need to be explained but perceived job-hopping is very hard to overcome.**

Most employers indicated that they would hire someone who was unemployed as long as they could demonstrate that through periods of unemployment, they were passionate about learning and continuing to develop themselves (education, volunteering or other related activities.) It should be noted that several employers did say that any sustained periods of unemployment were a bit of a drawback for a job applicant. Employers did not consistently indicate whether periods of unemployment should be explained in the resume itself or in the cover letter.

Participants were much more black and white about applicants that looked like they were job-hopping or continually moving to a different position.

*“If they are job hopping, in other words they are opportunistic, I am immediately going to disqualify that resume.”* Hiring decision maker for medium-sized technology firm

#### **LESSON SIX: Your cover letter, resume and interview should tell a consistent story about your skills and the employment opportunities in which you thrive.**

Employers want to be able to describe a job candidate in a few sentences. They also generally look to minimize the uncertainty associated with hiring. A cover letter, resume and any interviews should consistently demonstrate the key skills, abilities and areas of knowledge that provide the foundation for quickly describing a job candidate. Employers are more likely to hire those job candidates they can describe with some confidence and are less likely to consider those that they do not feel confident in describing.

*“That they can back up what they have in their resume during the interview.”* Hiring decision maker for large technology firm when asked what was the most critical aspect on how an applicant should present themselves.

## II. Key Differences in Silicon Valley's Technology Community

The following segments are meant to summarize some of the key differences in recruiting, evaluating and hiring that was found among Silicon Valley's technology employers.

### **SEGMENT ONE: Recruiters vs. Hiring Decision Makers**

Technology firms can generally be classified into two groups, those that actively recruit job candidates and those that wait for job candidates to come to them. Typically, firms that hire or use recruiters are actively seeking qualified job candidates. Recruiters or larger firms with multiple human resource specialists will actively use LinkedIn to find the right job candidates as well as rely on their internal job boards to find the right job candidate. Those firms that do not use recruiters or have a less developed human resource department are less likely to actively seek job candidates and instead use craigslist and other resources to find qualified job candidates.

### **SEGMENT TWO: Elite firms vs. Known firms vs. Unknown firms**

Silicon Valley's technology community has grown tremendously in the last 25 years, but it is still a geographically small and well connected community. Job candidates that worked for elite firms, those that are market leaders in growing industries, were often quickly identified as worthy of further consideration. Those that worked for firms that the hiring decision maker had not heard of were less likely to be considered, all other things being equal. Job seekers that have not worked for easily identifiable employers should provide a brief description of each firm for which they worked and the connection that firm may have had to elite firms or at least key technologies.

### **SEGMENT THREE: Small Firms vs. Large Firms**

For this study small firms are defined as those with 10 or less employees, medium sized firms are 11 to 99 employees and large firms are those with 100 or more employees.

There is some overlap between smaller firms and those that rely on hiring decision makers rather than recruiters to find their talent. Smaller firms recruit differently. They are less likely to depend on LinkedIn or their own internal online job board and more likely to use craigslist or other sources to find job applicants. Smaller firms are also likely to be more critical of the resume and less likely to interview a large number of candidates for a single job. Recruiters and hiring decision makers of larger firms indicated they were often looking for an excuse to bring someone into interview, whereas hiring decision makers for smaller firms were often looking for an excuse to throw out the resume.

## III. Specific Lessons for Four Technology Occupations in Silicon Valley

This section is meant to summarize some of the key findings in the detailed evaluation of ten redacted resumes in four different occupational categories.

## **OCCUPATION ONE: Software Engineers**

For software engineering applicants, firms are looking for the key technologies they employ. Some of the valued computer programming languages include C++, Java, PHP, Visual Basic, and/or any Web programming languages. Education is not a primary determinant in the hiring process but most applicants are at least expected to have a bachelor's degree and sometimes a master's is expected. Firms like to see an initial description of the applicant's skills and a summary of those skills within the context of their work experience. In addition to skill sets, programming language proficiency, and certifications attained, information provided within a resume should include samples of what the applicant has done in programming and how the programming language has been applied in the applicants' work experience. Resumes should succinctly demonstrate technical skills that were used in the workplace.

Resumes 9 and 10 (see Section IV for all resumes) were consistently ranked ahead of resume 8, although larger elite firms note that neither of these resumes would "pass the test" for those companies that don't have a problem finding a high caliber of applicant. The patents and publications in resume 10 were appreciated by some; however it depended on where the position was in the organization. The certifications in resume 10 and resume 9 were both impressive, particularly the front-end developer experience listed in resume 9. For smaller firms, resume 9 and 10 could get an interview. Resume 10 may get called to discuss the recent gap in employment.

## **OCCUPATION TWO: Project Managers**

When assessing project managers, firms like to see client-facing experience, and they are looking to understand how much responsibility the applicant has had in a project. Firms like to see both experience managing large projects and past technical roles. Project managers should also demonstrate a deep understanding of the industry in which they are working. A bachelor's degree is necessary for consideration by many employers, while few prefer a master's. A project management certificate would benefit most applicants in this field. Resumes should provide some measure of individual organizational skills and a track record of successfully managing projects, meeting deadlines and managing staff.

Resume 3 was the strongest, and most likely to get an interview, because of the industry experience at a large and established technology firm in Silicon Valley as well as a valuable certification. While some recruiters prefer more information, most firms felt that the resume was too long (five pages) and even after submission, might be cut to the first two pages. Resume 4 showed good technical skills and good technical education. Participants also felt resume 2 was worthy of consideration, lauding it for excellent formatting and layout that made it easy to see the applicant's many achievements, awards and other accolades.

## **OCCUPATION THREE: Quality Assurance (QA) Engineers**

Quality assurance engineers/testers go by many names (systems engineer, software QA, QA specialist, etc.) Along with including detailed work history, technology employers looking to hire quality assurance engineers/testers or QA engineers want to see the types of products with which applicants have worked, as well as their level of familiarity with various hardware. Resumes for these positions need to be specific and focused on their contributions to past organizations. Details regarding an applicant's technical experience are very important.

Resume 6 was the strongest and most likely to get an interview due to good experience, skills, and role progression. Technical proficiencies were apparent. Six years at one firm added to the general positive reaction. Employers also indicated that resume 6 had an excellent format and layout. Resume 5 would have gotten a significantly more positive response if the applicant had explained the two-year gap in work experience. C++, JAVA, and Linux are good skills that were appreciated and it was apparent that this applicant was focused on QA.

#### **OCCUPATION FOUR: Field Applications Engineers (FAEs)**

When assessing field applications engineer (FAE) applicants, firms are looking for specific technical skills paired with good communication skills. Firms hiring FAE applicants are generally looking for previous FAE job experience and relevant technical skills. One employer indicated they would like for applicants to have a master's degree, but a 4-year, or bachelor's, degree would suffice for most employers. For this occupation, employers only critiqued one resume (resume 1). They appreciated the experience at well-known firms. More focus on the role the individual played in different work experiences, particularly in the summary, would have improved the resume.

## **IV. Tech Resumes**

Tech recruiters and hiring decision makers critiqued the following redacted resumes in order to provide specific guidance for job seekers and workforce career advisors.

## **Resume #1 - FAE**

Silicon Valley City, CA, USA (408) 555-5555, resume#1@email.com

### **SUMMARY**

Applications engineer with industrial experience in design, technical support, documentation, training, and troubleshooting of digital and analog communication boards ranging from stand-alone applications to PC-based products.

- Supporting customers in system design, bring-up and verification. Solving customers' issues, and documenting issues and solutions. Troubleshooting and reproducing customers' issues in the lab. Traveling to customers' site.
- Reviewing customers' system architecture, board schematics and layout.
- Collaborating with company and customers engineers on root cause analysis.
- Writing product documentation including datasheets, application notes and programmers' manuals.
- Developing and documenting new products.
- Providing presale support and technical presentations to customers
- Designing system architectures. Performing board verification.
- Capturing analog and digital board schematics with Cadence and Orcad.
- Designing board layouts with KALEY. Designing in VHDL with Altera Max ++.
- Excellent written and verbal communication skills.
- Organized, and detail-oriented. Creative problem-solver.
- Value customer needs and requests as first priority.

### **TRAINING & SKILLS**

Hardware / Tools: FPGAs, Oscilloscope, HP Logic Analyzer, Spectrum Analyzer, Signal Generator, IXIA. Software: Cadence (PCB & Verilog design), Orcad (PCB design), Altera Max++ (FPGA design), Corelis – ScanPlas (JTAG design), HyperLynx (Board simulation), FrameMaker, Microsoft Office (Word, Excel, Power Point, Internet Explorer), Oracle, Kaley (PCB layout design). Languages: C++, Assembly

### **PROFESSIONAL EXPERIENCE**

EXTENSION COURSES, California

2009 to Current

#### **Project & Program Management Study**

- Role of the project Management.
- Project Integration and Risk Management.
- Managing the Development of New Products.
- Managing Projects at Young Companies.
- Project Leadership and Communication.
- Project Management Negotiation Principles and Techniques.
- Applied Project Management.

Company Name, SILICON VALLEY, California

2006 to 2008

#### **Applications Engineer**

- Provided technical support to customers in SRAM system design, bring-up and verifications, which reduced the customer time to market. Troubleshoot and reproduced customers' issues in the lab. Traveled to customers' site.
- Created product collateral including application notes, errata, and technical papers, which improved efficiency and accuracy of the customers' design process.
- Provided presale support and technical presentations to customers, which facilitated the customers learning and specification process. Provided training to worldwide application engineers.
- Participated in the QDR consortium definition of the QDR-II+/DDR-II+/QDR-III specification, which improved the collaboration of the QDR consortium members, and reduced the customers' queries.
- Performed system validation of high speed memories on reference boards, which verified and ensured the memories functionality and signal integrity.
- Created 65nm SYNC / NoBL External Requirements Objective Spec (EROS) including the electrical, functionality and testing requirements, which improved and facilitated the chip design and the product engineers' product design process.
- Managed and supervised an application team in India for datasheets and models generation and verification, which facilitated the customers design process.
- Collaborated with company and customers engineers on root cause analysis.

Company Name, SILICON VALLEY, California

2004 to 2005

**Applications Engineer**

- Supported customers in SPI-4 / SPI-3 system design, bring-up and verification using IDT products such as Bridgeport and Fastport, which reduced the customer time to market.
- Wrote product documentation including datasheets, application notes and programmers' manuals, which improved efficiency and accuracy of the customers' design process.
- Collaborated with chip designers in product bring-up, and lab trouble-shooting, which facilitated the product bring up.
- Trained customers and internal engineers with company products, which facilitated the customers learning and specification process.
- Reviewed customer system architecture, board schematics, and layout, which accelerated customer board debugging.
- Initiated and developed System Design Guidelines which dramatically improved efficiency and accuracy of the customers' design process.

Company Name, SILICON VALLEY, California

1999 to 2003

**Hardware Systems Engineer**

- Supported customers in switch / router system design, bring-up and verification using AMCC products such as Network Processors, Switch Fabrics and Traffic Managers, which reduced the customer time to market.
- Wrote product documentation including datasheets, application notes, errata, and programmers' manuals, which facilitated the customers learning and specification process.
- Collaborated with chip designers in product bring-up, lab trouble-shooting & timing analysis, which facilitated and improved the product bring up process.
- Trained customers and internal engineers with company products, which facilitated the customers learning and specification process.
- Reviewed customer system architecture and board schematics, which accelerated customer board debugging.
- Generated systematic timing analysis procedures, which facilitated board design internally and for customers.
- Participated in products core team.

Company Name, OUTSIDE OF US

1998 to 1999

**Hardware Development Engineer**

- Developed PCI-based PC boards for encoding digital video, which facilitated the customers design process. Performed system design, captured schematics with ORCAD and supervised board layout and assembly.
- Performed board verification using Logic Analyzer System, which accelerated the board debugging process.
- Led production release and assisted software team during driver and application development, which improved the production process.
- Designed evaluation board for VisionTech KFIR device (MPEG-2 Encoder / Multiplexer) and supervised 6-layer board layout including placement, routing & rename.

Company Name, OUTSIDE OF US

1994 to 1997

**Hardware Development Engineer**

- Developed and tested digital communications board with INTEL 960JX RISC processor and ALTERA CPLD for, which used for system control in wireless access product.
- Used CADENCE tools for designing electric plots.
- Used Max++ for designing in VHDL for ALTERA.
- Performed system testing for several access projects.
- Initiated, developed, and oversaw completion of board develop/test fixture. Fixture significantly streamlined board troubleshooting and equipment connections.

**EDUCATION & PROFESSIONAL DEVELOPMENT**

- Project & Program Management Certificate, EXTENSION COURSES CA, USA.
- M.Sc. Program, Electrical Engineering, 2 years, XXX University.
- B.Sc., Electrical Engineering, XX University, .
- Associate of Science, Electronic Engineering, X College,.



## Resume #2

Silicon Valley City, Ca 92111  
(626) 555-5555      resume2@email.com  
<http://www.linkedin.com/in/resume2>

---

### PROJECT MANAGEMENT

---

## INFORMATION TECHNOLOGY PROJECT MANAGER

Experienced project manager on multiple information technology projects meeting or exceeding the company's strategic and financial goals.

### PROFESSIONAL PROFILE

- Meet end-user requirements, cost, and quality objectives through timely development and execution of information system functions, computer operations, and software development of systems.
- In-depth knowledge and experience in management, consulting, planning, project management, and networks.
- Saved \$3 million annually by developing a global software update and distribution system.

### AREAS OF EXPERTISE

Infrastructure	Gap Analysis	Capital Budgets
Project Management	Systems Analysis	Database Design
Mergers and Acquisitions	Process Design	IT alignment to business
Cost benefit Analysis	Application Development	SDLC
Training	Administration	Consulting
Contract Negotiation	Data Center management	Product/Services assessment
Technology advancement	Programming	HIPPA

### PROFESSIONAL EXPERIENCE

**Consultant**, Independent, Southern California City, CA, 2004 to Present

- Lowered software costs by 30% by identifying a selection of software packages matching the needs of a manufacturing company.
- Development of multiple project plans for cost take-out and performed due diligence for mergers and acquisitions for security OEM and a medical group
- Interim president to build operational process and procedures for a security OEM
- Lowered costs by 15% and improved performance by 20% by evaluation, re-engineering and deployment infrastructure for several SMBs
- Establishment of policies and procedures for datacenters, programmers, security, and network access for a petro-chemical company and a utility
- Improved worker performance and efficiency by training users in Microsoft Office (Word, Excel, PowerPoint, Outlook, Access)
- Design and development using Access, SQL, RDB, RMS, Oracle, and SQL databases

- Improved processing efficiency by 15% after performing work flow analysis and business process re-engineering for a government agency
- Alignment of IT strategy to business strategy for a government agency
- Evaluation of business processes and recommendation of changes

**Director of Information Technology, COMPANY NAME, CO, 2002 to 2004**

- Implementation of HIPPA compliance in all software
- Provided a 76% reduction in security problems, a 36% overall performance increase on the production systems, and an improved view of the IT organization by the company.
- Wrote and executed test plans and test cases in both highly structured and loosely structured development environments that addressed areas including functional needs, data validation, browser compatibility, load, stress, performance, and acceptance.
- Design and development of Ambulance Billing Software utilizing SDLC, CITRIX, Java, and mainframe database
- Design and development of RDB and RMS databases to support HIPPA requirements
- Design and development of software utilizing SDLC methodology

**Consultant, COMPANY NAME, CO, 2001 to 2002**

- Development of multiple project plans for merger cost take-out
- Improved system and network performance by 20% after performing evaluation, re-engineering and deployment of infrastructure.
- Saved company 20% in on-going operational costs, reduced the reported errors by 65%, and improved the perceived system speed by 14% by implementing work flow.

**Consultant, LARGE KNOWN TECHNOLOGY FIRM, NY, 1998 to 2001**

- Built cross-departmental relationships to manage project/support objectives, design application solutions, prioritize deliverables, determine implementation strategy and coordinate assignment of resources for Mobil Oil and Texas Utilities.
- Facilitated, prioritized, and communicated functional, technical, and scheduling requirements of large-scale projects to IT teams; serve as liaison between clients and staff.
- Used MS Project to manage project planning and scheduling; regularly reported project status to team members, clients, and executive management.
- Immediately and effectively escalated critical issues and implemented strategies for their timely resolution.
- Designed, developed, and implemented a contingency planning methodology for infrastructure for Utility reporting to the PUC

## **EDUCATION**

**BS Computer and Management Science, XXX College**

**Microsoft Certified Professional**

**IBM Certified Consultant**

**PMI Certified PMP**

---

## Resume #3, CAPM, CSM Project Manager - Information Technology

Silicon Valley City, CA  
(408) 555-5555

resume3@email.com  
[www.resume3.com/resume3](http://www.resume3.com/resume3)

### Profile

Accomplished and highly respected Project Manager with an emphasis on leading support operations, server deployments, and major infrastructure improvement projects for the software and networking market segments during a successful tenure at Cisco Systems.

Exceptional communication skills are proven beneficial in managing cross-collaboration projects, driving Software Configuration & Development, Release Engineering & Documentation Management, Computer-Aided Engineering, Design Support and Field Data Analysis.



### Selected Achievements

- Effective process improvement methodology at COMPANY NAME generated a savings of more than \$2M yearly.
- Customer satisfaction rating was 98%+/- while serving as the Support Lead for COMPANY NAME including 65,000 users, one million documents and 16,000 support cases/year.
- Recognized COMPANY NAME EDCS and ClearCase/MultiSite Subject Matter Expert.

### Key Leadership Strengths

- PMI Certified (CAPM)
- Certified ScrumMaster (Agile CSM)
- ClearCase / MultiSite Subject Matter Expert
- Compliance Standards, Business Practices
- Electronic Documentation Control Systems
- Formal PMBOK Training
- International Teaming and Collaboration
- Build & Release Engineering

### Professional Experience

**COMPANY NAME- Silicon Valley, CA**

**1995– 2009**

**Project Manager and Lead Engineer, Corporate EDCS Support ..... 2007 - 2009**

#### ***Engineering Information Framework, Product Development Infrastructure***

- Program Manager for the EDCS next generation enhancement program, defining and authoring product requirement, functional and system specifications while managing the development team in the production of test plans, cost benefit (ROI) analysis, and engagement of all key stakeholders.
- Established and implemented all team operating policies and procedures while leading and mentoring the global support team, managing more than 16,000 trouble tickets per year.
- Served as the SME and primary principal, collaborating with cross-departmental leaders in driving, designing and implementing corporate standards for utilizing the EDCS database and documentation control system.
- Compiled comprehensive COMPANY NAME documentation system specifications. Identified more than 350 technical requirements necessary for translating business needs into technical demands, all related to the conversion of the EDCS initiative into a Documentum solution.
- Developed and participated in all cross-departmental initiatives to oversee the integration of merger and acquisition IP systems into COMPANY NAME's corporate repositories.
- Drove all support initiatives for the Legal Department, maintaining the integrity of all litigation and discovery, providing necessary evidence for intellectual property claims.

---

**Senior Software Engineer, COMPANY NAME Support ..... 2004 – 2007**

**SCM Core Support Team, Product Development Infrastructure**

- Managed cross-functional negotiations in planning, defining and implementation of replacing 400 servers with 150 cost-effective systems as determined necessary for the COMPANY NAME License/Registry Consolidation and Deployment Project. *Delivered 6 weeks ahead of schedule. Wrote all tools required to pre-analyze, consolidate, test results and report to stakeholders.*
- Planned and executed integration project for MSSBU ClearCase environment impacting more than 800 engineers, migrating all tools and data to centrally-managed CCADM environment. Wrote all required tools for analysis and migration.
- Developed and managed department knowledge-base including all bug/issue identification, assignment, review and verification, managing “fixes” within CCADM release train schedule. *Eliminated 4 year defect backlog - permanently.* Established a framework for timely and accurate resolution of all new bugs within 3 months of inception.

**Software Engineer III, Business Unit, COMPANY NAME ..... 1995 - 2004**

**Switch Software Tools, Multi-Service Switching Business Unit**

*Company originated as Stratacom, Inc before being acquired by Cisco Systems in 1996*

- Championed, designed and developed View Pruning process which became the corporate standard, saving COMPANY NAME Systems over \$2M dollars annually.
- Provided all business unit engineering technical support for COMPANY NAME, resolving open issues within 48 hours. Developed/scripted all triggers, wrappers and productivity tools for the platform.

**Additional Relevant Experience**

- COMPANY NAME – Silicon Valley, CA ..... Build and Release Engineer
- COMPANY NAME – Silicon Valley, CA ..... Member of Technical Staff
- COMPANY NAME – Silicon Valley, CA ..... Programmer/Analyst

**Education and Professional Development**

- Bachelor of Arts – Major: Computer Studies, Minor: Economics (Accelerated Honors Program)  
BLANK University, CITY NAME, IL
- Certified Associate Project Manager (CAPM) .....Community College, Silicon Valley, CA
- Certified ScrumMaster (CSM) .....Learning Lab, Silicon Valley, CA

**Technical Skills**

**Operating Systems**

- UNIX: Solaris/FTX/Linux (Red Hat), Windows System Administration, IBM (MVS/VM)

**Software / Applications**

- Microsoft Office Suite, Microsoft Project, IBM Rational ClearCase/MultiSite, Adobe FrameMaker, Accurev, RCS, CVS, EDCS (Document Management)

**Tools**

- CDETS (Bug Tracking), Remedy Alliance (Case Support Management), HTML & Wikis, Active Directory/DNS, Shell Scripting, makefiles/sed/awk, REXX/CLIST, PGP Encryption

**Methodologies**

- VNC remote support, Scrum Agile, Waterfall, PMI PMBOK (all knowledge areas and process groups), SDLC, Cisco GEM (ISO 9000)

*The project management help you need is only one click away ...*

---

## PROBLEMS, ACTIONS AND RESULTS

---

### NEW PRODUCT

#### PROBLEM

As engineers in the Multi-Service Business Unit (MSSBU) started new projects, they kept creating new ClearCase views (work spaces) without deleting old ones. The Version Object Bases (VOBs) were becoming bloated with old references, affecting overall performance, and the Unit was forced to constantly buy additional storage shelves and servers. The same problem was being experienced throughout COMPANY NAME.

#### ACTIONS

I developed a NEW PRODUCT, an automated set of tools which swept the ClearCase environment nightly, to identify inactive views. When a view had not been used for more than 30 days, a series of weekly email notices were issued until the view had been removed, activated, or flagged for indefinite retention. After the fourth notice, the view would be archived and removed.

#### RESULTS

MSSBU realized substantial immediate savings, as the budget for new view space was reduced by more than 90%. At the same time, complaints about ClearCase performance, which is a common issue in many organizations, dropped over 50%. When the corporate (central) administration group learned about my program, they requested my tools and algorithms, and made the solution a corporate standard. Ongoing corporate savings have been estimated to be about \$2 million annually.

### LICENSE/REGISTRY SERVER CONSOLIDATION

#### PROBLEM

As COMPANY NAME acquired new companies and grew, ClearCase license and registry regions were added without any planning or organization. Expensive Solaris servers were used because originally lower cost alternatives were not available. The chaotic structure also forced many engineers to use more than one expensive ClearCase license at a time. COMPANY NAME had created more than 400 of these regions when I addressed the issue.

#### ACTIONS

1. Identified a Red Hat Linux unit as an inexpensive alternative server for license and registry service.
2. Re-organized the region topography into 150 pieces, grouped together based on the IOS development branches assigned to specific Business Units.
3. Developed a set of tools to do license analysis, predict client impact of each consolidation, audit each target region prior to beginning a consolidation, and handle the actual consolidation work itself.
4. Developed a master schedule for all the deployments. Worked with all clients to arrange two hour downtime windows to complete their regions.
5. Provided procedures and training for deployment team.
6. Arranged global distribution of the required hardware. Ensured that each server would reach a data center early enough to allow racking and configuration by local system administrators.
7. Tracked overall project status using graphical tools available to all personnel via a Wiki.

- 
8. Adjusted schedule as needed when a group could not move at the planned time.

## RESULTS

This entire 18-month project reached 100% completion (all regions consolidated as planned) more than 6 weeks ahead of schedule. Corporate expenses for licenses and associated maintenance contracts dropped over 50%. None of the consolidations had to be backed out due to errors or unexpected consequences. Project declared an unqualified success.

### **KNOWLEDGE BASE BUG BACKLOG ELIMINATED**

#### PROBLEM

Although members of the CCADM (ClearCase Administration) team were expected to complete one documentation bug fix assignment each month, this task was receiving very low priority. Bugs went unfixed for up to four years, leading to costly and time consuming mistakes in the team's administration of ClearCase for a client base of 7,500 engineers.

#### ACTIONS

1. A CCADM release was completed and shipped every three months. The development team had successfully completed twenty one releases without a single schedule slip. The department policy was to not allow a release to ship unless all of the bug fixes planned for the release had been completed and verified. I took advantage of this track record and policy to resolve my problem.
2. I made the case for the critical consequences of inaccurate documentation, and won the support of management for a new practice of assigning every documentation bug to a specific, planned, CCADM release. Once this change was implemented, there was very real pressure on the assigned engineers to complete their bugs, to avoid being responsible for delays in the CCADM release schedule.

## RESULTS

Within three months, the entire CCADM documentation defect backlog had been eliminated, permanently. The new policy fixed the problem entirely. New bugs were immediately attached to planned CCADM releases and assigned to a developer. All bugs were promptly fixed and verified, eliminating the dangers associated with ongoing inaccurately documented critical processes and procedures.

### **GLOBAL EDCS SUPPORT TEAM UNIFICATION**

#### PROBLEM

Global support for EDCS (COMPANY NAME's Electronic Documentation Control System) was handled by four Wipro contractors in ASIA, two LARGE TECH COMPANY contractors in SOUTHERN US, two COMPANY NAME engineers in SILICON VALLEY, and a globally distributed team of local administrators who handled issues strictly for their own business units, on a part-time basis. Poor communication and case transfers among the sub-teams, irregular escalation policies, a shortage of local administrators and morale issues all affected the overall quality of the EDCS support effort.

#### ACTIONS

1. I worked with all of the support team to establish policies and procedures which were fair, comprehensive, and lightweight.
2. Built team unity and improved our clients' experience.



- 
3. Worked with our contract administrators, to be sure that the policies I wished to adopt would not conflict with contractual service level agreements.
  4. Introduced “first in, first out” case management approach eliminating cherry-picking accusations, a set of guidelines for appropriate and inappropriate case escalations, a stream-lined training program for local administrators (and introducing new training requirements for EDCS administration privileges) enabling me to add more support without more expense, and a strong emphasis on clear, complete, two-way communication when cases were transferred.

## RESULTS

The new approach was seen as a real success by all team members, management, and our customers, demonstrated by a steep improvement in case Customer Satisfaction scores. The solution's completeness was shown by the very small number of adjustments and changes needed later to address issues not originally foreseen.

# Resume #4

Address

email

tel #

## Program Manager

with strong background in technical engineering and product development

More than 10 years' experience in program management, customer support, and operations management in a cross-functional matrix environment; combined with a technical management degree. Pragmatic and methodical: skilled at product improvement, and proactively solving problems. Conscientious, efficient, and accountable. Adept at leading teams to optimum performance. Strong communication skills. Strategic and focused on attaining results. Six Sigma Black Belt in progress. Areas of expertise include:

- Strategic Planning
- Change Management
- Product Development
- Policy Development
- Product Lifecycle
- Research & Development
- Process Improvement
- Budget Management
- Cost Analysis

***"Resume #4 always worked out the details of his projects precisely. He finished on time with complete thoroughness - ensuring satisfied recipients."*** – reference name, COO, COMPANY NAME

## Technical Skills

**Languages:** C Programming, VBA, HTML, Texas Instruments TMS320C31 Assembly Language, Motorola 68000 Assembly Language, Various Intel Microprocessor Assembly Languages

**Applications:** MS Project, MS Access, Microsoft Office Suite: Word, Excel, PowerPoint, Outlook

**Design Tools:** Mentor Graphics, Falcon and Design Architect

**Finance:** DIVER, AGILE, MS Excel

**Subsystems:** Phoenix BIOS, Fixed disk drive

**Platforms:** Apple, Industry Standard PC, Sparc 5, Sparc 10/20

**Operating Systems:** Windows 98/NT/2000/XP Pro, and Windows 7 Premium

## Professional Experience

**COMPANY NAME, INC – SILICON VALLEY, CA**

**2007 – 2010**

*COMPANY NAME is a designer and manufacturer of a wide range of IP networking equipment, including media converters, multi-access platforms, network interface cards, routers, and switches.*

**Business Operations Manager** ultimately responsible for cross functional leadership including 4 department employees with program management obligation of entire facility; held regular department meeting and submitted progress reports to upper management. Managed programs that:

- Stabilized operations costs and increased trouble ticket response times by nearly 80% achieving savings of \$300K per year.
- Slashed energy costs \$24K per year and recovered \$14K in rebates for equipment purchases.
- Created an Outlook tracking and scheduling tool that significantly streamlined procedures and expanded stakeholder visibility online.
- Averted JSOX violation by updating procedures to issue contractor access cards to secure areas.
- Negotiated new contracts reducing corporate operational costs by \$34.4K annually.

**COMPANY NAME – SILICON VALLEY, CA****2003 – 2007**

*COMPANY NAME provided residential and commercial repairs, maintenance, and renovation services.*

**Licensed General Contractor** of a privately-owned building company with less than 5 employees.

Applied acquired program management skills by:

- Handled every business aspect, including prospecting, lead generation, marketing, estimating, quoting, designing (custom-built furniture to customer design, bathroom and kitchen remodels, retrofitting), implementing, and invoicing. Sustained positive cash flow in declining market.

**COMPANY NAME – SILICON VALLEY, CA****1998 – 2003**

**Customer Support R&D HW Design Engineer** managed warranty and support cost reduction program, including 3-5 year roadmaps, within the mobile (laptop) computer division.

- Invented power-on indicator accurately captured first day of equipment use within 5 days of purchase, saving up to \$1B in warranty costs (based on projected sales).
- Collaborated with COMPANY NAME divisions in France and Brazil to allow the sharing of project information with a global workforce; deploying warranty programs worldwide.
- Trained French management team on best practices for hiring candidates with the ability to articulate technical concepts.
- Introduced groundbreaking hardware diagnostics suite that reduced repair NTF by 50%, dropping repairs by 25%; translating to \$10.4M in warranty savings.

————— Earlier Experience —————

**COMPANY NAME – SILICON VALLEY, CA**

*COMPANY NAME, is a world-wide supplier of commercial telephony-based systems (PBX and PhoneMail).*

**Sr. Associate MTS, FW/LW Design Engineer**

- Lead PhoneMail design engineer for embedded microprocessor-based line cards HW with telephony and ISA bus interfaces.
- Designed, implemented and successfully released communications protocol from application layer to hardware device driver on time with no software defects.
- Founded alternative programmable devices process saving \$1M annually.

————— **Awards and Recognition** —————

Service ID Patent

Hidden Hardware Diagnostics Patent

————— **Training and Development** —————

CEDIA Boot Camp Custom-Installation Basics Workshop • 2004

Information Driven Change • 2002

Team Building and Problem Solving in the Workplace • 2004

Managing Interpersonal Relationships • 2001

Effective Communications Skills and Conflict Resolution • 2002

Phoenix BIOS Developer's Course • 1999

Seven Habits of Highly Effective People • 1999

Powerful Non-defensive Communications • 1999

Product Lifecycle Training – Hewlett Packard • 1999

————— **Education** —————

**Six Sigma Black Belt Online Training Program** – In progress  
COMMUNITY COLLEGE, SILICON VALLEY, CA

**Bachelor of Science (BS) in Technical Management** (with Honors/Capstone Judge's Choice Award)  
UNIVERSITY – NORTHERN CA

## Resume #5

**Phone: (408) 555-5555**

**Email: resume5@email.com**

## OBJECTIVE

- Seeking a position of Software QA engineer.

**QUALIFICATIONS:**

- Understand software product life cycle and familiar with project management
- Knowledge of computer hardware testing, integration, and troubleshooting
- Programming in C/C++, Java, Perl, Shell Scripting, SQL, and PL/SQL
- Comprehensive knowledge in TCP/IP, OSI/ISO model, LAN/WAN, and VOIP
- System administration of Solaris, Linux, and Windows XP/Vista/Win7
- Software Test automation skills with Silk, QTP, Selenium, and LoadRunner

## WORK EXPERIENCE

<b>Software Test Engineer</b>	<b>COMPANY NAME. SILICON VALLEY CA</b>	<b>2007-2009</b>
-------------------------------	--	------------------

- Wrote IEEE test plan of new software features based on the software requirement specification.
- Wrote test cases and test procedures based on the test plans.
- Installed various Linux OS and Microsoft Windows OS on multiple computer hardware platforms.
- Integrated computer systems of various vendors with Nvidia workstation GPUs, Quadro Plex, and S4 and installed, configured, and running tests.
- Ran hardware bring-up tests to qualify new hardware with particular display drivers.

**Software QA Engineer    COMPANY NAME. SILICON VALLEY CA                      2007**

- Execute performance and benchmark tests on the SMTP relay servers with Anti SPAM and Anti Virus applications.
- Server hardware upgrade, replacement, and troubleshooting.
- Review and update test documents, define benchmarks and analyze test results.
- Reproducing bugs found in the test for developers and verify bug fixes.
- Write Linux Shell scripts to automate tests.

**Software Test Engineer   COMPANY NAME. SILICON VALLEY CA                      2006-2007**

- Develop test plan for new products and set up test environment in labs for the media broadcasting servers.
- Executing test cases according to the test plan and test procedures.
- Monitor, trouble shoot, and report errors from testing in a daily basis. Enter any software defects to the defect tracking system.
- Verify fixes for software and hardware defects.
- Configure new system for projects.

**Software QA Engineer    Independent Consultant** **2002-2006**

Clients: COMPANY NAME, COMPANY NAME., and COMPANY NAME.

- Prepare, review, and modify test documentation for proprietary client/server model software products.
- Analyze, test, troubleshoot, and repair faulty systems on daily basis.
- Setup test bed for QA team members utilizing network administration knowledge.
- Execute installation, functional, and regression tests on various flavors of operating system such as Solaris, Linux, and Windows.
- Install, verify testing environment and execute integration and end-to-end testing.
- Utilize bug database to open new issue and close the fixed problem on a daily basis.
- Communicate with developers to facilitate the problem solving process to meet the time line.

**Software QA Engineer****COMPANY NAME. SILICON VALLEY, CA 2000-2003**

- Executed installation, acceptance, compatibility, functional, regression, error, and boundary tests on proprietary application software running over the Internet.
- Executed system test on various SUN UNIX servers and Windows NT/2000 servers.
- Installed, configured, and tuned Sybase database, Netscape Web server, JRUN, JDK1.4.0, webMethods Integration Server, Microsoft IIS, and other third party middle ware/software.
- Wrote, maintained, and updated test plan, test cases based on product's engineering specification as well as marketing documentation.
- Trouble shoot on software products, computer hardware, and network connectivity.
- Wrote test analysis report and logged bugs found to bug tracking database.
- Worked closely with development team to facilitate bug fixing, patch releasing, and deliver new releases.
- Executed, scheduled, and requested code build.
- Backed up and restored database for SQA team on request basis.
- Upgraded system hardware and software on demand.
- Provided technical support to other SQA engineers, customer service team, and sales team.

**Software QA Engineer****COMPANY NAME. SILICON VALLEY CA 1997-2000**

- Performed installation, configuration, performance, and system integration testing on all product lines such as Internet fax, telephony, roaming, billing, and prepaid systems.
- Demonstrated capability of integrating third party hardware and software such as Lucent Internet Telephony Server, Cisco VOIP Router and their software.
- Installed and configured Oracle Server 8.0 as the backend database server, JDK, Java Web Server 2.0, and Certificate Administration Server of both Netscape and Verisign.
- Performed system administrator and DBA tasks in system integration lab and QA lab.
- Involved in the deployment of application services and customer support.
- Utilized trouble shooting skills to facilitating problem finding and solving.
- Worked closely with developers to accelerate bug fixing, patch releasing.
- Coordinated with different groups to resolve resource and schedule conflicts.

**EDUCATION**

- B.S. major in mathematics and mechanics, BLANK University, (1982).
- AS in CIT, COMMUNITY COLLEGE, SILICON VALLEY, CA, USA (2003).

**PROFESSIONAL TRAINING**

- Computer software automation testing, Computer School
- Sun Microsystems certified Solaris 9 Operating System Administrator
- CompTIA Linux+ Certification
- UNIX Network Administration Course, COMMUNITY COLLEGE
- Oracle Database Administration Courses, COMMUNITY COLLEGE (College certification)
- SQA Methodologies, Education Center

# Resume #6

Residence: CA

Phone: 555-555-5555

E-mail: [resume6@email.com](mailto:resume6@email.com)

## OBJECTIVE

To obtain a challenging **Software Quality Assurance Engineer** position that will allow me to use and expand my skills and interests in software testing.

## SUMMARY

Over 10 years in testing business integration software, customer oriented applications, and data processing and exchange solutions. QA experience in products based on SOA/SCA and J2EE (JCA, JSP, EJB). Configured and managed test data for SAP, Siebel, Clarify, JD Edwards, Oracle E-Business and other products. Performed functional, system, and integration tests, and wrote automation suites for regression tests. Continuously worked with new tools and products: switching from one product to the next after bringing it to a stable state from which it could be transferred to an off-shore team. Worked closely with development and product management teams on numerous projects, reacting quickly to last minute changes and adhering to deployment deadlines.

## TECHNICAL PROFICIENCIES

<b>Tested Products:</b>	WebSphere (WS), WS Process Server, SCA Components, WebSphere InterChange Server, CrossWorlds Business Integration Adapters
<b>Configured/Managed:</b>	Web Sphere MQ/JMS, WS Integration Developer, Rational Application Developer
<b>QA/Development Tools:</b>	SilkTest, ClearCase, CMVC, ClearQuest, Test Tracking Tool, IBM SVDK (Self-Voicing Dev. Kit), WebKing, Eclipse, JTS, JUnit, JMeter, Selenium
<b>Languages/Technologies:</b>	Custom Java API, JavaScript, HTML, JSP, XML, UNIX shell scripting, DB2, Oracle, SQL Server, Cloudscape Network Server, MySQL
<b>Operating Systems:</b>	Windows, IBM AIX, Linux SuSe, RH5, Solaris, HP-UX
<b>Applications:</b>	Siebel, Clarify, JDBC, JDEdwards, Oracle E-Business Suite, PeopleSoft, SAP

## PROFESSIONAL EXPERIENCE

[COMPANY NAME](#), SILICON VALLEY, CA

July 2008 –

April 2010

### QA Engineer, Test Lead

WebSphere Service Component Architecture (SCA) and WS Process Server (WPS) solutions. Customer business functionality is provided as a series of abstract services which can be configured and assembled to build a composite application that addresses specific business problems

- Led test efforts on two projects: SOA Core HTTP and SCA binding interactions with external Web services
- Tested synchronous and asynchronous service invocations via WSDL and Java interfaces
- Was involved in cross-modules tests using SCA binding. Configured HTTP export/import binding to enable testing of real-life scenarios
- Implemented test cases using Java and JSP. Built composite applications to perform functional and interoperability tests for HTTP and SCA binding. Automated functional and globalization tests using JTS
- Wrote test plans; created end-to-end request/response integration test scenarios and appropriate data sets. Developed XML documents that define tests: service URL and corresponding parameters, test input and expected output, and test validation service to compare actual and expected results.
- Led testing in highly dynamic small QA/development team of six engineers. Followed Agile methodologies (iteration-based planning and scrum meetings)

[COMPANY NAME](#), SILICON VALLEY, CA

Feb 2002 - July

2008

### QA Engineer, Test Automation

WebSphere Process Server (WPS) Adapters. Automation of functional tests

- Reviewed test automation harness design documentation for Adapter testing. Developed test approaches and created sample scenarios to verify harness framework functionality
- Automated inbound/outbound request/response verification tests specified in XML. Setup JTS framework and managed regression test cycles
- Led training sessions with teams in China, writing and providing them with training materials, and helping them with the development of test-cases' automation

WPS Adapters. Functional, system, and integration tests

- Tested Adapters with integration brokers: WebSphere InterChange Server and WebSphere MQ Integrator via Java Messaging Service (JMS) transport layer
- Tested bi-directional connectivity between Enterprise Information System (EIS) and J2EE components when Adapters moved to support Java Connection Architecture (JCA) standards
- Tested JCA Oracle E-Business Application Suite adapter. Performed extensive beta testing
- Created SQL query checking result in Oracle database
- Performed media UI accessibility tests to verify that installer's panels are accessible for those who are blind
- Optimized contributions for functional/integration tests within Agile iterations
- Performed media verification test for WebSphere Process Server (WPS). Tested ISO and DVD images on Windows/Linux

COMPANY NAME, SILICON VALLEY, CA

Nov 2000 - Feb 2002

#### **QA Engineer**

Business Integration InterChange Server. System and functional tests

- Created test scenarios and appropriate data sets, constructed business objects and wrote SQL scripts for data validation. Tested end-to-end e-business integration solution comprised of integration modules and business objects that supported business connectivity between Siebel, Clarify, JDBC, SAP, and PeopleSoft applications via ICS server
- Served as a point of contact for the server team, sharing the knowledge of the system test. Wrote documentation and provided training sessions
- Performed full-scope testing of ICS connectors that integrated business processes between applications and enterprise systems. Developed testing framework and automated GUI and functional test scenarios with SilkTest

COMPANY NAME, SILICON VALLEY, CA

1999 - 2000

#### **QA Engineer**

E-commerce B2B solutions. Functional tests

- Tested e-commerce B2B web-based application that linked vendors and users, providing goods and services through catalogs
- Created test plans, test cases to perform functional verification, edge cases, error handling, regression, performance, and stress testing. Ran SQL queries to lookup transactions in Oracle database.

### **EDUCATION**

Certifications:

- IBM WebSphere Education:  
"Integrating Using WebSphere Integration Developer & Process Server" 2006, 2007
- Rational ClearCase and UCM for Windows 2002
- CrossWorlds Education "Core Technology" 2000

Technologies Institute

CA, 1998

- Certified Software Quality Assurance Engineer

B.S. Engineering

COUNTRY

Hobbies: Avid swimmer

Languages: English, EUROPEAN LANGUAGE

References: Available upon request



## **Resume #7**

1111 , Resume7 Drive, Silicon Valley City, CA 92111

[resume7@email.com](mailto:resume7@email.com) (408) 555 5555

---

- Software QA Engineer with over 9 years of experience testing object oriented, multi-tiered web applications in a multiplatform environment
- Experience in developing automate tests using tools like Load Runner/Win Runner
- Experience in functional, system, Java API, regression, performance and load testing
- Ability to write utility programs using scripting languages like Perl and shell scripts.
- Ability to manage and run test cases from Test Director
- Proficient in analyzing projects, test planning and scheduling resources

### **TECHNICAL SKILLS**

<b>Operating Systems</b>	MS Vista, Solaris, HP and AIX
<b>Languages</b>	C, JAVA, J2EE, SQL, Perl, Shell scripts
<b>Database</b>	ORACLE , MSSQL
<b>Tools</b>	Test Director, Silk, Quick Test, WinRunner 9.2, Load Runner 9.5

### **PROFESSIONAL EXPERIENCE**

**QA Engineer at COMPANY NAME, SILICON VALLEY** **2006 –Till date**

- Documented detailed test plans and test cases for Verisign applications
- Performed Stress test using Grinder Automation tool for SSL auth application
- Developed Load Runner scenario test cases for CELP application to measure performance (GUI interface)
- Performed manual regression for VeriSign applications on VISTA platform
- Performed functional test on CELP application
- Executed automated test cases using Win Runner for regression testing
- Prepared manual and automated test matrix for RSA Rollover application
- Filed detailed bugs using bug tracking system (Source force)
- Analyzed targeted applications and define testing objectives and scope
- Configured Unix & Oracle Monitors for Load test using Vmware environment
- Developed test scripts using Perl/Shell to validate EACS APIs in Linux
- Trained new members of the team to understand Verisign products

**Test Engineer at COMPANY NAME SILICON VALLEY** **2005 – 2006**

- Performed load test planning & developed Load Runner Vugen test scripts
- Conducted load test using Load runner controller and Load generator for PCN, Cisco discovery, Cisco Customer registry, SLD, Idome and Cisco eCase Web applications. on WebSphere and Weblogic appservers
- Ran baseline, simultaneous, concurrent, reliability, WAN simulated tests

- Prepared test reports and analyzed them to validate test success criteria
- Communicated detailed status report with application and Load testing team.
- Collaborated with Project Managers and SMEs and escalated issues as needed
- Designed documentation repository for storing tests with respective results

**QA Engineer at COMPANY NAME, SILICON VALLEY** **2004 – 2005**

- Configured client test lab to reproduce complex Customer Scenarios and issues
- Developed and executed performance tests and functional tests on Siebel CRM application using Load runner and Quick Test
- Coordinated Automated Functional Testing using Test Director
- Established automatic e-mail notification and traceability notification rules for Siebel CRM projects and managed workflow for projects
- Facilitated test plan walkthroughs and inspections

**QA Engineer at COMPANY NAME, SILICON VALLEY** **2003 – 2004**

- Developed test plan and test cases for Customer Distribution and License Config. Management at Inxight, a leading provider of information discovery
- Responsible for functional, performance testing on both Unix and Windows

**Senior QA Engineer, COMPANY NAME., SILICON VALLEY** **2000 – 2002**

- Developed test cases using J2EE to test Intranet SDK's APIs
- Developed and executed test plans for "Rated Event Loader" which integrates rates of GSM, GPRS and WAP events into the billing software's database.
- Lead regression testing for Orion coordinated with a team of 10 members
- Visited Customer site at England, UK to help Delta3 to upgrade their Infranet.
- Tested WAP, GPRS, and GSM wireless applications.
- Automated Time Zone test cases using QA Director

**QA Engineer, COMPANY NAME, SILICON VALLEY** **1998 – 2000**

- Developed and executed test plans for Action Server. Technologies used -Visual Café, JAVA, DCOM, Oracle RDBMS, JavaStar.
- Action server used SMTP/POP protocol to interact with MS-Exchange, Eudora.
- Performed White box testing, performance testing, regression testing etc.
- Created and configured database and set up environment (MS SQL Server, Oracle)
- Testing done in NT and UNIX (Solaris) and bugs filed in a bug tracking system.

**Education** M.S. (Computer Science), BLANK Institute of Technology COUNTRY

**Additional training** UNIX System Admin, UNIX/Shell Script, SQL, JAVA RMI

## **Resume #8**

Email: [resume8@email.com](mailto:resume8@email.com)

Phone: 650-555-5555

### **SUMMARY:**

- 15 years of solid software development experience in the areas of web application and telecommunication.
- Skilled in debugging and complex problem solving.
- Very responsible reliable team player.
- Willing to learn new skills & tools and able to take on new challenges.

### **SKILLS:**

PHP, HTML, AJAX, Javascript, JQuery, CSS, MySQL, XML, Java, C, Linux, Unix, Window, gdb, Eclipse, Netbeans.

### **EXPERIENCE:**

- **Internet Programming and Development Certificate** **3/2010 - now**  
EXTENSION COURSES, CA

Implement a simplified version of craigslist that provide users with the capability of creating an account, login to their account, post the item they want to sell, or search for the item they are interested to buy base on category, location etc.

Create a web based book review system that enable administrator to add a list of book to be reviewed, and users could login to add their review and also view the review detail from other users.

- **Member of Technical Staff – software engineer** **9/2000 – 10/2009**  
COMPANY NAME., SILICON VALLEY, CA

Primary work on tools, protocols and state machines:

Tools:

- Design and implement for supporting new IP Platform functionality in launcher, which is a tool used to configure a runtime session.
- Implement a new feature for configEditor to automatically retrofit new changes of the configuration file back to their old version by using Java and XML. With this feature, all the future changes could be applied automatically by adding the new fields into a configuration file in XML, which greatly simplified the retrofit procedure.
- Add dbgout and top command support to the new RCP platform by using Java, so the result could be saved and viewed for analyzing later. This feature is heavily used by the software engineer and application engineer to communicate with customer when dig into issues.

Protocols:

- Design and implement the encoder and decoder of protocol MM1, MM7, M3UA, NAS, WIMAX and WSP etc.
- Add a new feature to the message construct tool which could show the encoding result one line per parameters with detail comment. It turns out to be a great help for our customers as well as in house developers to find encoder bugs.
- Implement a dynamic encoding mechanism which encode the given message base on a run time condition. It greatly simplified the customers' script.

State Machines:

Involve in design, implement and test M3UA, SUA and RANAP Release 8 state machine.

• **Member of Technical Staff- software engineer**

1997

– 2000

COMPANY NAME., IL

Primarily worked on the following projects:

- Provide new capabilities to the Service Control Point (SCP) to decide whether to continue a call, forward the call to the 3<sup>rd</sup> party, or simply fail the call.
- Design and implement Macro Enhancement Routing(MER) to allocate outgoing calls proportionally among different routes carrying traffic to any given destination. It greatly increase the efficiency and flexibility of call routing procedures.
- I was in charge of the retrofit of Operator Service Point System (OSPS) and Large Terminal Growth(LTG), which are two critical components of the 5ESS system.
- Add a new feature to enable operator to specify a specific number of reconnection for the Directory Assistant (DA) call. Once the value is exceed, the Operator Service Point System (OSPS) provides an announcement to the DA caller and disconnect the call automatically.

• **EDUCATION:**

- MS – Computer Science, State University of BLANK STATE at CITY
- BS – Computer Engineering, BLANK University, ASIA

## Resume #9

SV City, California 94111  
(555)555-5555  
resume9@email.com

### Software Engineering Professional

---

SMB Financial Apps Experience	JavaScript, jQuery, CSS, HTML / XHTML
Client-side, User Focused	PHP, Java, C++
Team-oriented, Collaborative	Rapid Prototyping

---

### EXPERIENCE

#### COMPANY NAME, SILICON VALLEY, CA

2010–Present

##### Front-End Web Developer

Develop B2B network and e-commerce web applications targeting small to medium businesses (SMB). Client web application development in PHP, JavaScript, jQuery, CSS, and XHTML.

- Design dynamic web applications with a focus on workflow and usability.
- Continually redesign web pages to improve usability based on customer feedback and refactor to create maintainable and efficient code.
- Rapid CSS prototyping during design meetings for proof-of-concept and side-by-side design comparisons.
- Some work on PHP, MySQL back-end as needed.

#### COMPANY NAME, SILICON VALLEY, CA

2004–2009

##### Software Engineer

Designed and implemented features for financial applications as part of COMPANY NAME's Small Business Group.

- Prototyped and developed web applications using Java and Flex/ActionScript.
- Developed rapid prototypes (Flex) to prove visual design concepts and create UI standards references.
- Designed and implemented new features in five releases of QuickBooks using C/C++.
- Implemented infrastructure refactoring to improve OO design and extend functionality.
- Designed and conducted requirements gathering study with local and international customer service representatives.

#### COMPANY NAME, SILICON VALLEY, CA

2000–2002

##### Software Engineer

Researched and developed software tools for COMPANY NAME's IA32 server division.

- Investigated design alternatives and created prototype for HP server software using JSP and XML. Demonstrated prototype resulting in the approval of new project.
- Determined root cause of defects and resolved bugs for C++ and Java projects.
- Wrote and presented technical specifications documents and investigation reports.
- Conducted document reviews to eliminate defects at the earliest stages of the product life cycle.
- Worked as part of product development team consisting of 5-10 engineers, cross-functional and cross-departmental extended teams, and 3<sup>rd</sup> party SDK developers.

**LARGE CO, Inc., SILICON VALLEY, CA****1997–2000****Software Engineer**

Developed web and desktop applications for a software R & D branch of COMPANY.

- Designed and implemented web applications with Perl and CGI.
- Programmed multimedia software in C++.

**TECHNICAL SKILLS**

- *Web Development:* PHP, JavaScript, jQuery, AJAX, Flex, ActionScript/MXML, HTML, XHTML, CSS, XML
- *Programming Languages:* Java, C++, C
- *Databases:* MySQL, PostgreSQL
- *Applications:*
  - *IDE:* Eclipse, FlexBuilder, NetBeans, Visual Studio
  - *Source Control:* Subversion, Perforce, SourceSafe, ClearCase
  - *Graphics:* PhotoShop

**EDUCATION**

EXTENSION COURSES, CA (courses taken between 2/2010 – 1/2011) Completed the following courses to obtain Internet Programming and Development certificate:

- *Developing JavaScript-based Rich Web UI with jQuery*  
Built demo travel insurance website using jQuery.
- *Linux Based Web Application Development – Apache, MySQL, PHP (LAMP)*  
Implemented craigslist-like web application using WAMP stack.
- *Python*  
Completed several assignments demonstrating OOP Python, file IO, sequences, list comprehensions, and packages. Developed unit tests using unittest module.
- *Ruby on Rails (RoR)*  
Developed an e-commerce website with shopping cart and order fulfillment system.
- *AJAX*  
Programmed forms submission and autocomplete using AJAX. Also created maps using Google, Yahoo and Bing map APIs and AJAX.
- *Cloud Computing*  
Configured and programmed an application using Google App Engine in Python.
- *Developing Rich Internet Applications with Flex*  
Completed client-side UI project in Flex.

CITY State University, CITY, CA

B.S. in Computer Science

University of STATE, CITY, STATE

B.A. double major in Political Science and Philosophy

## Resume #10

55555 Street Name, Silicon Valley City, CA 95555  
resume10@email.com (H) 555-555-5552 (C) 510-555-5555

---

### OVERVIEW:

An inventive, big-picture software engineer with a clear mind. Constructive team leading skills with a thorough database and middleware knowledge and experience. Seeking a senior software engineer position in an environment where challenges are met and overcome using innovative solutions.

### SKILLS / CERTIFICATES:

- **Languages:** C/C++/C#, SQL, Java, JPA, JDBC, PHP, Python, Perl Script, XML, AJAX, Ruby
- **OS/platforms:** Unix/Linux/Solaris/HP/AIX, Windows, Eclipse, .NET, Android, iPhone, J2EE
- **Database:** DB2, Oracle, SQL Server, Cloudscape, MySQL, dBASE

### EXPERIENCE:

*COMPANY NAME*- SILICON VALLEY, CA

1997 - 2009

#### Advisory Software Engineer

##### **WebSphere Research and Development:** (Windows, Java, JPA, Eclipse, JDBC, J2EE)

- Designed the integration of Apache Java Persistent API (JPA) and PureQuery (DataZero) which cut the development cost in half; delivered at least 2 months earlier and eliminated future maintenance cost.
- Led and delivered the integration of Apache JPA and ObjectGrid (IBM in-memory database).
- Developed the integration of Apache JPA and IBM WebSphere (Web 2.0).

##### **DB2 Content Manager Library Server Development:** (Windows/Unix, C/C++/Java/Perl, Eclipse)

- Led database configuration component, delivered database upgrade and 64-bit toleration in Content Manager Version 8.3.
- Led level 3 supports, problem solving for Content Manager. This prevented the impacts to the development schedule.
- Originated database schema change process to prevent breaking the database and the development builds of Content Manager.
- Defined "Instances" for Content Manager so that every component in the installation have a clear picture of the design and the scope of their responsibilities and made configuration extendable.
- Led performance tuning in library server for driving CM acceptance for E2Open
- Led Content Manager ESP (early support program) deliverable for supporting Oracle database in CM Version 8.2

##### **COMPANY NAME DB2 Universal Database RDS / DPS (Database Technology Institute, DBTI):** (C/C++, AIX)

- Led Federated two-phase-commit project. Simplified the complex transaction processing and made the design so clear and easy to implement.
- Led DataJoiner / UDB integration (Information Integration)
- Developed DB2 Spatial Extender, presented and made initial sell to Census Bureau, Washington, DC

*COMPANY NAME* - Research Center, SILICON VALLEY, CA

1992 - 1997

#### Staff Software Engineer

##### **DB2 Client Server Query Processing Research and Development (DBTI):** (C++, DB2/SQL, AIX)

- Implemented view, trigger, view/column privileges and grant with grant in DB2 UDB
- Implemented database system catalog, packed-descriptors in DB2 Client Server



**US PATENTS:**

- SUPPORTING DATABASE INDEXES ...
- USER-DEFINED SEARCH ...
- RUNTIME SUPPORT ...

**RESEARCH PRESENTATION / PUBLICATION:**

- NINE LISTED

**CERTIFICATE:**

- DB2 DBA Certificate
- DB2 Programmer Certified
- Professional Effectiveness Program Certificate (PEP), Oct. 2009, SILICON VALLEY NON-PROFIT  
Courses include:
  - Team Building
  - Communication
  - Problem Solving
- Internet programming and Development Certificate, January, 2011, EXTENSION COURSES, CA:  
(GPA: 4.0/4.0) Courses include:
  - Cloud Computing
  - iPhone Application Development
  - Android Application Development
  - C# .NET Programming, Comprehensive
  - PHP (Hypertext Preprocessor)
  - Programming the Windows Presentation Foundation
  - XML and Java
  - Python for Programmers
  - Ruby Introduction

**EDUCATON:**

NAME University, CITY, STATE  
M.S. Computer Science, (GPA: 3.93/4.0), 1989

NAME University, CITY, COUNTRY  
B.E. Electronics Engineering

# Appendix B: Key Messages for Silicon Valley Job Seekers

---

As part of the regional workforce study on Silicon Valley's technology community, the research team completed in-person and online resume panel interviews with 27 recruiters and hiring decision makers from regional technology companies.

The following lessons are meant to summarize the key findings from the resume panel research and provide technology job seekers with universal recommendations when seeking employment in Silicon Valley.

**1. A resume should be targeted and specific to each employment opportunity you are considering.**

In fact, the resume should read as if the targeted job is a natural next step in your career progression.

**2. Be concise.**

Recruiters spend as little as 15 to 30 seconds reviewing each resume. Make sure your resume conveys an accurate, clear, and compelling portrait of you in as few words as possible.

**3. There are four key ingredients for the first page of your tech resume.**

- A strong objective, summary, or mission statement.
- Work experience that demonstrates key skills, familiarity with relevant industries, and an understanding of the position to which you are applying.
- A clean, well-formatted document that is easy to review and allows the employer to quickly describe your strengths.
- A track record of innovation. You should show how you have been a problem solver in your previous positions.

**4. Technical skills are necessary but not solely sufficient for employment in Silicon Valley.**

Employers also require flexible learners who are willing to take on new and increasingly complex projects.

**5. Periods of unemployment and gaps in individual history need to be explained, but perceived job-hopping is very hard to overcome.**

Most employers indicated they would hire someone who was unemployed as long as they could show that during periods of unemployment they demonstrated a passion for learning and continued to develop their skills through education, volunteering, or related activities.

**6. Your cover letter, resume, and interview should tell a consistent story about your skills and the employment opportunities in which you thrive.**

Employers are more likely to hire job candidates they can describe with some confidence.

# Appendix C: Key Messages for Silicon Valley ICT Employers

---

The Silicon Valley Workforce Investment Boards' research team reached the following conclusions based on employer surveys, executive interviews, and extensive analysis of investment and related industry data.

**1. Silicon Valley's tech hiring will grow over the next two years.**

Sixty percent of those surveyed said information and communications technologies (ICT) employers will have more full- and part-time employees 12 months from now. Led by growth in field applications engineers, software engineers and, project managers, cluster employment will grow by 15% over the next two years.

**2. Talent shortages loom for some of the most in-demand ICT jobs.**

A majority of surveyed employers are reporting they already have at least some difficulty finding qualified candidates to fill key positions for software engineers, field applications engineers, project managers and quality assurance testers or engineers, among other occupations. ICT cluster growth, retirements, and a diminished pipeline of university graduates will exacerbate the shortage.

**3. Future ICT jobs will require both relevant tech skills and a flexible and entrepreneurial mindset.**

Core tech skills alone are no longer adequate. Employers want workers who are entrepreneurial, flexible, have a passion for learning, and are comfortable in working in teams, as well as dealing with ambiguity.

**4. Investing in educational and physical infrastructure are critical for Silicon Valley to retain its ICT edge.**

With high-octane talent being Silicon Valley's fuel, the region must strengthen its K-12 STEM (science, technology, engineering, and math) pipeline and increase the number of STEM university graduates. Improvements in public transportation and affordable housing are critical to luring future ICT workers. The study also recommends immigration reform to make it easier for talented foreign workers to bring their skills to the Valley.

**5. Workforce investment boards need stronger partnerships with employers in order to better prepare workers for skill demands.**

Most ICT employers—almost 70 %—said they were not aware of the four local workforce boards serving Silicon Valley. Workforce boards must raise their institutional profiles in order to strategically connect employer demand with job seeker supply.

For example, workforce agencies can enhance their value to ICT job seekers and employers by providing job seekers with opportunities to learn new technical and teambuilding skills in portfolio labs. These labs would enable job seekers—particularly those who are unemployed—to demonstrate their proficiency for in-demand applications.

# Appendix D: Key Messages for Silicon Valley Economic Development Stakeholders

---

The Silicon Valley Workforce Investment Boards' research team reached the following conclusions based on employer surveys, executive interviews, and extensive analysis of investment and related industry data.

**1. Silicon Valley's chief global growth engine—the Information and Communications Technologies (ICT) cluster—will add jobs.**

Sixty percent of those surveyed said ICT employers will have more full- and part-time employees 12 months from now. Led by growth in field applications engineers, software engineers, and project managers, cluster employment will grow by 15% over the next two years.

**2. Talent shortages loom for some of the most in-demand ICT jobs.**

A majority of surveyed employers are reporting that they already have at least some difficulty finding qualified candidates to fill jobs in key occupations. A shortage would weaken the Valley's competitive position and hinder employer efforts to capitalize on revenue opportunities.

**3. The Valley's global competitive advantages will remain in place.**

The winning formula of a highly skilled talent pool, a high quality of life, proximity to savvy customers, and access to capital will continue to keep Silicon Valley leading the pack of global tech regions.

**4. Future ICT jobs will require both relevant tech skills and a flexible and entrepreneurial mindset.**

Core tech skills alone are no longer adequate. Employers want workers who are entrepreneurial, flexible, have a passion for learning, and are comfortable working in teams, as well as dealing with ambiguity.

**5. High labor and property costs mean that Silicon Valley will only attract ICT work that cannot be performed elsewhere.**

As local companies increase their education and skill demands, lower- and middle-skill tech jobs will continue to bleed away to other regions, both domestically and internationally. For example, Silicon Valley has five times the number of software engineers as San Diego while San Diego has about twice the number of media communications and equipment workers.

**6. Investing in educational and physical infrastructure are critical for Silicon Valley to retain its ICT edge.**

With high-octane talent being Silicon Valley's fuel, the region must strengthen its K-12 STEM (science, technology, engineering, and math) pipeline and increase the number of STEM university graduates. Improvements in public transportation and affordable housing are critical to luring future ICT workers.

**7. Workforce investment boards and partners can play larger roles in serving workers and employers during this period of transition for Silicon Valley and the ICT cluster.**

To help workers meet employer demand, workforce boards should provide job seekers with opportunities to demonstrate their skills while continuing to evolve job search and resume strategies. Additionally, the WIBs should also explore programs that enhance workers' problem-solving, entrepreneurial, and flexibility skills.

Economic development stakeholders can support the process by connecting WIBs with employers—the key source of real-time intelligence about worker skill needs.

# Appendix E: Key Messages for Silicon Valley Educators

---

The Silicon Valley Workforce Investment Boards' research team reached the following conclusions based on employer surveys, executive interviews, and extensive analysis of investment and related industry data.

**1. Talent—entrepreneurial, inquisitive, and motivated—is the fuel powering the Silicon Valley innovation factory.**

Where iron ore and coal once fed the nation's industry engine, brainpower is now the capital upon which economic vitality depends.

**2. Talent shortages loom for some of the most in-demand information and communications technologies (ICT) jobs.**

A majority of surveyed employers are reporting they already have at least some difficulty finding qualified candidates to fill key positions for software engineers, field applications engineers, project managers, and quality assurance testers or engineers, among other occupations. ICT cluster growth, retirements, and a diminished pipeline of university graduates will exacerbate the shortage.

**3. The region's educational pipeline is not sufficient to meet future talent requirements.**

From lack of middle and high school students with adequate science, technology, engineering, and math (STEM) training to a dearth of bachelor's and master's degree candidates in STEM-related fields, the region is not adequately prepared to meet the expected increased demand for higher-skilled tech workers.

**4. Silicon Valley ICT jobs will demand higher skill requirements while lower-skill tech jobs will continue to leave the region.**

Due to relatively high labor and property costs, regional employers are constantly shedding any job functions that can be performed effectively in other parts of the world. Even compared with a relatively strong tech economy like San Diego, Silicon Valley has a much higher concentration of computer scientists, researchers, and software engineers, while San Diego has about twice the number of media communications workers as Silicon Valley.

**5. While technical credentials maintain some value for some lower-skill tech occupations, ICT employers reject traditional training approaches for innovation jobs.**

Surveyed employers found no value in classroom training, industry-recognized credentials, and quantified technical abilities. These employers are looking for workers who have demonstrated their ability to muster a broad array of skills and attributes to innovate and solve problems.

**6. Educators should focus on promoting flexibility and entrepreneurial skills in addition to enhanced STEM training.**

ICT employers want workers who are creative, flexible, innovative, and comfortable with ambiguity. Educators should support non-rote experiential learning in public schools and ensure the availability of opportunities—including art and music education—that allow students to develop their creative abilities.

# Appendix F: Key Messages for Workforce Investment Boards

---

The Silicon Valley Workforce Investment Boards' research team reached the following conclusions based on employer surveys, executive interviews, and extensive analysis of investment and related industry data.

**1. Provide job seekers with opportunities to demonstrate their skills and attributes.**

One example is a portfolio learning lab in which customers are divided into interdisciplinary teams and given a project to complete. This would provide a tangible product to show employers that would highlight both technical and teamwork skills.

**2. Provide resume and job search services that are informed by employer demands.**

Resumes should be targeted to specific job opportunities and should highlight the job seeker's innovation and problem-solving skills. Consider resume review panels and other opportunities for employers to provide feedback on customer resumes and workforce board practices and procedures.

**3. Offer opportunities for flexibility training.**

Provide training opportunities that teach the problem solving, entrepreneurial, and flexibility skills today's employer's demand.

**4. Develop relationship strategies with employers.**

ICT employers are the best sources of real-time information on rapidly changing trends in job growth, occupational demands, and the evolving nature of work roles. To build relationships, WIBs should provide employers with greater value, such as developing opportunities for employers to engage with financiers, legislators, community leaders, and government agency officials at quarterly leadership meetings.

**5. Develop new pathways for successful job placement.**

WIBs should shift focus from providing narrowly defined occupation-specific training to helping workers become the flexible problem solvers that ICT employers value.

**6. Where possible, seek opportunities to work collaboratively with other regional workforce boards and related partners.**

Collaborations, such as this study, allow WIBs to better serve the Silicon Valley economy by providing targeted, coordinated services with minimal duplication of effort.



# Appendix G: Venture Capital and R&D Data

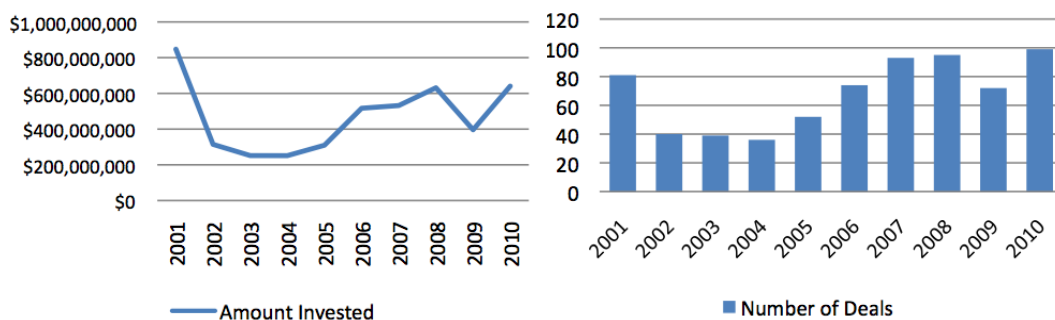
The venture capital information and analysis contained in Appendix G is based on results from the PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, which is based on data provided by Thomson Reuters. The MoneyTree™ Report's sector definitions are included in each section. The definition of the Silicon Valley region used by the MoneyTree™ Report includes Northern California, the coastline, and the Bay Area. The MoneyTree™ Report is widely recognized as the definitive industry-endorsed source for information on venture capital financing and emerging business activity.

## IT Services

IT services saw a predictable dip in level of investment and number of deals in Silicon Valley during the mid-2000s, immediately following the technology investment bubble. The sector has seen steady growth and activity since then, with 2007 and 2008 actually exceeding the number of deals from the previous high of 2001. The investor community's enthusiasm for this subsector may lie with the explosion of e-commerce opportunities as well as the subsequent concerns about Internet security, privacy of information, and the expanding need for data processing. Nationally, the trend in this sector effectively mirrors these charts, with Silicon Valley representing roughly 30% of both the number of deals and the amount invested nationwide.

Venture capital (VC) activity is trending to later stages. In the first quarter of 2011, of the \$208 million in VC investments, 70% went to expansion and late stage investments. The percentage of total VC IT Services investments in seed or early stage rounds has declined steadily from 62% in 2008, to 55% in 2009, and 42% in 2010.

**Figure G-1: IT Services VC Trends**



*IT Services Data Definition: Providers of computer and Internet-related services to businesses and consumers including computer repair, software consulting, computer training, machine leasing/rental, disaster recovery, web design, data input and processing, internet security, e-commerce services, web hosting and systems engineering.*

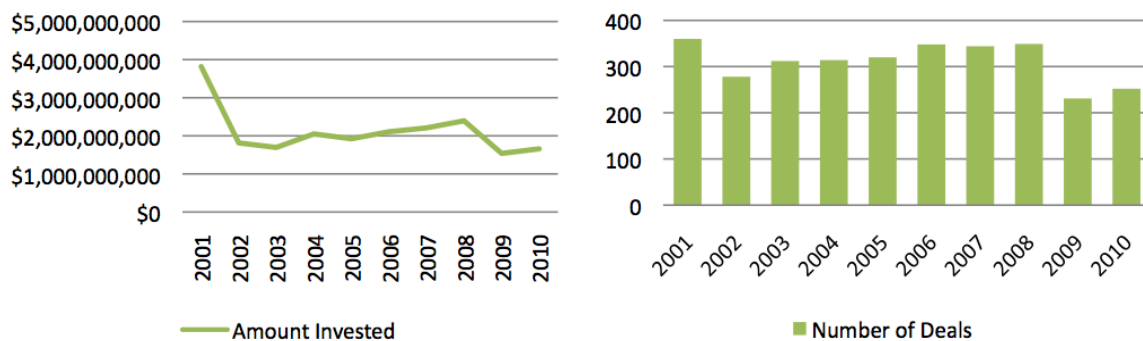
## Software

Software and services not surprisingly remain consistent drivers of VC activity both in terms of investment and number of deals. Despite a decline in 2009, likely tied to the recession and general investor unease, software continues to vastly outpace the other subsectors both in terms of dollars and in the actual number of company investments. New applications and new products will continue to drive the growth in the software sector for the foreseeable future, a good sign for Silicon Valley given the strong concentration of existing software developers and the academic institutions that will continue to feed it.

Virtualization and Software as a Service (SaaS) will continue to feed the sector and bring substantial growth in the future. It is unclear however whether software innovation will be driven by VC-backed start-ups or by larger software internally or by acquisition.

First quarter 2011 shows robust VC activity in the software space, with almost double the amount invested and 40% more deals in Q1 2011 than Q1 2010.

**Figure G-2: Software VC Trends**

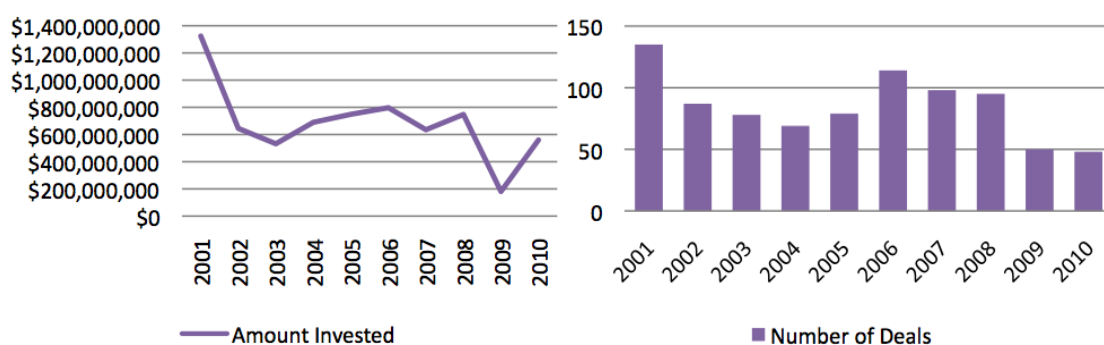


*Software Subsector Data Definition: Producers of bundled and/or unbundled software applications for business or consumer use including software created for systems, graphics, communications and networking, security, inventory, home use, educational, or recreational. Also included is software developed for specific industries such as banking, manufacturing, transportation, or healthcare.*

## Telecommunications

The recession's impact can clearly be seen in this subsector with a dramatic dip in activity and level of investment in 2009. This is expected to be a temporary trough however, as mobile and wireless technologies and VoIP take over the telecom landscape and generate multiple pockets of innovation and growth. Also, as consumer computer use rises and processor speed increases for most all products, there will be more and more need for additional bandwidth. For all but the most complex computer gaming and video usage, a consumer's challenge will be the size of the "pipe," not the "power" of their machine. Investment in this area has been trending upward over the past 12 months, and California continues to lead, though the first quarter of 2011 was more lackluster, with only \$33 million being invested in 10 deals. By comparison, 2010's first quarter saw more than \$170 million invested in this subsector.

**Figure G-3: Telecom VC Trends**



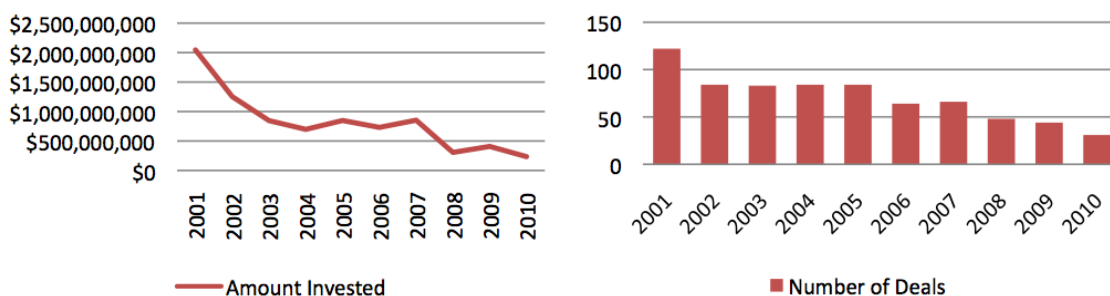
*Telecom Subsector Data Definition: Companies focused on the transmission of voice and data including long distance providers, local exchange carriers, and wireless communications services and components. Also included are satellite and microwave communications services and equipment.*

## Networking & Equipment

Networking and equipment activity has seen a consistent decline since its post-bubble peak of 2006, largely due to the diffusion of communications technologies and the transition from hard-wired equipment to wireless and mobile communications technology that has reached beyond the workplace and into consumers' homes. This somewhat rapid departure from traditional networking technologies and equipment has likely fed the retreat of venture investments in the sector, but Silicon Valley remains in the center of the action, accounting for over 50% of the amount invested in this sector in 2009. Depending on how cloud computing infrastructure evolves and is deployed, there may be reason to believe this sector will rebound somewhat, though the likely dominance of larger providers could create an uphill slog for venture-backed start-ups in this space.

First quarter 2011 results indicate this downward trend is showing no signs of reversing. With overall venture capital enthusiasm rising and deal flow exploding, the Networking & Equipment subsector had its slowest quarter ever, with only \$22 million invested in 2 deals.

**Figure G-4: Networking & Equipment VC Trends**



*Networking Subsector Data Definition: Providers of data communication and fiber optics products and services. Includes WANs, LANs, switches, hubs, routers, couplers, and network management products, components and systems.*

## Semiconductors

The semiconductor subsector saw its post-bubble peak in VC investment in 2004 and since then has seen a steady decline in both activity and level of investment at the early stages. This is to be expected with a maturing industry, which overall rebounded in 2010 to significant growth due to pent up demand for televisions, computers, and cell phones coming out of the recession.

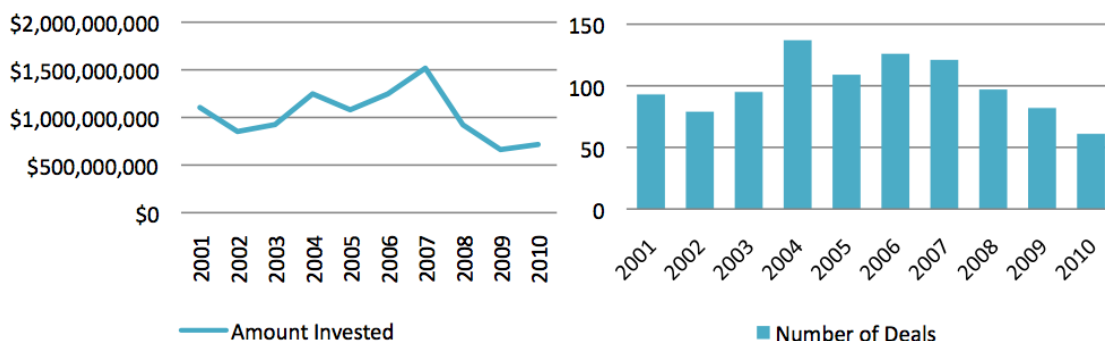
But despite that strength, VC enthusiasm didn't follow. This can be attributed to a variety of factors, including the trend to high performing chips for consumer products, which by definition are extremely price sensitive and thus become more like a commodity and have less opportunity for large increases in value for innovative designs, speed or overall performance. For the vast majority of consumers, the processing power they currently possess in their laptops and smart phones are more than they will need for all but the most complex video game applications. Semiconductor innovations in areas such as power use are likely coming from the semiconductor manufacturers themselves and not from venture-backed entrepreneurial start-ups.

Silicon Valley has a disproportionate share of national semiconductor VC investment, so this trend could be a concern to the region going forward. In 2009, Silicon Valley represented more than 76% of the amount invested nationally and more than 64% of the total number of semiconductor deals.

Another possible indicator for the semiconductor industry can be seen in Google's acquisition trends. Google has been on a buying spree, particularly in 2010 when they not only have resources but are seeing significant value available. Google averaged 3.5 acquisitions per month throughout 2010, though just one acquisition was in the chip/semiconductor space. The large semiconductor firms themselves are seeking to diversify into other areas, as evidenced by Intel's purchase of software security firm McAfee.

First quarter 2011 numbers do indicate a slight uptick in VC activity with over \$200 million invested. However, in each of the last three years, the first quarter numbers were the strongest for this subsector and investment and number of deals declined throughout the year.

**Figure G-5: Semiconductors VC Trends**



*Semiconductors Subsector Data Definition: Design, develop or manufacture semiconductor chips/microprocessors or related equipment including diodes and transistors. Also includes companies that test or package integrated circuits.*

## Conclusion from Venture Capital Data

Clearly, the ICT cluster is already enjoying the benefits of the recovery, with a great deal of venture capital excitement surrounding three dominant concepts: the cloud, social media, and mobile technologies. One venture capitalist was quoted in the Silicon Valley Capital Confidence Index as saying, “The social and mobile web ecosystems are growing at a torrid pace. This, coupled with the increased availability of angel and early stage venture funding, [is] driving the creation of a huge number of start-ups in the Bay Area.” Another said, “The level of activity, especially in the software/Internet/social media sector is almost frantic. This will continue for a while.”

Companies throughout the Valley are announcing planned workforce increases including Facebook, Google, Apple, VMWare, and Skype. Many of these companies have recently leased or purchased additional space to accommodate the planned expansions. Lease and sales prices for commercial and research properties in the Valley are increasing in another sign of confidence in the future of technology in Silicon Valley. And some companies led by Facebook are planning to follow LinkedIn and market IPOs (initial public offerings), which should reinvigorate the market for startup equity capital.

## Research and Development Budget Trends

The analysis in this section is based on data gathered by internationally-recognized business research firm Schonfeld & Associates.

Silicon Valley continues to be a thriving ecosystem for ICT research and development. However, the numbers can be a bit deceiving, since when analyzing the large amount of R&D investment by technology area, it is clear that each subsector tends to be dominated by a small handful of big spenders.

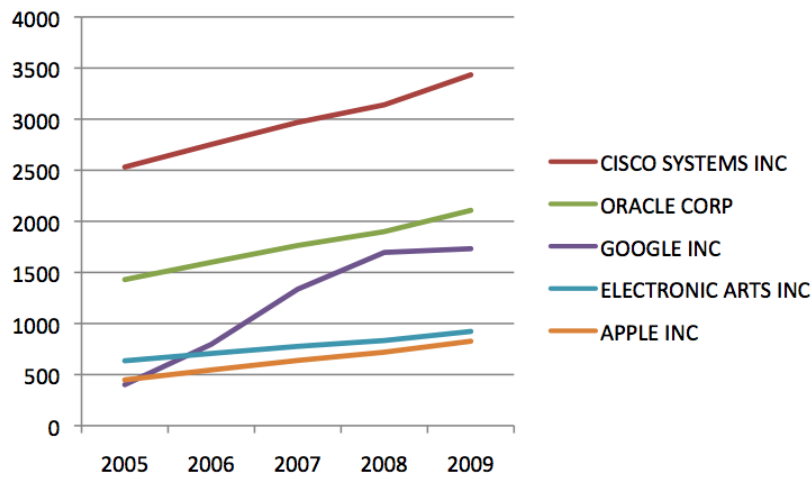
These big spenders continue to invest in R&D at a steady—though not robust—rate.

The following chart shows the five largest R&D spenders in the Valley and their trends over the years 2005-2009. Even at the height of the recession, companies continued their commitment to internal R&D. Google’s apparent “leveling-off” coincides with their rapid ramp-up of acquisitions, which went from 3 in 2008, to 5 in 2009, to over 22 in 2010.<sup>20</sup>

---

20 CB Insights September 2010, [www.cbinsights.com](http://www.cbinsights.com); Berkery Noyes Full Year Mergers and Acquisitions Trends Report, December 2010

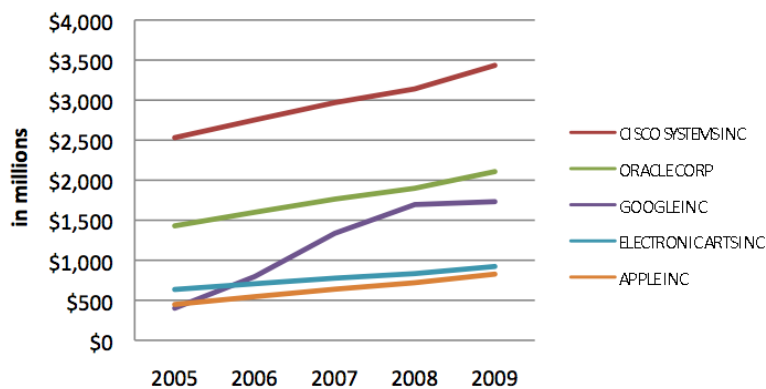
**Figure G-6: Largest R&D spenders in Silicon Valley**



The region is dominated by the companies one would expect. The following charts show the top 15 companies in groups of five to better show the comparative growth trends of their nearest peers in size. What becomes clear is that while all these companies continue to be committed to internal R&D, none seem to be making large scale increases or “big bets” on it.

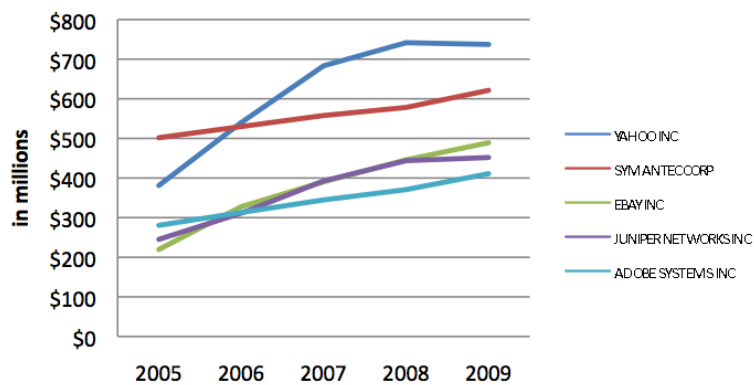
The following charts illustrate the top 15 R&D budgets broken into groups of five for comparison purposes.

**Figure G-7: Top 5 R&D Spenders**

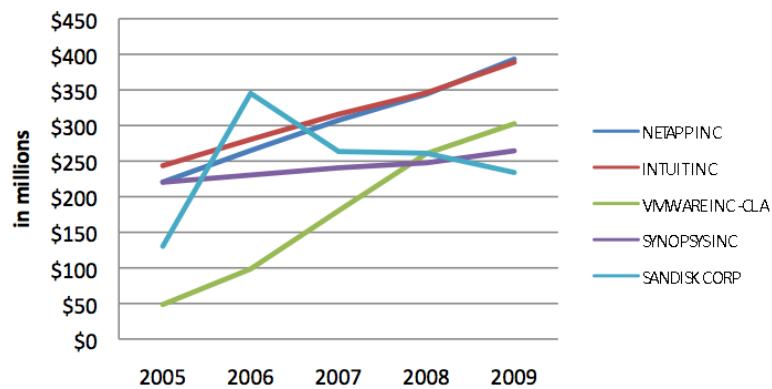




**Figure G-8: Second 5 R&D Spenders**



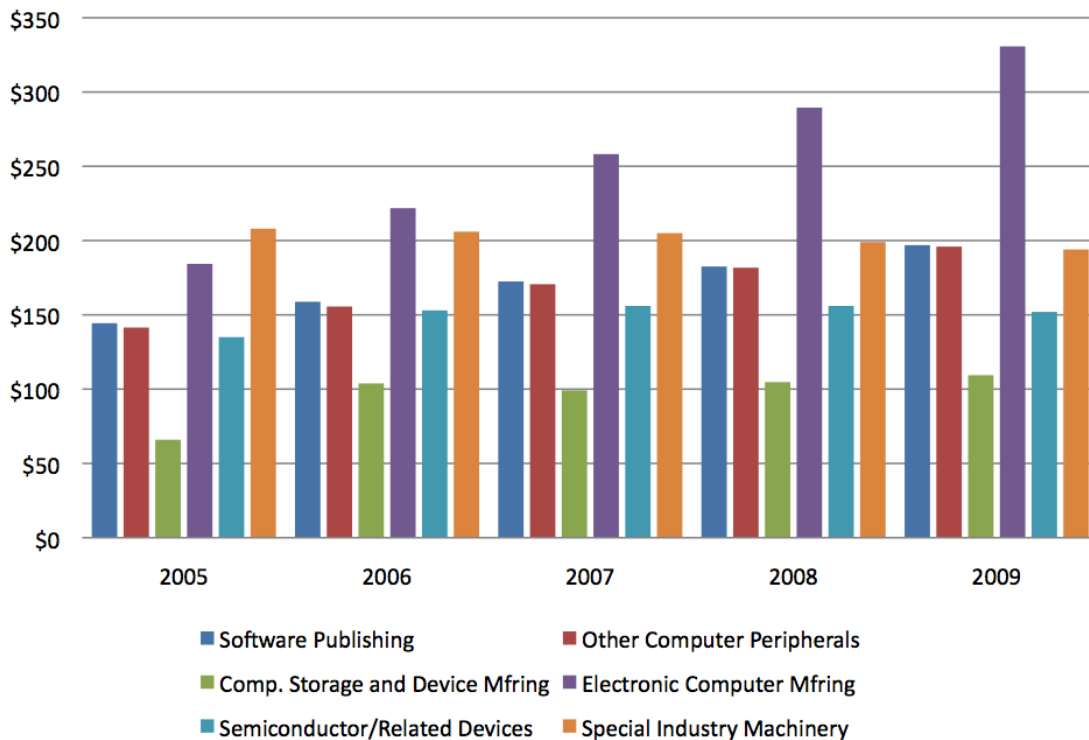
**Figure G-9: Third 5 top R&D Spenders**



## Subsector Analysis

The following charts compare the average R&D budgets for each of the NAICS subsectors represented in Silicon Valley.

**Figure G-10: IT Subsector Average R&D Budget Trends (includes primary & secondary NAICS sectors)**



### Software Publishing

- Largest subsector in terms of entities in the Valley
- Sample companies: Oracle, Symantec, Adobe, Cadence, McAfee, Electronic Arts

### Other Computer Peripherals

- There are 24 companies in the “Other Computer Peripherals” subsector, but it is dominated by a small handful of companies—with Cisco accounting for over 70% of the sector total and the combination of Cisco, Juniper, and Brocade making almost 90% of total R&D subsector spending in 2009.

### Computer Storage and Device Manufacturing

- Six companies in the Valley in this subsector including SanDisk and NetApp
- Subsector has seen significant leveling off in R&D spending, as a whole growing only about 5% from '06 through '09

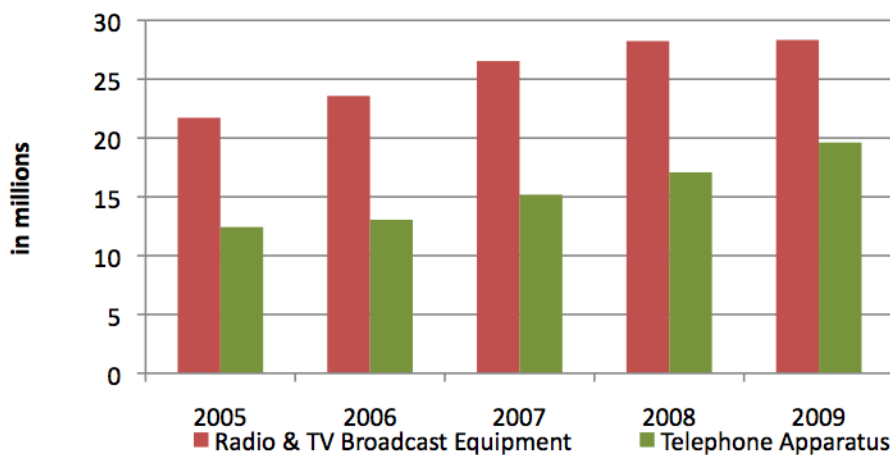
### Electronic Computer Manufacturing

- Biggest spending subsector on R&D—but only three companies are in the sector
- Totally dominated by Apple, with more than \$825 million in R&D spending in 2009

### Radio and TV Broadcast Equipment

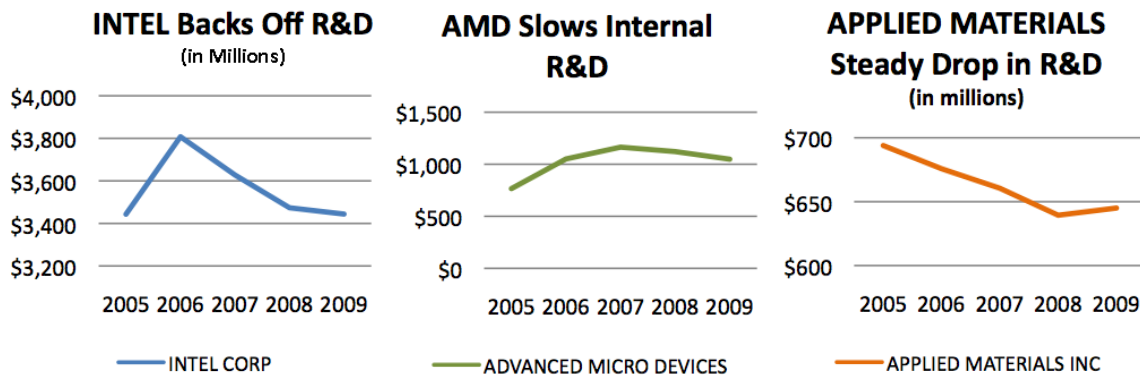
- Relatively small subsector in Silicon Valley, represented by companies such as JDS Uniphase, Harmonic, DSP Group, and Applied Signal Technology
- JDS Uniphase accounts for almost 55% of the subsector's total R&D investment in 2009

**Figure G-11: Smaller Subsector Average Annual R&D Budgets, \$0-\$30 Million**

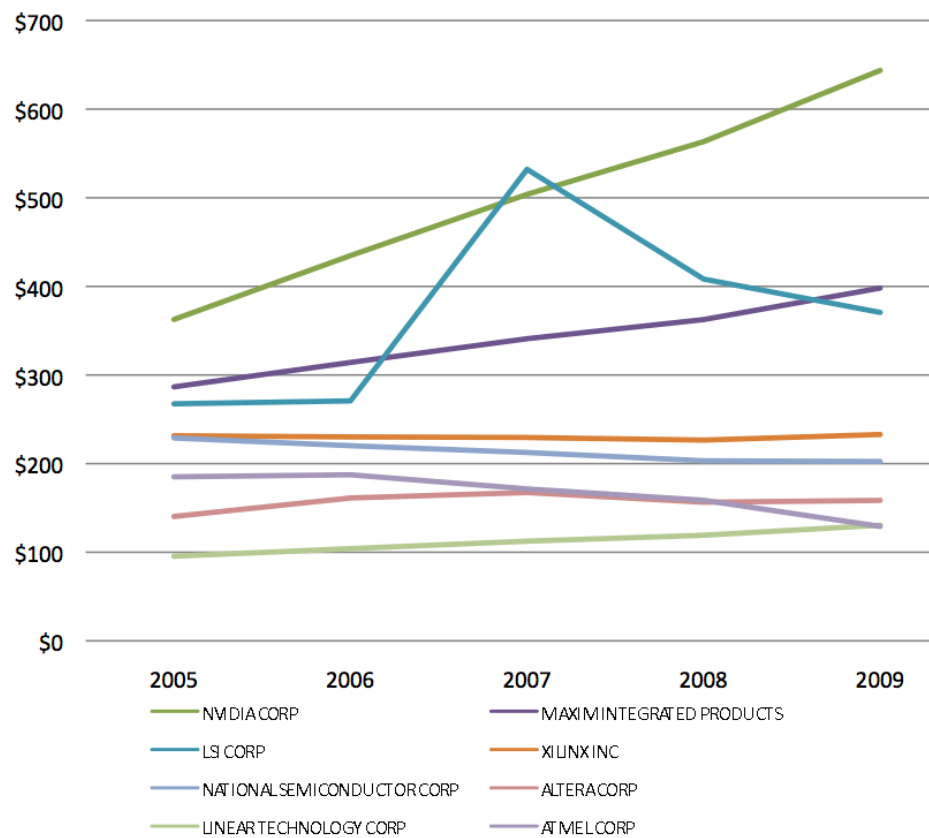


Semiconductor companies appear to have the most substantial contraction in internal R&D budgets.

**Figures G12-15: Internal Contractions of R&D Budgets**



**Semiconductor Sector R&D in Transition**



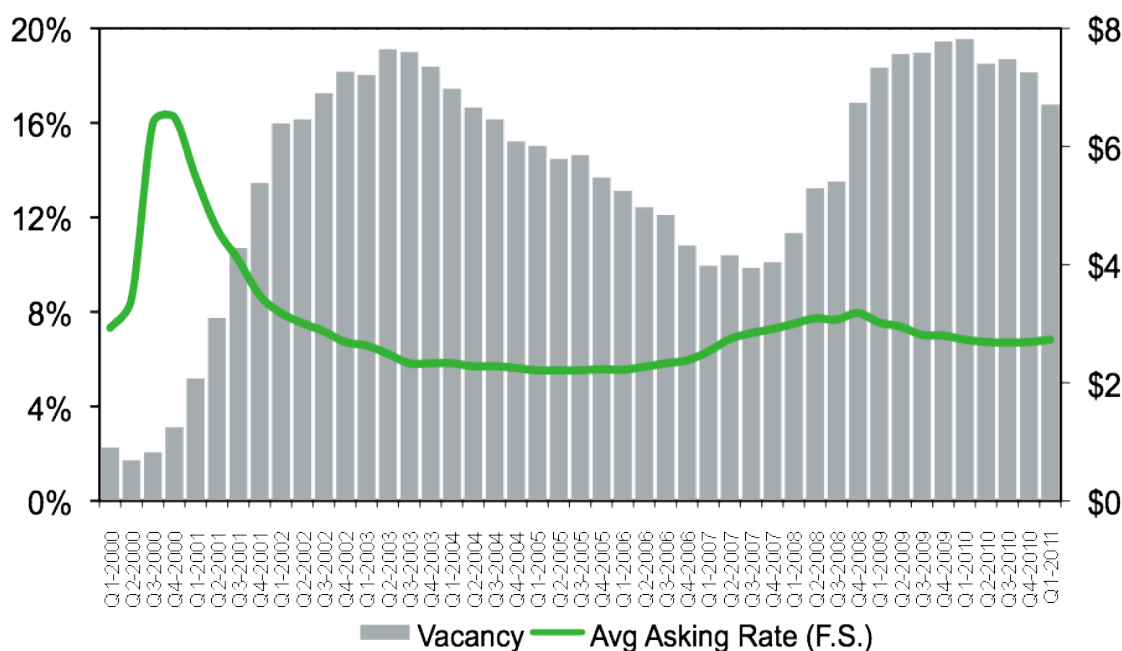
## Appendix H: Real Estate Costs

There were several major cost pressures for Silicon Valley technology companies identified in executive interviews and other corporate input. Labor costs often get most of the attention, particularly when comparing overseas locations, even though labor is largely on par with competing technology regions in the US (even if it is much higher than locations without ICT concentrations), and the gap between Silicon Valley and foreign locations continues to close as wages steadily rise in those markets. State and local taxes are also a favorite target. Interview feedback also suggests that real estate costs/ground rent is one of the largest cost drivers in the Valley.

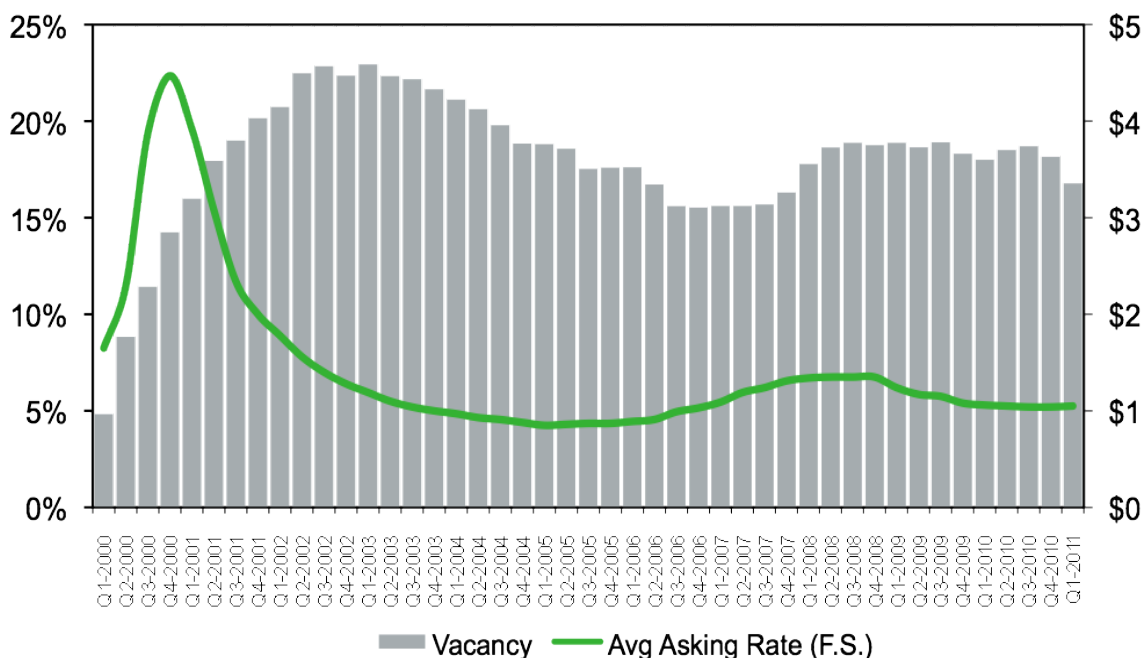
While it is widely accepted that available developable land is limited, we are seeing some developing trends in the Valley. With almost no new construction in the Valley since 2008 and the high price of construction and time to deliver these options to market, companies have relied on moving into existing space. Companies need to acquire and occupy new space quickly in order to keep pace with the rapid evolution of the sector, so existing facilities requiring fewer modifications are far more desirable and cost effective.

While demand for “quality” properties has been significant in 2011, rents have actually not increased significantly since the end of the recession as these charts from Bay Area real estate firm Cassidy Turley indicate:

**Figure H-1: Average Office Asking Rate and Vacancy**



**Figure H-2: Average R&D Rate and Vacancy**



The other trend that has emerged due to the high cost of construction and limited available land is a departure from the traditional spread-out corporate campus that the Valley had once featured. Expansion of existing facilities is now more “vertical” with more square footage on the same footprint, rather than “out.” Companies now use space far more densely than before, maximizing headcount in smaller facilities.

The recent mergers and acquisitions activity has caused many companies to grow to a certain level and rather than go public are acquired and consolidated by larger players (such as Oracle, Google, Cisco, Apple and Hewlett-Packard) that have campuses to fill. If not for this trend, the supply/demand, and thus the rates, might be even worse.

Multi-tenant facilities that housed smaller firms and start-ups, the 1,000 to 10,000 square feet market, have struggled through the recession and the decline in VC activity and early stage funding. But with investor activity picking up and more new companies emerging, we can expect that market to begin to tighten as well. Other avenues of funding such as angel investors and successful entrepreneurs are another source that will support this growth of smaller companies in need of space.

# Appendix I: Occupation-Specific Technical Skills

---

Even with the emphasis on flexibility and entrepreneurship, technical skills remain critically important and still rate as employers' top requirement. Researchers asked Silicon Valley employers what occupation-specific skills they look for when hiring candidates in the four in-demand occupations identified by the study.

## ***Software Engineers:***

For software engineer applicants, firms are looking for the key technologies used by the firm. Some of the valued computer programming languages include C++, Java, PHP, Visual Basic, and Web programming languages. Education is not a primary determinant in the hiring process, but most applicants are expected to have at least a bachelor's degree; a master's degree is sometimes expected.

## ***Project Managers:***

When assessing project managers, firms like to see client-facing experience and previous experience managing large projects, especially in the same industry. Firms like to see candidates who have had past technical roles and who demonstrate a deep understanding of the industry they will be working in. A bachelor's degree is necessary for consideration by many employers, while a few prefer a master's degree. A Project Management Certification would benefit most applicants in this field.

## ***Quality Assurance Engineers:***

Employers evaluating quality assurance engineers (also known as systems engineers, software QAs, QA specialists, etc.) want to know the types of products applicants have worked with, understand their level of familiarity with various hardware, and expect to see a detailed work history. Higher-level positions may require knowledge of C++, Unix, Linux, Shell, SQL, and various Web applications, and a technical certificate as a Microsoft Certified Systems Engineer (MCSE) may be preferred. Education requirements vary depending on the specific role, from an associate's or technical degree to a master's degree in Computer Science.

## ***Field Applications Engineers***

Firms hiring field applications engineers (FAE) are generally looking for previous FAE job experience combined with relevant technical skills and good communication skills. A bachelor's degree will likely suffice for most employers, but some will prefer that candidates have a master's degree.



# Appendix J: Survey Methodology

A quantitative telephone survey of 251 respondents in the technology industry (firms classifying themselves as in the technology industry or providing technology related products or services) was conducted as part of this project. The table below provides a brief overview of the survey methodology.

Table J-1: Overview of Project Methodology	
<b>Method</b>	Telephone and web survey of technology firms in southern Alameda (south of San Leandro), San Francisco, San Mateo, Santa Clara, and Santa Cruz Counties
<b>Number of Respondents</b>	251 total survey respondents (201 completed a telephone survey and 50 completed a web survey)
<b>Field Dates for Survey</b>	April 13 – May 13, 2011
<b>Survey Universe</b>	4,617 firm locations in southern Alameda (south of San Leandro), San Francisco, San Mateo, Santa Clara, and Santa Cruz Counties with two or more employees
<b>Margin of Error</b>	The maximum margin of error for questions answered by all 251 respondents is +/-6.02% at the 95% level of confidence

## Survey Design

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

Screening questions were utilized to ensure that firms were located within one of the five counties of interest for the study and that they classified themselves within the technology industry or providing technology related products or services.

## Sampling Method

Technology firms were organized into one of three sectors: hardware and software, Internet, and networking and telecommunications, as defined by the NAICS codes below.

### Hardware and Software

323115	Digital Printing
334111	Electronic Computer Manufacturing
334112	Computer Storage Device Manufacturing
334113	Computer Terminal Manufacturing
334119	Other Computer Peripheral Equip Manufacturing
334210	Telephone Apparatus Manufacturing
334220	Broadcast & Wireless Communications Equip
334290	Other Communications Equip Manufacturing
334611	Software Reproducing
423430	Computer & Software Merchant Wholesalers
443120	Computer & Software Stores
511210	Software Publishers

### Internet

335921	Fiber Optic Cable Manufacturing
425110	Business to Business Electronic Markets
454111	Electronic Shopping
518210	Data Processing & Related Services

### Networking and Telecommunications

517110	Wired Telecommunications Carriers
517210	Wireless Telecomm Carriers (Except Satellite)
541511	Custom Computer Programming Services
541512	Computer Systems Design Services
541513	Computer Facilities Management Services
541519	Other Computer Related Services
611420	Computer Training
811212	Computer & Office Machine Repair
811213	Communication Equip Repair

A database of all known firms matching the study parameters was purchased from InfoUSA and represents the universe for the study (5,463 firm locations with two or more employees). Of the 5,463 firm locations in the database, 15.4% indicated that they were not located in one of the five counties or did not identify as part of the technology industry or providing technology related products or services or had a phone that was disconnected, for a revised universe estimate of 4,617 firm locations in our survey boundaries.

The sample was stratified into the three sectors described above and larger firms (those with 10 or more employees) were targeted first and contacted twice before contacting any of the smaller firm (those with less than 10 employees) locations.

## Data Collection

Prior to beginning 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. Call-backs were also scheduled at respondents' convenience. The data collection period for the telephone version of the survey was April 13 through May 13, 2011.

The web version of the survey was distributed to an email list developed from InfoUSA records and technology industry associations. The data collection period for the web version of the survey was April 30 through May 12, 2011.

During data processing, the data were checked to ensure that no individual firm location completed the survey more than once (for example by phone and web).

## 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 +/- 6.02% and +/- 3.61% (depending on the distribution of each question) for questions answered by all 251 respondents.

It is important to note that questions asked of smaller sub-groups (such as questions only asked of firms with locations outside of Silicon Valley) or analysis of sub-groups (such as differences by technology group) will have a margin of error greater than +/-6.02%, with the exact margin of error dependent on the number of respondents within each sub-group as well as the distribution of responses.

# Appendix K: Employer Survey

---

**Silicon Valley WIBs  
Employers (n=251)  
June 2011  
Toplines**

## **Silicon Valley ICT Employer Survey**

---

### **Introduction:**

Hello, my name is \_\_\_\_\_. May I please speak to someone involved with planning or staffing at [organization]?

[IF NEITHER A PLANNER OR SOMEONE WITH STAFFING IS AVAILABLE] Can I speak to a decision maker at your location?

Hello, my name is \_\_\_\_\_ and I'm calling on behalf of the four workforce investment boards in Silicon Valley, who would value your participation in a brief survey about the region's workforce.

**(If needed):** The survey should take approximately ten minutes of your time. By answering this survey, you can help the regional workforce investment system develop the appropriate type of training that will prepare the employees you will be looking for in the future.

**(If needed):** This survey has been commissioned by Silicon Valley's workforce investment boards, which are committed to developing the regional workforce. The survey is being conducted by BW Research, an independent research organization.

**(If needed):** Your individual responses will not be published; only aggregate information will be used in the reporting of the survey results.

---

### **PLEASE NOTE TRADITIONAL ROUNDING RULES APPLIED**

#### **NOT ALL PERCENTAGES WILL EQUAL EXACTLY 100%**

I'd like to begin by asking you a few general questions about your firm's current location.

- A. In what county are you located?
- |     |                                  |
|-----|----------------------------------|
| 55% | Santa Clara                      |
| 16% | San Mateo                        |
| 14% | Alameda                          |
| 8%  | San Francisco                    |
| 8%  | Santa Cruz                       |
| 0%  | Other [Terminate]                |
| 0%  | (DON'T READ) Refused [Terminate] |

[FOR WEB AND NON-CLASSIFIED EMPLOYERS]

B. Is your firm classified as a technology industry or does it provide technology related products or services?

- 100% Yes (continue)
- 0% No [TERMINATE]
- 0% (DON'T READ) Refused [TERMINATE]

C. Does your firm have more than one location?

- 38% Yes
- 62% No
- 0% (DON'T READ) Refused [Terminate]

## **SECTION 1 – General Employment Assessment**

Next, I would like to ask some general questions about your permanent employees [IF SC=1 that work from your current location and not those that are at your corporate headquarters or other locations]. [IF NEEDED] This does not include temporary employees.

0. Including all full-time and part-time employees, how many permanent employees work at your location?

Total permanent employees	Mean	More Conservative Mean <sup>21</sup>	Median
32,346	130.96	35.99	8.00

[IF UNABLE TO PROVIDE NUMBER OFFER INTERVALS]

- 32% Less than 5 employees
- 26% Between 5 and 10 employees
- 14% Between 11 and 24 employees
- 18% Between 25 and 99 employees
- 10% 100 or more employees
- 2% DK/NA

1. If you currently have [TAKE Q1 #] full-time and part-time permanent employees at your location, how many more or less employees do you expect to have at your location 12 months from now?

- 60% More
- 5% Less
- 33% Same number
- 2% DK/NA

[If amount differs by 10% or more in either direction, ask: ]

Just to confirm, you currently have \_\_\_\_ employees and you expect to have \_\_\_\_ (more/less) employees, for a total of \_\_\_\_ employees 12 months from now.

<sup>21</sup> With outliers removed (4 firms) – one firm reporting 17,000 employees, one firm reporting 3,000 employees, one firm reporting 2,100 employees and one firm reporting 1,500 employees

## Expected Employment in 12 months

(Calculated by only examining employers with both current and projected data)

	Current	12 months
n	243	243
Mean	132.86	181.88
Median	8.00	10.00
Total Employees	32,284	44,196
<b>New Employees</b>		<b>11,912</b>
<b>% Growth</b>		<b>36.9%</b>

## Conservative Statistics – Expected Employment in 12 months

(Three firms removed – one reporting 4,000% growth, one reporting 300% growth, and one reporting 35% growth)

	Current	12 months
n	240	240
Mean	62.85	69.57
Median	8.00	10.00
Total Employees	15,084	16,696
<b>New Employees</b>		<b>1,612</b>
<b>% Growth</b>		<b>10.7%</b>

Let me ask the same question again, but instead of 12 months out, please think about 24 months from now.

2. If you currently have [TAKE Q1 #] full-time and part-time permanent employees at your location, how many more or less permanent employees do you expect to have at your location 24 months from now?
- 57% More
  - 10% Less
  - 30% Same number
  - 4% DK/NA

## Expected Employment in 24 months

(Calculated by only examining employers with both current and projected data)

	Current	24 months
n	239	239
Mean	134.42	187.50
Median	8.00	11.00
Total Employees	2,126	44,813
<b>New Employees</b>		<b>12,687</b>
<b>% Growth</b>		<b>39.5%</b>

### Conservative Statistics – Expected Employment in 24 months

*(Three firms removed – one reporting 250% growth, one reporting 59% growth, and one reporting 38% growth)*

	Current	24 months
n	236	236
Mean	59.91	68.82
Median	8.00	10.00
Total Employees	14,138	16,242
<b>New Employees</b>		<b>2,104</b>
<b>% Growth</b>		<b>14.9%</b>

[If amount differs by 10% or more in either direction, ask: ]

Just to confirm, you currently have \_\_\_\_ employees and you expect to have \_\_\_\_ (more/less) employees, for a total of \_\_\_\_ employees 24 months from now.

Next, I would like to ask about just those workers at your current location that are not permanent workers, they are either temporary, contract and working on a project-by-project basis, or for a certain period of time.

3. Does your firm hire non-permanent workers, either on a temporary or contract basis that can work on a project-by-project basis, and if yes how many do you currently employ at your location?

58% Yes  
 15% No, never hire non-permanent workers  
 26% No, currently do not have non-permanent workers  
 2% DK/NA

Total contract/ temporary employees	Mean	More Conservative Mean <sup>22</sup>	Median
8,620	40.85	8.58	2.00

[IF UNABLE TO PROVIDE NUMBER OFFER INTERVALS]

31% 0 contract/ temporary employees  
 32% Between 1 and 4 contract/ temporary employees  
 10% Between 5 and 10 contract/ temporary employees  
 3% Between 11 and 24 contract/ temporary employees  
 4% Between 25 and 99 contract/ temporary employees  
 20% 100 or more contract/ temporary employees

<sup>22</sup> With outliers removed – one firm reporting 4,444 contract/ temporary employees, one firm reporting 999 contract/ temporary employees, firm reporting 900 contract/ temporary employees, and one firm reporting 500 contract/ temporary employees.



4. If you currently have [TAKE Q4 #] \_\_\_\_\_ **temporary and/or contract** workers at your location, how many more or less **temporary and/or contract** workers do you expect to have at your location 12 months from now?

25% More  
 4% Less  
 58% Same number  
 13% DK/NA

#### Expected Contract/ Temporary Employment in 12 months

*(Calculated by only examining employers with both current and projected data)*

	Current	12 months
n	189	189
Mean	45.07	53.88
Median	2.00	2.00
Total Employees	8,519	10,183
<b>New Employees</b>		<b>1,664</b>
<b>% Growth</b>		<b>19.5%</b>

#### Conservative Statistics – Expected Contract/ Temporary Employment in 12 months

*(Two firms removed – one reporting 150% growth and one reporting 25% growth)*

	Current	12 months
n	187	187
Mean	20.72	22.07
Median	2.00	2.00
Total Employees	3,875	4,128
<b>New Employees</b>		<b>253</b>
<b>% Growth</b>		<b>6.5%</b>

[If amount differs by 10% or more in either direction, ask: ]

Just to confirm, you currently have \_\_\_\_\_ non-permanent workers and you expect to have \_\_\_\_\_ (more/less) non-permanent workers, for a total of \_\_\_\_\_ non-permanent workers 12 months from now.

5. What level of difficulty does your firm have finding and hiring qualified non-permanent workers [IF NEEDED] this includes temporary and contract workers, great difficulty, some difficulty, or no difficulty?
- 10% Great difficulty  
 29% Some difficulty  
 53% No difficulty  
 8% DK/NA

## **SECTION 2 – Industry, Technology and Work profile**

Now I would like to ask about the industry and technologies that are most important to your firm.

6. What industry or industries best describe the work your firm is most connected to? (DO NOT READ, ALLOW MORE THAN ONE RESPONSE)

25%	Technology or Information technology
25%	Software
21%	Professional and technical services
11%	Communications, including mobile devices
9%	Hardware
8%	Sales/ retail
7%	Internet
7%	Manufacturing
6%	Networking
5%	Semiconductors
5%	Information Technology or technology support services
4%	Cloud computing
3%	Advanced Manufacturing
3%	Mobile Devices
2%	Utility or energy
2%	Internet
1%	Non-profit organization
1%	Wireless technology
8%	Other
2%	DK/NA

7. Which of the following technologies, software, hardware, Internet, networking or telecommunications are most important to your firm. (ACCEPT FIRST RESPONSE)

[REPEAT CATEGORIES AS NEEDED]

29%	Software
16%	Hardware
13%	Internet
7%	Networking
7%	Telecommunications
22%	A combination
3%	Other
4%	DK/NA

Next, I would like to ask about the role of technology at [FIRM NAME].

8. Please identify the emerging or new technologies that are most important to your firm. (DO NOT READ, ALLOW MORE THAN ONE RESPONSE)

25%	Mobile technologies
23%	Software and related
15%	Applications development
12%	Cloud computing
12%	Internet and Web based technologies
9%	Chip design/ hardware
4%	Networking
3%	Telecommunications and Wireless
3%	Multimedia
1%	Green
14%	Other
14%	DK/NA

9. Next, I would like to ask if your firm is primarily focused on serving other businesses, a b2b focus, primarily focused on serving consumers directly or a combination of both b2b and consumers?

55%	Primarily businesses or B2B
10%	Primarily consumers directly
33%	A combination of both businesses and consumers
3%	DK/NA

**[IF SC=1 ASK Q11 OTHERWISE SKIP TO Q13]**

Now I would like to ask about the type of work that is done at your location and any other locations in Silicon Valley?

10. Does your firm have locations outside of Silicon Valley?

(n=96)

82%	Yes
15%	No
3%	DK/NA

**[IF Q11=1 ASK Q12 OTHERWISE SKIP TO Q13]**

11. Please tell me if the following types of work are done by your firm in Silicon Valley..

Here's the (first/next) one \_\_\_\_\_ (READ ITEM): Is this type of work done at your location?

(n=79)

**RANDOMIZE**

		Yes Typically	Sometimes Not typically	Not Done	READ DK/NA
A.	Strategic planning	65%	6%	28%	1%
B.	Research and evaluation	44%	19%	33%	4%
C.	Product design and development	42%	10%	46%	3%
D.	Product testing and quality control	38%	13%	47%	3%
E.	Initial product development and manufacturing	32%	6%	58%	4%
F.	Marketing and promotion	65%	13%	22%	1%
G.	Customer service	75%	9%	15%	1%
H.	Project management	63%	11%	24%	1%
I.	Sales	76%	11%	11%	1%

12. From a technology perspective, which of the following descriptions comes closest to describing your firm?

- 4% A new firm either researching or still developing a product or service
- 5% A firm that is starting to produce new products or services
- 47% A firm that has an established ability to produce certain products or services
- 38% A combination of some or all of these
- 6% DK/NA

Now I want to ask about hiring preferences at your firm.

13. When a non entry-level position becomes available in your firm, do you more often promote from within, hire from outside the company, or is it an even split between the two?

- 15% Promote from within
- 47% Even split (50-50 promote & outside)
- 33% Recruit from outside
- 6% DK/NA

## **SECTION 3 – Occupational Assessment**

### **Occupation-Related Questions**

**[NOTE - PLEASE COMMUNICATE TO RESPONDENT THAT WE WILL BE USING GENERAL OCCUPATIONAL TITLES RATHER THAN SPECIFIC JOB TITLES THAT MAY BE USED WITHIN EACH ORGANIZATION]**

14. Now, I'm going to ask you about specific occupations within your organization related to your business. The occupational titles we are using may differ from the specific position titles used in your organization. For these questions, I would like you to try to equate your organization's specific position titles with the more general ones we will use here.

Please only assign one occupation to each employee. If they fall into more than one category, please assign them to the occupation in which they devote more of their time.

Please tell me if your organization employs, at (any of your locations/your location), individuals in positions matching the following general occupational titles:

Here's the (first/next) one: \_\_\_\_\_ (READ ITEM, THEN ASK): Do you have employees who fit this occupational description at your current business location?  
(1 = Yes, 2 = No, 3 =DK/NA)

Occupational List (Read brief definition of occupation only if needed by respondent)

### **RANDOMIZE**

#### **Occupations**

- Occupation 1: Software Engineers
- Occupation 2: Field Applications Engineers or FAEs
- Occupation 3: Quality Assurance Testers or Engineers
- Occupation 4: Project Managers
- Occupation 5: Web Developers
- Occupation 6: Graphic Designer
- Occupation 7: User-Interface Designer
- Occupation 8: Hardware Engineer

(SELECT UP TO 3 OF THE OCCUPATIONS THAT THE RESPONDENT INDICATED ARE REPRESENTED AT THEIR LOCATION(S) IN Q18 – TO BE ASKED THE FOLLOWING OCCUPATIONAL QUESTIONS)

[NOTE: FOR DATA COLLECTION, EACH OCCUPATION SHOULD HAVE ITS OWN NUMBER AND THAT NEEDS TO BE USED FOR ENTIRE DATA COLLECTION – FOR EXAMPLE, OCCUPATION 6 SHOULD ALWAYS BE OCCUPATION 6 – RESPONSES TO Q19 FOR OCCUPATION 6 SHOULD BE FOUND UNDER Q19.6]

		Yes	No	DK/NA
1.	Software Engineers	48%	49%	3%
2.	Field Applications Engineers or FAEs	25%	68%	7%
3.	Quality Assurance Testers or Engineers	43%	53%	4%
4.	Project Managers	59%	37%	4%
5.	Web Developers	37%	60%	3%
6.	Graphic Designer	22%	75%	4%
7.	User-Interface Designer	33%	63%	4%
8.	Hardware Engineer	32%	64%	4%

Next I'm going to ask you a few questions about some of the occupations you mentioned, including \_\_\_\_\_ (READ LIST OF OCCUPATIONS TO BE USED)

15. As I read each of the following occupations, please tell me how many individuals you have at (IF SC=1 your current location) that are currently employed either full-time or part-time in this occupation.

	Software engineers	Field applications engineers or FAEs	Quality assurance tester or engineers	Project managers
n	89	55	93	80
Mean	42.57	18.42	14.86	9.38
Conservative Mean	17.69 <sup>23</sup>	9.50 <sup>24</sup>	8.59 <sup>25</sup>	2.78 <sup>26</sup>
Median	3.00	2.00	2.00	1.00
Total Employees	3,789	1,013	1,382	750
***OCCUPATIONAL DATA BELOW IS FROM A SMALL SAMPLE SIZE – CAUTION GENERALIZING RESULTS***				

	Web developers	Graphic designers	User interface designers	Hardware engineers
n	5	8	10	15
Mean	1.00	1.13	1.10	3.53
Conservative Mean	--	--	--	--
Median	1.00	1.00	1.00	1.00
Total Employees	5	9	11	53

23 Two firms removed – one reporting 1,200 employees and one reporting 1,050 employees as software engineers

24 One firm removed reporting 500 employees as FAEs

25 Two firms removed – both reporting 300 employees as quality assurance testers or engineers

26 Two firms removed – one reporting 333 employees and one reporting 200 employees as project managers

(IF NEEDED: Please exclude temporary, seasonal, and independent workers from these counts.)

[CREATE INTERNAL CONTROL SO THAT THE COMBINED OCCUPATIONAL EMPLOYMENT IS NOT MORE THAN OVERALL EMPLOYMENT Q1]

16. As I read each of the occupations again, please tell me how many more or less employees you estimate will be employed in each of the occupations 12 months from now.

[Use the following format for each one:]

If you currently have [TAKE Q19 #] [INSERT OCCUPATION TITLE] \_\_\_\_\_ (across all your business locations/ at your current business location), how many more or less [INSERT OCCUPATION TITLE] do you expect to have at your (locations/location) 12 months from now?

(IF NEEDED: Please exclude temporary, seasonal, and independent workers from these counts.)

		More	Less	Same	DK/NA
1.	Software Engineers (n=96)	44%	1%	45%	10%
2.	Field Applications Engineers or FAEs (n=61)	41%	2%	52%	5%
3.	Quality Assurance Testers or Engineers (n=105)	32%	2%	57%	9%
4.	Project Managers (n=84)	29%	2%	60%	10%

\*\*\*OCCUPATIONAL DATA BELOW IS FROM A SMALL SAMPLE SIZE – CAUTION GENERALIZING RESULTS\*\*\*

5.	Web Developers (n=5)	0%	0%	100%	0%
6.	Graphic Designers (n=8)	38%	0%	63%	0%
7.	User-Interface Designers (n=11)	36%	0%	64%	0%
8.	Hardware Engineers (n=16)	31%	0%	63%	6%



## Expected Employment in 12 months:

(Calculated by only examining firms with both current and projected data)

	Software engineers		Field applications engineers or FAEs		Quality assurance testers or engineers		Project managers	
	Current	12 months	Current	12 months	Current	12 months	Current	12 months
n	81	81	54	54	90	90	74	74
Mean	46.31	115.33	18.57	22.35	15.26	50.47	9.92	10.99
Median	3.00	4.00	2.00	2.50	2.00	3.00	1.00	2
Total Employees	3,751	9,342	1,003	1,207	1,373	4,542	734	813
<b>New Employees</b>		<b>5,591</b>		<b>204</b>		<b>3,169</b>		<b>79</b>
<b>% Growth</b>		<b>149.1%</b>		<b>20.3%</b>		<b>230.8%</b>		<b>10.8%</b>
***OCCUPATIONAL DATA BELOW IS FROM A SMALL SAMPLE SIZE – CAUTION GENERALIZING RESULTS***								
	Web developers		Graphic designers		User interface designers		Hardware engineers	
	Current	12 months	Current	12 months	Current	12 months	Current	12 months
n	5	5	8	8	10	10	15	15
Mean	1.00	1.00	1.13	1.63	1.10	1.40	3.53	4.13
Median	1.00	1.00	1.00	1.50	1.00	1.00	1.00	3.00
Total Employees	5	5	9	13	11	14	53	62
<b>New Employees</b>		<b>0</b>		<b>4</b>		<b>3</b>		<b>9</b>
<b>% Growth</b>		<b>0.0%</b>		<b>44.4%</b>		<b>27.3%</b>		<b>17.0%</b>

**Conservative Statistics -- Expected Employment in 12 months:**  
*(Calculated by only examining firms with both current and projected data)*

	Software engineers		Field applications engineers or FAEs		Quality assurance testers or engineers		Project managers	
	Current	12 months	Current	12 months	Current	12 months	Current	12 months
n	79	79	No outliers		89	89	No outliers	
Mean	34.08	37.76			15.39	17.29		
Median	3.00	4.00			2.00	3.00		
Total Employees	2,692	2,983			1,370	1,539		
<b>New Employees</b>		<b>291</b>				<b>169</b>		
<b>% Growth</b>		<b>10.8%</b>				<b>12.3%</b>		
	Web developers		Graphic designers		User interface designers		Hardware engineers	
	Current	12 months	Current	12 months	Current	12 months	Current	12 months
n	No outliers		No outliers		No outliers		No outliers	
Mean								
Median								
Total Employees								
<b>New Employees</b>								
<b>% Growth</b>								

[CREATE INTERNAL CONTROL SO THAT THE COMBINED OCCUPATIONAL EMPLOYMENT IS NOT MORE THAN EXPECTED 12 MONTH EMPLOYMENT IF Q2ML=MORE Q1+Q2; IF Q2ML=LESS Q1-Q2; IF Q2ML=SAME Q1]

[If amount differs by 10% or more in either direction, ask:]

Just to confirm, you currently have \_\_\_\_ (insert occupation title) and you expect to have \_\_\_\_ (more/less), for a total of \_\_\_\_ (insert occupation title) 12 months from now.

17. For the same list of occupations, I'm interested in the level of difficulty your organization has in finding applicants who meet the organization's hiring standards. As I read each occupation, please tell me whether your organization has no difficulty, some difficulty or great difficulty finding qualified applicants. (PRESENT IN ORDER THEY WERE PREVIOUSLY PRESENTED)

		No difficulty	Some difficulty	Great difficulty	DK/NA
1.	Software Engineers (n=96)	28%	51%	15%	6%
2.	Field Applications Engineers or FAEs (n=61)	33%	44%	20%	3%
3.	Quality Assurance Testers or Engineers (n=105)	42%	43%	8%	8%
4.	Project Managers (n=84)	46%	37%	11%	6%
***OCCUPATIONAL DATA BELOW IS FROM A SMALL SAMPLE SIZE - CAUTION GENERALIZING RESULTS***					
5.	Web Developers (n=5)	60%	20%	20%	0%
6.	Graphic Designers (n=8)	75%	25%	0%	0%
7.	User-Interface Designers (n=11)	36%	55%	9%	0%
8.	Hardware Engineers (n=16)	31%	50%	19%	0%

18. For my next occupation-specific question, I'm going to present you with two applicants with different strengths.

For \_\_\_\_\_ (INSERT OCCUPATION), would you prefer

- Applicant One has a diverse technical background and the demonstrated ability to learn quickly, adapt to new objectives and take on new tasks and responsibilities.
- or
- Applicant Two who has more industry experience and demonstrated skills specific to (OCCUPATION NAME) but does not appear to be as flexible, adaptable and entrepreneurial as applicant One?

[IF NEEDED] assume all other aspects of the applicants are equal.

		Applicant 1 Flexible Learner	Applicant 2 Specific Skills	It depends	DK/NA
1.	Software Engineers (n=96)	58%	26%	10%	5%
2.	Field Applications Engineers or FAEs (n=61)	49%	34%	13%	3%
3.	Quality Assurance Testers or Engineers (n=105)	50%	34%	10%	6%
4.	Project Managers (n=84)	77%	15%	2%	5%
***OCCUPATIONAL DATA BELOW IS FROM A SMALL SAMPLE SIZE - CAUTION GENERALIZING RESULTS***					
5.	Web Developers (n=5)	80%	0%	20%	0%
6.	Graphic Designers (n=8)	63%	38%	0%	0%
7.	User-Interface Designers (n=11)	73%	27%	0%	0%
8.	Hardware Engineers (n=16)	56%	25%	19%	0%

Now I want to ask you about different skills, abilities and knowledge that are most important for the occupations we have been talking about.

19. I'm going to read a list of skills, abilities or areas of knowledge. Please tell me which two of these are most important when considering applicants for \_\_\_\_\_ (INSERT OCCUPATION). (READ OPTIONS)

*\*\*\*Multiple responses were given for this question. Frequencies may equal more than 100%\*\*\**

#### **Software Engineers (n=96)**

- 42% Ability to program using object-oriented languages
- 36% Ability to work effectively in a fast paced and dynamic environment
- 30% Ability to effectively communicate with people of differing technical backgrounds
- 30% Willingness to learn new skills and take on new responsibilities
- 21% Experience developing with embedded software
- 16% DK/NA

#### **Field Applications Engineers or FAEs (n=61)**

- 64% Ability to provide technical support to engineers during product integration
- 53% Ability to work effectively in a fast paced and dynamic environment
- 24% Ability to effectively communicate in writing including technical specifications and product documentation
- 24% Willingness to learn new skills and take on new responsibilities
- 20% Ability to replicate experiences in a lab environment
- 4% DK/NA

#### **Quality Assurance Testers or Engineers (n=105)**

- 48% Ability to define, develop and write test plans and cases
- 36% Willingness to learn new skills and take on new responsibilities
- 35% Ability to work effectively in a fast paced and dynamic environment
- 33% Working knowledge of programming languages like C++ and/or Java
- 22% Ability to effectively communicate in writing
- 10% DK/NA

#### **Project Managers (n=84)**

- 58% Ability to effectively communicate with people of differing technical backgrounds
- 43% Ability to work effectively in a fast paced and dynamic environment
- 40% Ability to multitask and use different communication tools effectively
- 25% Knowledge of product design and evaluation process
- 23% Willingness to learn new skills and take on new responsibilities
- 4% DK/NA

*\*\*\*OCCUPATIONAL DATA BELOW IS FROM A SMALL SAMPLE SIZE – CAUTION GENERALIZING RESULTS\*\*\**

**Web Developers (n=5)**

60%	Willingness to learn new skills and take on new responsibilities
40%	Ability to program in XML, Java and other related online programming languages
40%	Experience with front-end development and graphic user interfaces
40%	Ability to work effectively in a fast paced and dynamic environment
20%	DK/NA

**Graphic Designers (n=8)**

63%	Ability to create and design art to be used in marketing and creative materials
63%	Experience working with different graphics software like Photoshop and Illustrator
38%	Ability to work effectively in a fast paced and dynamic environment
25%	Willingness to learn new skills and take on new responsibilities

**User-Interface Designers (n=11)**

55%	Experience with front-end development
55%	Ability to effectively evaluate and improve usability
36%	Willingness to learn new skills and take on new responsibilities
18%	Ability to effectively communicate in writing
18%	Ability to work effectively in a fast paced and dynamic environment
9%	DK/NA

**Hardware Engineers (n=16)**

50%	Willingness to learn new skills and take on new responsibilities
38%	Ability to work effectively in a fast paced and dynamic environment
31%	Ability to test and verify hardware and support peripherals to ensure they meet specifications
31%	Ability to effectively communicate with people of differing technical backgrounds
19%	Working knowledge of programming languages like C/C++ and/or Visual Basic
13%	DK/NA

[REPEAT QUESTIONS Q21 FOR EACH OCCUPATION]

20. Are there any other skills, areas of knowledge or abilities that are critically important for applicants for [OCCUPATION NAME] that we did not already talk about? [ REPEAT FOR EACH RELEVANT OCCUPATION]

## **SECTION 4 – Local WIB Awareness and Interest Profile**

21. Finally, have you heard of any of the local Workforce Investment Boards or WIBs? These agencies would include NOVA, work2future, Alameda County WIB, San Mateo County WIB and/or Santa Cruz County WIB.

(n=251)

23%	Yes
69%	No
8%	DK/NA

[IF Q22=2 OR 3 SKIP TO Q25]

22. Have you had any experience evaluating job seekers from any of these local workforce investment boards?

(n=58)

21%	Yes
72%	No
7%	DK/NA

[IF Q23=2 OR 3 SKIP TO Q25]

23. Have you hired any job seekers from a local workforce investment board?

(n=12)

58%	Yes
33%	No
8%	Not sure

Local workforce investment boards are nonprofit, federally funded employment and training agencies that provides customer-focused workforce development services.

24. Next I would like to know your organization's level of interest for the following services that could be developed and run by a local workforce investment board.

What level of interest would you have in contracting with a local workforce investment board to identify and screen job candidates, for either permanent or temporary positions, if it were less expensive than services available through private for-profit agencies?

(n=251)

13%	Great interest
27%	Some interest
47%	No interest
13%	DK/NA

Before we finish, I'd like to ask you a general question and verify your contact information.

25. Are you interested in receiving information from the NOVA Workforce Investment Board (IF NEEDED: The local workforce investment board in North Santa Clara County) including the findings of this research and how to stay engaged with the regional technology research?

41% Yes  
51% No  
9% DK/NA

[IF Q26=1 ASK]

Can we confirm your contact information and get your email address so NOVA send you information?

Thank you for completing the survey. Since it sometimes becomes necessary for the project manager to call back and confirm responses to certain questions, I would like to verify your contact information.

First and Last Name of Respondent \_\_\_\_\_  
Position of Respondent \_\_\_\_\_  
Phone of Respondent \_\_\_\_\_  
Email of Respondent \_\_\_\_\_  
Name of Company \_\_\_\_\_  
Company Address (including City) \_\_\_\_\_

Those are all the questions I have.  
Thank you very much for your time.

Date of Interview \_\_\_\_\_  
Time of Interview \_\_\_\_\_  
Name of Interviewer \_\_\_\_\_  
County \_\_\_\_\_

Survey Type:

80% Phone  
20% Web