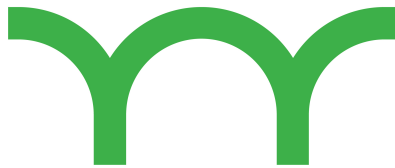# Next Economy: Workforce Development Recommendations for the Information & Communications Technology (ICT) Industry Cluster

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VALLEY VISION

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Contents

Introduction

Since 1994, Valley Vision (www.valleyvision.org) has strengthened communities through research, collaboration and leadership. We are a nonprofit consultancy focused on economic, environmental and social issues. Our vision is a prosperous and sustainable region for all generations. Valley Vision is one of the lead organizations for Next Economy, an initiative designed to accelerate job creation and new investment across key business areas in the region, strengthen our economic base and sharpen our competitive edge in the global marketplace. Next Economy lays out 5 goals: (1) foster a strong innovation environment; (2) grow international trade and export activity; (3) diversify our economy through growth and support of core business clusters; (4) grow and maintain a world-class talent base; and (5) improve the regional business climate for economic growth.

As a foundational Next Economy implementation activity, Valley Vision interviewed company leaders in the region's core business clusters[1] to gather information about opportunities for growth within the region, how well we are meeting our companies' needs for skilled employees and other areas where our network of partners could lend support. The following report shares information about the Information & Communications Technology cluster assessment and key findings from interviews with company leaders.

Sponsors and Staffing

The Sacramento Employment and Training Agency/Sacramento Works funded the Next Economy core business cluster workforce assessment project. The Center for Strategic Economic Research, SARTA and the Sacramento Area STEM Alliance provided invaluable strategic guidance during the initial planning phase. Valley Vision staff members Kristine Mazzei,

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[1] The core business clusters include Advanced Manufacturing, Agriculture and Food, Clean Energy Technology, Information & Communications Technology, Life Sciences and Health Services. Education & Knowledge Creation was not included in this assessment.

Suzanne Mayes and Jodi Mulligan planned and facilitated the cluster outreach strategy, and oversaw overall project management.

ICT Cluster Assessment Goals and Process

As one of Next Economy's lead organizations, Valley Vision is committed to ensuring that implementation activities for each of the core business clusters are aligned with regional needs. For each core business cluster, Valley Vision engaged industry leaders and key stakeholders to assess:

- Trends, challenges, and anticipated workforce needs
- Foundational skills needed for key occupations and those that can be layered or gained through retraining
- Where successful candidates are coming from: local talent vs. outside of the area
- Gaps and opportunities related to workforce development
- Other activities that could stimulate the business climate and encourage company growth

Selecting Target Companies
To ensure broad representation, Valley Vision collected company lists from the Sacramento Area Regional Technology Alliance (SARTA), the Center for Strategic Economic Research (CSER) and other resources to select a mix of companies that represent the overall cluster. Data gathered through the Next Economy cluster diagnosis and expert guidance from SARTA helped identify areas of the cluster that account for large numbers of employees and those that represent current and emerging growth opportunities. The target list also included members of the Sacramento Area STEM Alliance[2], since these companies demonstrated interest in developing strategies to address recruiting needs within the ICT cluster. The target list was designed to achieve balance between company size, geographic location and specific business activities.

Gathering Company Input
Valley Vision staff conducted one-on-one and group interviews with small, medium and large companies to understand their current and emerging workforce needs. Valley Vision staff also interviewed representatives from placement firms in the region to gather information about key positions they are working to fill in the ICT cluster, and to ensure the list of employer interview questions would elicit an appropriate level of detail. To the extent possible, company interviews included business analysts and product engineers in addition to human resources staff.

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[2] The STEM Alliance was an effort spearheaded by an employee at Vision Service Plan in 2013. Unfortunately the group may no longer be meeting.

ICT Interview Process

Each interview was guided by a general set of questions, which is included below. Valley Vision staff facilitated the conversations to ensure information related to workforce opportunities and challenges that could be used to inform regionally focused strategic planning activities was collected. Interviews lasted approximately 45 minutes and were conducted both in person and over the phone.

ICT Cluster Interview Questions:

1. What are the most common positions you are currently seeking to fill or have filled recently?
    a. What kinds of degrees or certifications are associated with these jobs?

2. What skills sets and knowledge are currently in greatest demand? Do you anticipate this to change in the next 18 months?

3. What balance are employers looking for in terms of education and training, and work experience?
    a. What counts more? For which positions?

4. What skills and/or experience levels are really difficult to find?

5. How ready are the people you hired to do the job? What other training or support did you need to provide?

6. Who or what are you competing with to hire top candidates?
    a. For example: other companies in or out of the region, a larger or smaller company, things related to quality of life (housing, civic amenities)

7. What economic or workforce development related activities would support the expansion of the regional market for your company's products and services?

8. Would you be interested in participating in a working session to help develop an action plan to address the needs we uncover during this process?

Interview Outcomes

The following summary provides an overview of key discussion outcomes, grouped into bulleted lists for each topic area. Feedback gathered during the interviews includes information about recently filled or vacant positions, skills that are currently in demand, emerging workforce needs, and areas where companies are having difficulty finding qualified candidates. Participants also provided feedback about specific actions the region could undertake to increase the region's talent pool for ICT related jobs and forge stronger connections between education and training providers and industry.

The table below provides a summary of vacant positions or those that were filled in the past six months. Information about desired skills and experience was aggregated to provide a summary of desired qualifications for each position. It should be noted that specific requirements will vary at the individual company level.

Position	Desired Skills and Experience
Web Developer	- Knowledge or certification in multiple programming languages or platforms: .NET, Javascript, Python, Node-js, SalesForce, SharePoint, C#, VB.net, ASP, PHP, Ruby on Rails, Ajax - Open source development experience - Client and server side development capabilities - Strong verbal and written communications skills - Prior experience typically required; skills are learned on the job
Software Developer/Engineer	- Knowledge or certification in multiple programming languages or platforms: Java/JEE, C++, C#, .NET, Python, RESTful web services - Multiplatform, co-development and open source experience - Ability to troubleshoot specific code and technology in general, both current and legacy systems support - Strong verbal and written communications skills 5+ years experience required for senior level positions - Bachelor's in Computer Science, Information Technology or Software Engineering
Mobile Application Developers	- Knowledge of multiple programming languages: Java, C, C#, HTML, CSS, others - Multiplatform, co-development and open source experience - Ability to communicate with client to understand specifications and deliver desired product - Few trainings or certifications offered; most knowledge is gained through experience - Significant growth expected for this position
Database Administrators	- SQL Server or Oracle certification - Strong communication skills - Bachelor's degree in Computer Science, Engineering or Information Technology

Position	Desired Skills and Experience
Network Administrators	• Microsoft, CompTIA, or Cisco Certification o Emerging demand for VOIP specialization • Familiarity with a variety of hardware and software • Associate's or Bachelor's degree in Computer Science or Information Technology
Network Security Administrator	• Network security and secure process development experience • CompTIA Security Plus Certification • Associate's or Bachelor's degree in Computer Information Systems (CIS) or related field
Systems Administrators	• Microsoft, CompTIA, or Linux certification • Previous experience with similar systems • Associate's or Bachelor's degree in Computer or Information Technology
Business Systems Analyst	• Technical or business background strongly preferred • Previous experience typically required, some entry level positions at larger companies • Bachelor's degree in Business or Information Management
Customer Service and Tech Support	• Strong communication and customer service skills • Legacy systems and desktop support experience • Associate's degree or appropriate certification (CompTIA A+, Microsoft Certified Desktop Technician)
Project Managers	• High level, senior positions focused on IT or project/product development common • Previous experience directly related to the job is important; few entry level positions • Ability to lead teams and manage client relationships • PMP certification is desired (required for State contracting jobs) • Bachelor's degree required; educational background matters more in health related project management
Business Operations and Customer Relations Management	• Knowledge of SAP, Oracle Suite, SalesForce, Microsoft CRM, Amdocs • General business knowledge and systems analysis skills • Excellent customer service and communication skills • Associate's or Bachelor's in Computer Science or Business o Employers hire from CSU Chico SAP program
Marketing	• Strong technical communication skills • Prior experience in a similar position • Bachelor's in communications, marketing or business
Skilled Manufacturing	• Hands on experience with soldering and Surface Mount Technology assembly • Overall understanding of the manufacturing process • Associate's or Bachelor's degree in Engineering or Manufacturing • Companies hire Cal Poly graduates

- Most of the positions listed above have an Associate's or Bachelor's degree as the foundation, typically in computer science or engineering. However, company leaders also reported that general business knowledge is increasingly important in technology related

positions. Many noted that a business degree with a specialization in information technology or information management is becoming more valuable and several companies seek this educational background over the technology specific degrees. Demand for business and systems analyst skills are also expected to increase.

- The topic of professional skills surfaced in most of the interviews. Company leaders stressed the importance of strong verbal and written communication skills, the ability to work in a team and solid critical and strategic thinking skills. Other desirable qualities include creativity, entrepreneurism and the ability to see a project through to completion with little supervision. Several companies reported that a candidate's fit with the organizational culture is often more important than a specific degree. In smaller organizations, the ability to navigate multiple roles is also necessary.

- Recruiters reported that the State of California currently has open positions for all levels of IT, with demand driven by changes in requirements for managing healthcare and legal data. Both consulting and permanent positions are available and hiring will continue as the state scales its workforce to previous service levels after significant cutbacks.

Emerging Trends

- Demand for mobile application developers, which is emerging as a distinct job, is on the rise and continued growth is expected in parallel with the increased use of smart phones and tablets. This was the emerging need most frequently cited by company leaders and finding qualified candidates is challenging since this is a relatively new field and few formal training programs exist.
    - A related emerging need is "bring your own device" managers with the ability to ensure devices work across platforms and with a variety of apps and software. As companies require employees to use smart phones, tablets and other devices in the workplace the complexity of keeping everything connected and working properly will increase.

- Company leaders consistently mentioned an increasing need to compile, store, manage and process large amounts of data. Three distinct areas related to data management were discussed:
    - "Big data" involves managing data sets that exceed the processing abilities of traditional software tools. New technologies and skills are required to capture, analyze, and process large data sets, and the associated task of data mining involves the ability to extract and process specific information as it is needed. Several companies mentioned using the Apache Hadoop software framework in this context and indicated that demand for experience with similar data storage and distributed computing will increase.
    - Data warehousing, or compiling data from multiple sources and organizing it for use in reporting and forecasting, is a rapidly emerging need for both large and small companies. Several company leaders noted that analytical skills and general business

knowledge are also necessary in this position to extract and configure the data as needed.

  o Cloud computing uses a network of remote servers to store, manage and process data. Data is accessible through the internet from any location, which provides tremendous flexibility for users. Employers indicated that developing and managing cloud-based services and ensuring data security are areas where significant growth can be expected.

- With the increased use of cloud computing and remote data access, employees at all levels will need to be comfortable working virtually with colleagues and clients across the globe. The ability to use document file tools like Dropbox or Jira and virtual meeting tools like WebEX or GoToMeeting. Strong collaboration and teamwork skills will also be increasingly important. Employment opportunities for engineers who can design and maintain virtual workspaces are expected to grow.

- The demand for senior level software developers and engineers who can work on both new and legacy applications or code is expected to increase, and company leaders reported an overall shortage of candidates with these skills.

- In the healthcare sector, Affordable Care Act implementation is expected to drive demand for employees with health care experience and Medicaid Management Information Systems (MMIS) knowledge. Other technology focused healthcare positions related to data and records management could also experience rapid growth in the near term.

- Historically, many ICT jobs have been narrowly focused and highly specialized. Both recruiters and employers interviewed for this study noted a shift in the industry and reported an increased need for employees with proficiency in multiple specialty areas. Specific combinations of skills that are in demand are discussed further in the following section.

Skills And Experience That Are Difficult To Find

- Senior Windows System Administrators and Mobile Application Developers are difficult to find in the Sacramento region and demand for these workers exceeds supply. As a result, companies commonly recruit from the Bay Area and encounter difficulty meeting salary requirements for these candidates.

- Highly technical people with good communication skills and an appropriate level of professionalism are often difficult to find. Company leaders noted a frequent need to provide additional training and support around verbal and written communication, time management, working on a team and leadership. This gap is present at all levels, but it occurs most often with entry to mid level employees.

- Company leaders and recruiters reported challenges finding candidates with a combination of specialized skills and many companies recruit outside of the region to fill positions with these requirements. The following examples of desirable combined skill sets were provided:
  - IT or programming skills and basic business skills, especially analysis and strategic planning
  - System administration and general project management skills
  - Server or system administration and network engineering skills
  - Project management/product development knowledge and IT skills
  - Proficiency in a variety of technologies and programming languages (i.e. .NET, Java, Ajax)
  - Database management (SQL Server or Oracle) and web user interface skills (Java, .NET, Ajax)

- Strong "tech to non-tech" communication skills are increasingly important, especially in the context of leading teams and serving as a liaison between developers and the client. Company leaders reported that this skill set is difficult to find and the training process is very time consuming. Companies mentioned similar challenges when filling technical sales and marketing positions.

- Companies involved in advanced manufacturing noted a shortage of engineers with an overall understanding of the manufacturing process, including product flow, productivity and data management. Hands on experience with computer controlled Surface Mount Technology (SMT) Assembly is a skill set that is difficult to find in the region, and companies recruit from the Bay Area or Cal Poly San Luis Obispo to fill positions that require this skill set.

Hiring and Recruiting Challenges

- Company leaders noted that there are not enough technology and related companies in the region (compared with the Bay Area) to support a robust ICT workforce. If a candidate possesses a unique skill set, there may not be other local job opportunities if the original position does not work out. Highly skilled workers are more likely to be located in the Bay Area where there is a larger pool of tech companies and available jobs.

- Convincing top talent to relocate to Sacramento can be difficult due to lower compensation packages and a perception that the region lacks a culture that supports innovation and entrepreneurship. Company leaders reported that ICT professionals, especially those at the beginning of their careers, gravitate to "cool" places with diverse employment opportunities and amenities typically found in larger cities. Several companies have hired candidates from the Bay Area and outside the region and allowed them to work remotely after unsuccessful attempts to find candidates with the required skill sets who are willing to relocate.

- Local companies in the region with similar needs often compete with one another for qualified candidates. In most cases, salary, benefits and workplace culture are the drivers that motivate a candidate to select one offer over another. Some smaller companies reported challenges filling positions due to an inability to match compensation offered by larger employers.

IT Project Management

The interview protocol also included a specific question about the perceived value of an Associate level IT Project Management program. Some companies reported that they do not anticipate needing to hire for this position. Among the companies that would hire IT Project Managers, the responses fell into two general categories:

- Some company leaders felt this program would be valuable in addressing an existing skills and knowledge gap in the region and increase the pool of well-rounded candidates. The program would be especially useful if it was offered outside of normal business hours and prepared participants for Project Management Professional (PMP) certification, which is required to become a state contractor.
- Others noted that an Associate's degree, even with an IT focus, would not be especially useful since most positions require a higher level of education and experience. Project managers need to understand project scope, budgets, working with clients and leading a team. Strong communication skills are also critically important. These skills are typically developed and refined on the job over time, not in a classroom.

Next Steps: ICT Cluster Workforce Development Recommendations

Valley Vision staff extracted key findings from the cluster interviews with a focus on identifying workforce gaps and opportunities, emerging trends in the ICT business cluster, and activities that could strengthen the region's workforce. Key stakeholders and industry representatives were asked to identify actions that would addresses both current needs in the ICT cluster and those that are expected to emerge over the next one to five years. Recommended actions for the region's ICT business cluster are outlined below.

1. **Ensure training and education programs are aligned with current and emerging workforce needs.**
   a. Explore the feasibility of creating local training or certification program focused on mobile application development.
   b. Review technical curriculum at local community colleges and universities to integrate opportunities for students to gain relevant hands-on experience (i.e. Operation Support Systems technologies and computer controlled SMT Assembly).
   c. Focus on creating training and skill building opportunities in extension or certificate programs instead of making changes to core curriculum, which can be time consuming.

d. Expand the availability of classes and training opportunities that address the soft skills gap (communication, critical thinking, problem solving, professional conduct) and make these skills a requirement for degree completion.

e. Embed preparation for required certification and examinations into curriculum.

2. **Increase awareness of education, certification and skill requirements for ICT related jobs**

a. Increase knowledge of career placement paths for various ICT jobs in the region.

b. Create a comprehensive inventory of training providers who offer certifications and exam preparation and conduct focused outreach to employers, recruiters and educators.

c. Create a targeted campaign encouraging experienced Project Managers to seek PMP certification.

3. **Strengthen connections between industry and education**

a. Explore ways to create more opportunities for internships, mentoring relationships and ways for students to gain experience in a variety of professional settings.

b. Provide more opportunities for business and community leaders to get in the classroom and share real world experience with students.

4. **Attract more ICT professionals to the Sacramento region**

a. Focus on attracting and retaining technology and related companies to provide enough job opportunities to sustain a robust ICT workforce.

b. Develop a targeted campaign articulating the benefits of living and working in Sacramento for graduating students and tech professionals.

c. Promote local assets, like SARTA and Hacker Lab, that would attract creative and entrepreneurial people to the region and seek opportunities to create more groups and events that would appeal to this population.

d. Bring ICT companies together to shoot a video highlighting the region's assets and opportunities for ICT professionals to be used as part of an external marketing campaign

5. **Encourage young professionals to pursue an IT career**

a. Conduct outreach at college and career events promoting the ICT profession and highlighting the variety of well paying jobs available in this business cluster.

b. Consider marketing the ICT profession and associated job opportunities to local students in both high school and college. There is a demand for good people and many of the available positions are filled by people from outside the region.

ICT Cluster Interview Participants

We would like to thank the company leaders who took the time from their busy schedules to participate in this cluster assessment and share their thoughts about the region's ICT workforce needs.

Company	Interview Participant
Avanti	Evelyn Milani, *President & CEO*
Connect Point Search Group	Maria Martinez, *Senior Search Consultant*
Diamond Foods	Ed Hickenbottom, *Vice President, Information Technology*
DST Output	Lino Carnesecca, *Senior Vice President, Systems Development and Support*
Eyefinity	Steve Baker, *President*
Hewlett Packard	Marty Menard, *Vice President, Finance and Administration Information Technology*
Objective Systems Integrators	Carrie Murany, *Human Resources*
Parallax	Ken Gracey, *President*
Providence Technology	Paul Crechriou, *Recruiter*
RagingWire	Doug Adams, *President*
SMUD	Kevin Sherlin, *Director, Business Technology*
Teichert	Susan Mansfield, *Chief Information Officer*
Veterinary Information Network	Paul Pion, *President* Russell McGuinness, *Development Director*
Visionary Integration Professionals	Jeffrey Mullins, *Chief Operating Officer* Jill Peters, *Human Resources Director*
Xerox	Frank Louie, *General Manager, State and Local Government and Higher Education* Jennifer Taggard, *Human Resources Account Manager*