San Mateo County Community College District November 24, 2014

BOARD REPORT NO. 14-11-4C

TO: Members of the Board of Trustees

FROM: Ron Galatolo, Chancellor

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REPORT ON COMPUTER INFORMATION SCIENCE (CIS) BUSINESS NEEDS ASSESSMENT

A Board Goal for 2013-14 included a goal of conducting a comprehensive needs assessment of community needs which included a community needs assessment, a business needs assessment and a student needs assessment. The Board has previously received the results of the Community Needs Assessment, the Student Needs Assessment, and four of the five industry segments examined as part of the Business Needs Assessment (Healthcare, Biotech, Accounting, and Art/ Design/New Media). Tonight the Board will receive the results of the last industry segment studied: Computer Information Science.

The report on this segment was delayed because, unlike the other segments, personal interviews of business owners--rather than focus groups and/or surveys--were needed in order to understand the education/training gaps as they are viewed by business owners. Faculty from all three Colleges conducted the interviews--in person and by phone--during the Summer.

COMPUTER AND INFORMATION SCIENCES EMPLOYER NEEDS ASSESSMENT REPORT

ISSUES

Nearly every business uses a computer. Most US citizens own a personal computer. As the world becomes increasingly connected, opportunities for technological innovation abound. Jobs in Computer and Information Sciences (CIS) will continue to swell as connectivity increases and technology evolves. Tremendous opportunity exists for students who wish to enter the CIS field.

The Computer and Information Sciences sector is projected to have a large number of openings in the region (San Mateo, San Francisco, Santa Clara, Alameda, Marin) through 2017 that cross sectors and occupations. These jobs will exist in most industries, demanding customized skills and knowledge of emerging software and technology. By 2017, the region is expected to have 25,478 computer related jobs with 974 annual openings. Wages in each of these categories range from $30.00-$54.00 per hour. The greatest numbers of openings projected for the following occupations within the sector:

CIS Projected Openings		
Position	*Projected Annual Openings*	*Projected Jobs in 2017*
Computer Software Engineers, applications	234	6,676
Computer Software Engineers, systems software	152	4,745
*Computer Support Specialists	123	2,693
Computer Systems Analysts	163	4,047
Network and Computer Systems Administrators	89	2,193
Network Systems and Data Communication Analysts	136	2,963
*Computer Specialists, All Other	77	2,161
Total	974	25,478

Source: The Economic Modeling Specialists Incorporated (EMSI) database for San Mateo, San Francisco, Santa Clara, Alameda, Marin.

*Computer Support Specialists and Computer Specialists (All Other) positions require the least amount of training and education, typically an Associate Degree or Certificate.

This assessment sought to define the IT labor market demands within San Mateo County.

ASSESSMENT PROCESS

Our effort to understand entry-level Computer and Information Sciences needs in San Mateo County began with labor market data. A work group comprised of faculty and deans from Computer Information Systems at all three Colleges analyzed data and met to discuss how to assess labor market needs.

Interviews with two leading IT recruitment firms were conducted to gather baseline data. The results indicated that small businesses generally have the most flexible hiring criteria. Based on further analysis of small business data, a series of 85 interviews with small business were then conducted across San Mateo County.

COMPUTER INFORMATION SYSTEMS FINDINGS FOR THE COLLEGES

Two firms that recruit computer support positions (temporary and permanent) in San Mateo County were interviewed: Aerotek and Tech Systems. They articulated industry standards and entry-level hiring needs.

- Entry-level requirements for medium to large sized companies:
    - Education: Four-year degrees are usually required. Substantial experience (7-8 years) may sometimes substitute.
    - Certificates desired in addition to a degree: CompTIA A+ certification; Windows 7 Configuration (MCTS); and Enterprise Desktop Support Technician on Windows 7 (MCITP)
    - Internships: Recruiters agree that internships are critical for candidates seeking IT related jobs.

Recruiters indicated that a four-year degree is usually required for entry-level jobs at medium to large sized organizations. They believe that small business hiring criteria is less stringent. Interviews from previous SMCCCD assessments (Accounting and Digital and Media Arts) also indicated that small businesses have more flexible hiring criteria for entry-level positions.

The majority of San Mateo County businesses employ fewer than 249 employees. Based on the large numbers of small businesses in San Mateo County, it was decided that a more intensive exploration of small business computer support needs was necessary:

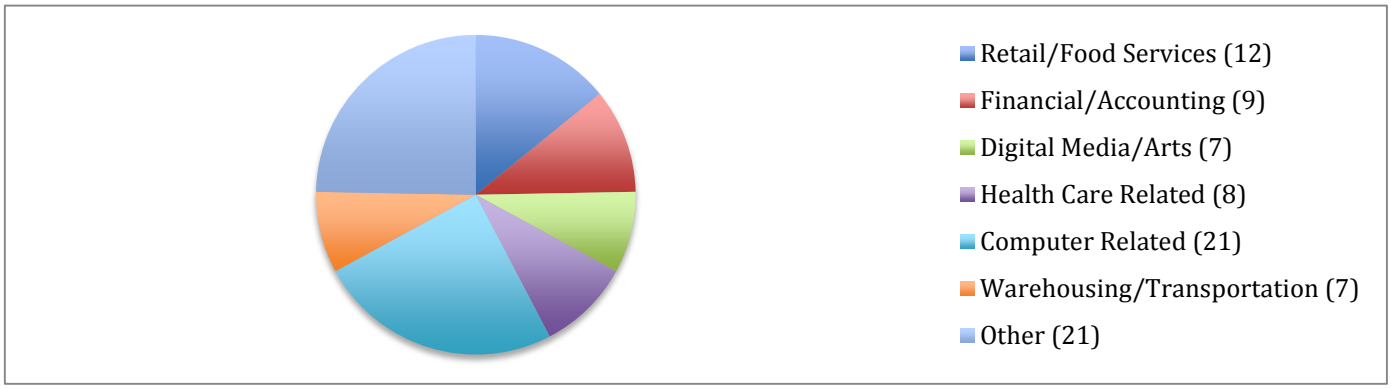
San Mateo County Business by size								
Size Categories	Total	0-19	20-49	50-99	100-249	250-499	500-999	1000+
No. of Businesses	82,689	74,752	4,895	1,729	945	222	89	57
No. of Employees	901,137	250,123	148,074	119,809	141,740	74,229	61,245	105,917

Source: CA EDD, Labor Market Information Division, www.labormarketinfo.edd.ca.gov.

Small business owners typically fulfill multiple roles within their busy organizations. With fewer resources compared to their medium-and-large sized counterparts, they are difficult to reach for interviews and surveys. For this reason, CIS faculty from all three colleges were placed on assignment to conduct the interviews during Summer, 2014.

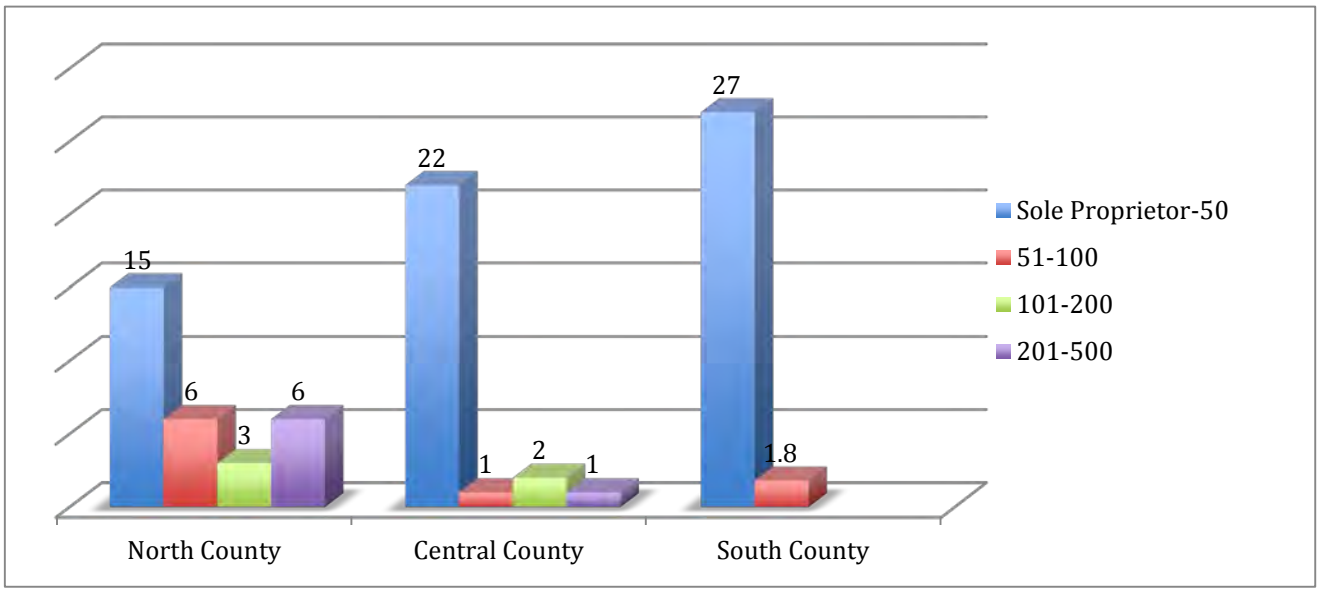
Eighty-five interviews with San Mateo County small businesses were completed during the summer regarding their Information and Technology (IT) needs. The interviews were conducted across the County from a range of sectors:

Interviews Completed by Sector



The majority (75%) of businesses interviewed have under 50 employees. None of the businesses interviewed had more than 500 employees.

Businesses Interviewed by Size and Location

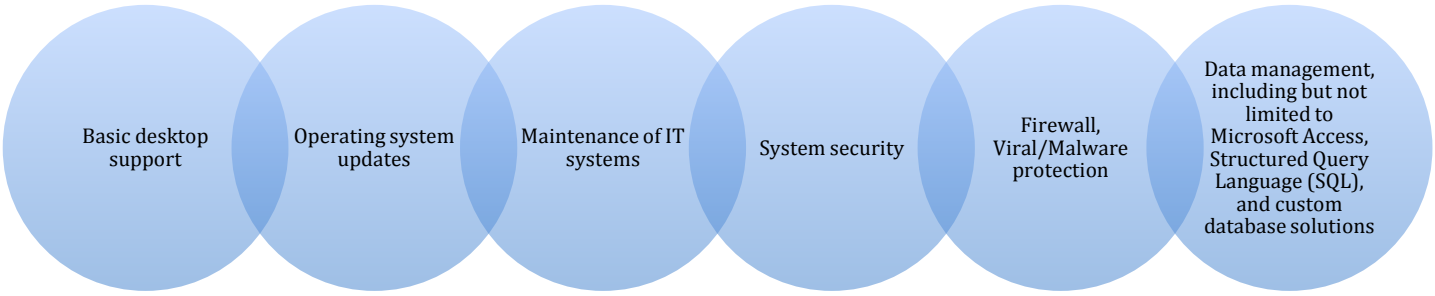


The purpose of the interviews was to:

1. Identify specific entry-level positions.
2. Define entry-level CIS career pathways for SMCCCD students
3. Refine CIS curriculum to maximize students' access to entry-level jobs in San Mateo County small businesses.
4. Find potential internships within small businesses for SMCCCD students.
5. Recruit small business CEO and COOs to serve on Advisory Committees.

Top IT Challenges of Businesses Interviewed

College faculty who conducted the interviews identified the top six IT challenges of local businesses:



System Challenges

Within each of the above-listed IT challenges are issues related to a range of hardware, software, network, support and other issues. Details are outlined for each of these categories:

Hardware	Software	Network	Support	Other
New hardware purchase	Install of new software	Keeping systems running	Systems Maintenance	Security: Virus protection
New hardware installation	Maintenance of software	Problem solving	Windows and desktop support	Security: firewall inclusion of network architecture
Hard drive replacement	Database management	Trouble shooting	Phone system support	Social media marketing
Data back up	Point of Sale (POS) Software support and maintenance	Network connectivity		Website development
Printer malfunctions	Basic windows support	Network design skills		Voice Over Internet Protocol (VoIP Systems)
New hardware replacement	Virus removal	Internet and Intranet		
	Driver issues			
	Applications support			Training of employees resulting from system upgrades
	Applications that require various versions of JAVA			Cloud repository and access
	Software incompatibility			Cabling
	Memory optimization			Phone systems
	Operating system upgrades			Virus removal
	Data synchronization			Mobile Application knowledge
	Integrating mobile and desktop solutions			

Skills Needed to Address IT Challenges

Small businesses identified skill sets that they believe are needed to address their IT related challenges:

- ✓ Career readiness: Candidates applying to work for small businesses in the IT field need interpersonal skills both for the interview and, when hired, for customer relations. A comprehensive, detailed resume is critical to attaining an interview. Small business owners identified a good work ethic as an ongoing issue with new employees. Other skills needed:

- Problem solving skills
- Workplace etiquette
- Ability to work independently
- Project management skills
- IT Skills
- Diverse skill sets with both Macs and PCs
- Desktop support
- System administration
- Database management
- Networking
- Adobe Creative Suite (Adobe CS) Software knowledge
- Printer repair

• Desired Degrees and Certifications

When small businesses hire entry-level IT professionals, degrees/certificates are not the top qualifications, but are one of several considerations. Personal referral and previous experience are also considered.

Small Business Hiring Considerations

- Most small businesses interviewed hire based on experience/competence and references. Personal referrals are a strong contributor to hiring decisions.
- All small businesses interviewed prefer candidates that can demonstrate experience within the IT field.
- Degrees are not required but are important to showcase potential skill sets. Few businesses interviewed require a four-year degree.
- Certificates are desirable. Those mentioned include:
  - Microsoft Certified Solutions Associate (MCSA)
  - Microsoft Certified Solutions Expert (MSCE)
  - Microsoft AX
  - Cisco Certified Network Associate CCNA

• Districtwide Opportunities To Address IT Skills Gaps in Small Businesses

- As personal referrals and experience are important considerations to small businesses that are hiring, internships add credibility to the potential employees' job search. Currently there are not enough internships available for our students.

- Certificates offer an opportunity to highlight specific skills and training. A range of CIS certificates are currently offered through SMCCCD. Certificates need to add obvious value for small business. Certificate and course names will need to translate into non-technical terms that a small business will recognize and value.
- Career readiness is crucial to get a job. Communication skills and accurate resumes are essential. Interpersonal skills are necessary to work with both colleagues and customers.

IMPACT ON DISTRICT PROGRAMS

1. New Certificate in End User Devices: Skyline College is in the process of developing a new certificate to incorporate skills for "Mobile End User Device Support" (Spring 2015). This certificate will address support for phone, tablet, and mobile devices that includes Bluetooth connectivity.
2. New Certificate To Serve Small Business Needs: CSM intends to develop a cross-discipline certificate that will include Computer Network, Computer Support, and Office Management courses.
3. Course Revisions Scheduled for Spring 2015: Both CSM and Skyline discussed the need to revise certificates so that they are simply named. Skyline will be either revising or creating courses to address Voice Over Internet Protocol (VOIP), Virtualization (Using VMware or Microsoft product line to logically divide or combine hardware and software resources in cost effective and technically efficient process), and Advanced Security Networking (enhancement to current courses).
4. Reintroduce Introduction to Linux Administration Course: Skyline will reintroduce this course in Fall 2015.
5. Internships: All employers emphasized the importance of internships that give students hands on experience in the field. The Colleges are seeking out increased internship opportunities for students by contacting SMCCCD alumni, the District's IT department, and interviewees from this assessment. Many of the business leaders interviewed indicated that they would accept interns from the District Colleges. A database of potential internships needs to be developed and maintained to efficiently place students.
6. Inclusion of Open Ended, Open Source projects into classes and internships. Faculty from Canada College use open ended, open source projects as a means to build experience into coursework.
    - Open Ended Projects are designed for students to choose/imagine a challenge they want to tackle. A Professor assigns the project as open-ended (i.e. students choose the project) with the condition that the project must meet a specific set of criteria. Students form teams and brainstorm an approach. Students submit a written proposal on their proposed project including: clearly defined goals, team tasks, and a tentative schedule. They then work on their project during the semester. Near end of term-- students give a presentation on their project including: their design approach; challenges encountered; reflections on what they learned; and a demonstration of their finished product. This includes a written report.
    - Open Source Projects are those that the code (the source) is freely available for distribution and use in other software. These are "living" projects that are posted on a community website and will change and grow as the community improves the source (e.g. finds and fixes bugs) or adds functionality. Anyone can contribute to the project through a web forum. A popular web hub for Open Source Projects is GitHub. It links to many open source organizations (each with many projects) including Adobe, Netflix, Twitter, Yelp, etc. The open source movement can be used as a project medium in the programming classroom. In this model, students would find an Open Source Project they are interested in and identify key components to work on that could include: 1) test, find, and fix bugs; 2) add new features; 3) enhance existing features; and 4) port over to another platform (e.g. from C++ to C#).

    Project-based learning of this nature offers real experience that can be applied to future jobs. Interest from other faculty in this type of project-based learning is high and will be pursued by the other colleges.
7. Departmental Name Change: At Skyline College, the Science/Mathematics/Technology Division and the Telecommunications and Networking Information Technology (TCOM) faculty are requesting a department name change to Network Engineering Technologies (NETX). They believe that the name will best reflect marketplace and industry needs. This change will be in effect Fall 2015.